INTERNATIONAL JOINT CONFERENCE ON SCIENCE AND TECHNOLOGY

SCIENCE, TECHNOLOGY, INNOVATION, AND CULTURE FOR SUSTAINABLE DEVELOPMENT: CHALLENGE FOR GREEN INDUSTRY

ISBN 978-602-99806-3-9

IJCST 2017 PROCEEDING

Main Theme:

Science, Technology, Innovation, and Culture for Sustainable Development: Challenge for Green Industry

AYODYA RESORT NUSA DUA BALI, INDONESIA, 27-28 SEPTEMBER 2017

Sponsored by:

PEMERINTAH KOTA DENPASAR

POLITEKNIK NEGERI JEMBER

Published by:
Pusat Penelitian dan Pengabdian kepada Masyarakat (P3M) Politeknik Negeri Bali
Jalan Kampus Bukit Jimbaran, Kuta Selatan, Kabupaten Badung, Bali – 80364, Indonesia

PROCEEDING

Proceedings
of The 2nd International Joint Conference on Science and technology (IJCST) 2017
Theme:
"Science, Technology, Innovation, and Culture for Sustainable Development: Challenge for Green Industry"

ISBN 978-602-99806-3-9

CONFERENCE CHAIR

- Dr. Ir. Lilik Sudiajeng, M.Erg

STEERING COMMITTEE

- Prof. A. P. Bayuseno, Drer Nat, B.Eng, M.SC (UNDIP Semarang, Mechanical Engineering)
- Jamari, B.Eng, M.Eng, Dr. (UNDIP Semarang, Mechanical Engineering)
- Prof. Renanto Handogo, M.Sc, Ph.D. (ITS Surabaya, Chemical Engineering)

PERSON IN CHARGE

- Director Of Bali State Polytechnic (BSP) Ir. Made Mudhina, MT
- Dean Faculty Of Engineering, University Of Trunojoyo Madura (UTM) Dr. Rachmad Hidayat, MT
- Dean Faculty Of Social Science And Law, Universitas Negeri Surabaya (UNESA) Prof. Dr. Sarmini, M.Hum
- Dean Faculty Of Mathematics And Natural Sciences, Universitas Negeri Surabaya (UNESA) Prof. Dr. Suyono, M.Pd
- Dean Faculty Of Engineering, University Of Pembangunan Nasional "Veteran" Jawa Timur (UPNVJT) Ir. Sutiyono, MT

ADVISORY

- Assistant Director Of Accademic Afairs, Bali State Polytechnic (BSP) I Putu Mertha Astawa, SE, MM
- Assistant Director Of Cooperation And International Relationship, Bali State Polytechnic (Bsp) Ir. I Gede Made Oka Aryawan, MT
- Vice Dean For Academic Affairs, University Of Trunojoyo Madura (UTM) Ari Basuki, ST., MT
- Vice Dean I Faculty Of Social Science And Law, Universitas Negeri Surabaya (UNESA) Dr. Agus Suprijono, M.Si
- Vice Dean I Faculty Of Mathematics And Natural Sciences Universitas Negeri Surabaya (UNESA) Prof. Dr. Madlazim, M.Si
- Vice Dean I Faculty Of Engineering, University Of Pembangunan Nasional "Veteran" Jawa Timur (UPNVJT) Dr. Ir. Ni Ketut Sari, MT

Main Reviewers:

No	Name	Institution	Email
1	Prof Bayuseno	Diponegoro University ,Indonesia http://www.undip.ac.id	apbayuseno@gmail.com
2	Prof. Dr. Zakaria Hossain	Department of Environmental Science and Technology, Mie University, JAPAN	zakaria@bio.mie-u.ac.jp
3	Dr. Yusri Yusof	Faculty of Mechanical and Manufacturing Engineering at the Universiti Tun Hussein Onn Malaysia (UTHM)	yusri@uthm.edu.my
4	Dr Jamari	Diponegoro University, Indonesia, http://www.undip.ac.id	j.jamari@gmail.com
5	Dr Erma Suryani	Sepuluh Nopember Institute of Technology, Indonesia https://www.its.ac.id/	erma@is.its.ac.id
6	Prof Renanto Handogo	Sepuluh Nopember Institute of Technology, Indonesia https://www.its.ac.id/	renanto@chem-eng.its.ac.id
7	I Dewa Made Cipta Santosa, PhD	Politeknnik Negeri Bali , Indonesia https:www.pnb.ac.id	idmcsantosa@pnb.ac.id

Editors:
I Dewa M C Santosa, ST, M.Sc, PhD
I Made Sudina, SST.Par
Cokorda Gde Candra Hadiputra, A.Md

Published by:
Pusat Penelitian dan Pengabdian kepada Masyarakat (P3M) Politeknik Negeri Bali
Jalan Kampus Bukit Jimbaran, Kuta Selatan, Kabupaten Badung,
Bali – 80364, Indonesia

Conference website: www.bali-ijcst.org

Preface

Ladies and Gentlemen,

It is my great pleasure to welcome you all to The 2nd International Joint Conference on Science and technology –IJCST 2017 in Nusa Dua Bali-Indonesia 27-28 September 2017. This conference is multidisciplinary including engineering and social science and hope can dedicate a positive contribution to science and technology development. Hosted by Bali State Polytechnic (PNB) and other established university partner including UPNV Jatim, FMIPA-UNISA, FISH-UNESA, and UTM, this conference are attended by more than four hundreds participants who present their best research results.

Papers have been reviewed by peer reviewers and already presented orally in the conference. Some selected paper are already submitted to be published in the **Journal of Physics: Conference Series** (http://jpcs.iop.org) and The International Journal of GEOMATE and automaticaly others are published in The IJCST 2017 proceeding. With high confidence, depend on the paper topic and quality will can reach aim and topic of the conference "**As an international platform for scholars, researchers, practitioners, and government to discuss interdisciplinary research and practices that focuses in the theme of "Science, Technology, Innovation, and Culture for Sustainable Development: Challenge for Green Industry**".

We would like to extend our warm and sincere thanks to authors for great contribution in this conference, and thank God so this proceeding can be completed and finished as planning. Hopefully all participants and authors can extend to build a networking each other in order to improve the research quality in future.

Sincerely yours,

IJCST 2017 Committee

Remark from Conference Chair

The honourable Minister of Tourism Republic of Indonesia
Distinguish guest and participants of IJCST 2017
Welcome to Bali – a wonderful Indonesia

The past few years has witnessed the idea of "Green Economy" flowing out from its realm of environmental economics. It is now omnipresent in mainstream policy discourse, our popular culture, industries, and development of disruptive technologies. It has successfully won the headspace and commitments of the world leaders as reflected in the Paris Agreement, the United Nations Sustainable Development Goals, G20 communiques.

The time to debate about whether we should transition to a green economy has now ended. It has been agreed upon to be the only way forward. However; shifting from the traditional 20th century model to a new green society requires massive investment and transformative disruptions. Delivering this ambitious global project requires strong public-private-partnerships and cross-sector collaborations. The 2nd International Joint Conference on Science and Technology (IJCST) 2017 aims to advance both by providing a multi-stakeholder platform for concerted action, research, and sharing of best practices under the theme "Science, Technology, Innovation, and Culture for sustainable development: Challenge for Green Industry"

I would like to welcome all of you to the IJCST 2017 and express my gratitude for the expertise you bring to our gathering. You are truly our greatest asset today and I encourage you to stay engaged, keep us proactive, and help the world shape the future of green economy.

I wish you a great conference and wonderful time in Bali.

Sincerely yours,
Conference chair
Dr. Ir. Lilik Sudiajeng, M.Erg

Welcoming Addressed by Director of Bali State Polytechnic

You're Excellency Minister of Tourism Republic of Indonesia
Distinguish guest and participants of IJCST 2017

Good morning

It is my pleasure welcoming you in Bali-the wonderful Indonesia, to attend the International Joint Conference on Science and Technology (IJCST) 2017.

This is the 2nd IJCST, which is held by Bali State Polytechnic, in collaboration with University of Pembangunan Nasional Veteran-East Java; University of Trunojoyo Madura-East Java; State University of Surabaya-East Java; and National Cheng Kung University Taiwan.

The conference is to aim an international platform for scholars, researchers, practitioners, and government to discuss interdisciplinary research and practices under the theme of "Science, Technology, Innovation, and Culture for Sustainable Development: Challenge for Green Industry". This theme is raised as a manifestation of the academic community's sensitivity towards global environmental issues that are now shifting from the issue of global warming to green economics.

It is an honor for me to convey that over 350 participants attended this conference from 14 countries. I give highly appreciation for your attendance. Your presence at this conference is very important to help the world in formulating green industry that leads to green economy.

Finally, wishing you a great conference and enjoy Bali, the wonderful Indonesia.

Bali State Polytechnic
Director,

Ir. Made Mudhina, MT.

Speech by Minister of Tourism

OPENING SPEECH

MINISTER OF TOURISM, REPUBLIC OF INDONESIA

International Joint Conference on Science and Technology (IJCST),
Nusa Dua Bali, 27 September, 2017

First of all I would like to extend my appreciation and gratitude to the committee of International Joint Conference on Science and Technology (IJCST) for exposing the theme of the conference on Science, Technology, Innovation, and Culture for Sustainable Development: Challenge for Green Industry. The theme is strongly intersected with global tourism development, since tourism is an integrated economic development involving high technology, innovation, culture and natural sphere.

The theme has clearly revealed that sustainable tourism, as part of sustainable development, is a joint effort among stakeholders. Multi-disciplinary research has to be constantly and mutually done to create green tourism economy, where tourism can be a catalyst of natural and cultural preservation, at the same time improving people's quality of life. Tourism development requires advanced technology, in transportation, information, and communication sector to ease tourist movement in accessing main attractions. Culture and nature are the main attractions for tourism, the question is how are they utilised to generate foreign exchange earnings but at the same time managing its sustainability.

It is imperatively expected that this scientific gathering will bring about new ideas and solutions as well as mutual commitment among practitioners and academicians to make tourism more sustainable and responsible, as mandated by UNWTO. Sustainable development is dealing with present and future generations welfare. Sustainable tourism is actually defined by the resonance of its sustainable development, benefiting present and future tourists and communities and viable within indefinite time, maximizing its economic gains.

Indonesia's tourism is mainly based on culture and nature as its main portfolio products. Resources related with the portfolio products has to be carefully and responsibly managed to ensure its sustainability. Research in new technological inventions and innovations have to be continuously developed to promote better tourism for our present and future generations. We cannot avoid using technology especially for the connectivity and digital marketing of our tourism, but we have to manage it to maximize its economic, cultural and natural benefit. I do hope that this conference will provide a great opportunity for the participants to share and understand both local and global issues of tourism development.

Wishing you all a very fruitful and rewarding conference.

Greetings from **Wonderful Indonesia**

Jakarta 18 September, 2017

Dr. Ir. Arief Yahya, M. Sc.
Minister of Tourism, Republic of Indonesia

Speech by Rector of Trunojoyo University Madura

Guest of Honour, Dr. Ir. Arief Yahya, M.Sc.
Minister for Tourism, Republic of Indonesia.
Mayor of Denpasar City,
Ida Bagus Rai Dharmaijaya Mantra, SE.,M.Si.
Distinguished speakers,
Researchers and Colleagues,
Assalamu'alaikum Warrohmatullahi Wabarokaatuh.

Praise goes to the most merciful God Allah SWT for the blessings of life and knowledge for us to gather on this meaningful occasion.

To start with we would like to warmly welcome the eminent speakers and delegates who have come from all over the world. We are indeed honoured to have you here with us, making this conference a truly international one.

Ladies and gentlemen,

The university of Trunojoyo Madura is located on Madura island as a part of East Java province area, and currently, it is on 16 years old. This university has committed to escalating its educational process and research activity. It is because those processes play a pivotal role to aim the vision of University of Trunojoyo Madura for a period 2014 – 2018. One of main strategies to achieve the University's vision is by implementing a cluster approach in order to increase the University of Trunojoyo Madura's competitive advantage. This approach is carried out by strengthening our research based on six potential sectors. These sectors are (1) salt and tobacco sectors, (2) food commodities sector (corn, cassava, cane, cattle, and sea commodities), (3) energy sector (oil and gas, renewable energy), (4) educational sector (formal and informal education), (5) social sector (worker and women studies), and (6) tourism and creative economic. All of these sectors are regarded to Madura resources.

Ladies and gentlemen

We do realise that the process of strengthening our research cannot be accomplished by ourself. It would be hard for the University of Trunojoyo Madura if only relaying it on our internal resources. A mutualism collaboration is needed, a collaboration which involves other external parties including universities, governments, businesses, and any other parties. Therefore, on this occasion, Faculty of Engineering, University of Trunojoyo Madura runs an International Conference for the second time called ICOSE (International Conference on Science and Engineering). The ICOSE is held in collaborating with several big universities namely Bali State Polytechnic, University of Pembangunan National Veteran of Surabaya, State University of Surabaya on one event named IJCST (International Joint Conference on Science and Technology) 2017. We hope that this conference will generate an advantageous knowledge sharing about previous research results and bright outlooks. Henceforward, University of Trunojoyo Madura wishes could achieve its vision with a better result.

In closing, we encourage delegates to participate actively in interesting discussions over the seminar periods. I wish everyone has a successful and fruitful conference.

Thank you very much

Wassalamu'alaikum Warrahmatullohi Wabarokaatuh

Speech by Rector of State University of Surabaya

It is with great pleasure that I extend my warmest welcome and best wished to all keynote speakers, presenters, and participants of the 2017 International Joint Conference on Science and Technology (IJCST), "Science, Technology, Innovation, and Culture for Sustainable Development: Challenge on Green Industry."

IJCST has worked with partners from higher education institutions and polytechnic from Indonesia and People's Republic of China, namely UPN Jawa Timur, Universitas Negeri Surabaya, Universitas Trunojoyo, Politeknik Negeri Bali, Politeknik Negeri Jember, and National Cheng Kung University. Each institution contributes largely to the success of the 2017 IJCST by gathering academics and professionals across the country and overseas with aims at sharing recent investigations of the theme and hoping they would fruitful to stakeholders in resolving challenges on green industry.

With regards to challenges that Indonesia and countries at the global level encounter particularly demographic plus in 2020 and a surge of primary needs including clean environment as well as increased international mobility of people from various cultures, the 2017 IJCST plays a crucial role in offering innovations and resolutions of those challenges. By so doing, proposals and recommendations withdrawn from the present conference will then serve as the basis for relevant stakeholders in policymaking.

I have always believed that IJCST has been an insightful platform for intellectuals and practitioners to continuously create breakthroughs in support of achieving sustainable development. My best wishes for a fruitful and productive conference.

With regards,

Prof. Dr. Warsono, M.S.
Rektor

Speech by Rector of University of Pembangunan Nasional Surabaya

Assalamualaikum Wr. Wb. , Good Morning
Honorable Guests:
Ministry of Tourism of Republic of Indonesia, "Ir. Arief Yahya, M.Sc"
Governor of Bali, "Made Mangku Pastika"
Directorate General of Research and Development, "Dr. Muhamad Dimyati, M.Sc."
Director of Bali State Polytechnic, "Ir. Made Mudhina, M.T."
Honorable Keynote Speakers :
Mayor of Denpasar City, "Ida Bagus Rai Dharmawijaya Mantra, SE, M.Si"
Head of Badung Regency, "Nyoman Giri Prasta, S.Sos"
Attache of Educational Affairs – Embassy of France in Indonesia, "Prof. Dr. Emilienne Baneth Nouailhetas"
Prof. Dr. Zakaria Hossain, Prof. Moonyong Lee, Prof. Jyh-Ming Ting, Dr. Yusri Yusof, Reviewers, and Last but not least beloved particpants,
Thank God for granting us with blessings, that we could gather here today in this very special moment, "International Joint Conference on Science and Technology 2017" organized by UPN "Veteran" Jawa Timur, Bali State Polytechnic, National Cheng Kung University, University of Trunojoyo, Surabaya State University, and Jember State Polytechnic.
Ladies and Gentlemen,
Environmental problems has been a very significat issue for many parties, especially for business actors. Either help the environment and hurt your business, or irreparably harm your business while protecting the earth. With such problems, it might be wise for us to focus on the promotion of several environmental-friendly steps, some to mention are low-carbon paths to industrial development; efficient use of non-energy raw materials; adoption of relevant products and technologies to meet environmental standards; adoption of environmental and related management systems with a view to entry into global value chains; and creation of businesses that can offer services in these areas.
The theme chosen is concerning with the current problem, Green Industry which is related to the increasingly polluted environment as well as the increasingly expensive energy problems that needs finding ways of savings. It is gratifying to note that the agenda of the seminar covering a wide range of very interesting items relating to the theme.
We believe this seminar is a great opportunity for all delegates to discuss the existing problems concerning science, technology, innovation, and culture for sustainable development in answering challengess for green industry.
Distinguished guests,
I wish this moment not only could enrich a broader knowledge, but also make new friends, and build net working in crearting better future.
At last but not least, I would like to express my greatest appreciation to everyone who has supported and brought this seminar into success, and we truly apologize for any inconveniences may arise during the seminar.
Thank you
Wassalamualaikum Wr. Wb.

Denpasar, September 27, 2017
Rector of UPN "Veteran" Jawa Timur
Prof. Dr. Ir. H. Teguh Soedarto, MP

Sponsor or funding acknowledgements

We are delighted to acknowledge the financial support received from Bali state Polytechnic- Ministry of Research , Technology and Higher Education- Indonesian Government and also the excellent support received from Mayor of Denpasar City, Governoor of Bali Province, Rector of Trunojoyo University Madura, Rector of State University of Surabaya, Rector of University of Pembangunan Nasional Surabaya.

List of Content

List of Papers

Creative Economy for Sustainable Tourism

Rai Dharmawijaya Mantra

Abstract

The vision of Denpasar 2015-2020 is "Creative Denpasar based on Culture in Balance towards Harmony". This vision is philosophically based on Tri Hita Karana, the harmony of human relationship with nature, with each other, and with God. This philosophical framework was adopted and adapted into the basic framework of the development of the city of Denpasar.

Modernization and globalization have indeed encouraged the people of Denpasar to live a life full of competition in various areas of life. In its development, even faced with various problems in the midst of the desire to win the increasingly tight competition, among others the desire to meet the material needs of an economic nature with the demand to preserve the cultural values that have been rooted in society. It is very difficult to leave one of these two aspects; therefore, the most likely solution is to synergize it. Development to meet the material needs of an economic nature should be based on firm appreciation of religion and understanding of culture.

Thus, Religion and Culture are the fountain of public welfare. Religion became the soul or spirit of the Culture embodied concretely through the philosophy of Tri Hita Karana which at the same time is also the three paths to prosperity. Culture is creativity, feel, and intention. The core of Culture is creativity, because if it is not creative then that culture will be abandoned or diminished. The creative process in Balinese culture has been going on since ancient times, and the dynamics of creativity is always trying to maintain the balance and harmonization of the three components of Tri Hita Karana and ensure its sustainability. This creativity dynamics has also spawned a variety of products in the form of behavior, interesting/unique values or objects that can be enjoyed as a form of tourist attraction.

With this foundation, the city of Denpasar is exploring the existence of culture and concluded that the foundations of culture need to be understood completely. In this view culture is made the centre of ideas and development concepts, empowerment, and service; given the ideas of development are always faced with stimulus and motivation that have come through reinterpretation, reintegration, and adaptation that always provide new understanding. It is through this process that anticipation of the effects of change and progress through modernization and globalization can strengthen the growing tradition in society.

This is in line with the basic foundation of Balinese culture that cultural enrichment must be developed on the basis of convergence between tradition and modernization or synergy between expressive cultures that prioritize spiritual values, traditions and aesthetics with progressive culture that prioritizes economic, technological and scientific values. This is the foundation of the very potential cultural insight to develop a creative, expressive, and progressive city. Thus, the genuineness of a local base of Balinese culture can be used to deal with modernization and globalization.

As long as the spirit of creativity is well preserved, new cultural products will always be born. This new cultural product, born of creativity is what will continue to attract tourists to enjoy.

Environment friendly ground improvement technique using waste shell husk

Z Hossain[1], S H Rachmawati[1] and A S M A Awal[2]

[1]Graduate School of Bioresources, Mie University, 1577 Kurima Machiya-cho, Tsu, Mie 514-8507, Japan

[2]Faculty of Civil and Environmental Engineering, Universiti Tun Hussein Onn Malaysia (UTHM), Batu Pahat, Johor 86400, Malaysia

zakaria@bio.mie-u.ac.jp

Abstract. A lot of waste shell husk are produced in Japan every year that not only causes environmental problem but also a lot of money being spent for its disposal. Use of waste shell husk as ground improvement material is vital in order to solve environmental problem and protection of limited natural resources of aggregate. In this study, several combinations of waste shell husk and cement are studied to find out its effect on soil bearing capacity, shear strength and compressive strength for ground improvement. Soil-shell husk specimens containing 10% and 20% of waste shell husk along with 2%, 4%, 6% cement were prepared. After one week of curing, all the specimens were tested under California Bearing Ratio (CBR), Direct Shear Test and Unconfined Compressive Strength (UCS). Test results showed that the addition of shell husk and cement typically improved the engineering properties of the soil. It is concluded that the highest CBR value was achieved by double layer of 20% shell husk with 6% cement. The direct shear and UCS tests further revealed that the increasing of shell husk-cement percentage increased the shear strength and compressive strength of soil. The results obtained are encouraging for environment friendly ground improvement technique using waste shell husk.

Process Optimization, Integration, and Intensification: Main Route for Green and Sustainable Chemical Process.

Moonyong Lee[a,†]

[a]*School of Chemical Engineering, Yeungnam University, Gyeongsan 712-749, South Korea*

Abstract

The development of the industrial systems for the year 2050 has been well defined in the recent Research Agenda with many strategic sectors, such as water, energy, food, health, etc. The drive towards greater sustainability has prompted process industries to search for opportunities to decrease their production costs, energy consumption, equipment size, and environment impact as well as improve the raw material yields, remote control, and process flexibility. Process optimization, integration, and intensification have become the main trend to achieve green and sustainable chemical process. Chemical processes are typically energy and cost intensive. One of the major challenges in chemical process industry is thus to improve the energy efficiency of existing and/or new processes through economic and ecological strategies. The energy efficiency of chemical plants has been improved successfully by optimizing the design and operational parameters in a most efficient way. Numerous approaches have been used to optimize the design and operation of chemical processes. Process integration and intensification is defined as a set of innovative principles applied to the design of processes and equipment to satisfy those concerns about energy and ecology impact of the chemical process, and is used widely in heat transfer, reactions, separation, and mixing, which results in plant compactness, cleanliness and energy efficiency. This presentation will review briefly applications and trend of process optimization, integration, and intensification in chemical processes mainly focused on distillation processes and natural gas processes. The potential and reliability of these technologies are addressed briefly, which will enable industry to achieve higher efficiency and high capacity. The recent developments in current research are summarized to highlight the importance as well as the effects, challenges, and future prospects of process optimization, integration, and intensification.

Malaysia in Context IR4.0; Challenges and opportunities

Yusri Yusof
Director of
Strategic and Corporate Communication Office

Abstract

The Fourth Industrial Revolution is the combination of the internet with a new ability to directly control the physical world, including the machines, factories and infrastructure that define the modern landscape. Transformations around the world are fuelled in a large part by technology and advancements in science. From biotechnology in Asia to AI in Silicon Valley, to Blockchain and global supply chains, technologies are creating ripple effects that impact societies and their institutions and their economies. These technologies are likely to entirely transform the ways in which we live, work and interact with one another. Taking stock of these new technologies as well as their disruption potential is critical for all nations and especially emerging economies like Malaysia.

“Consuming the world: the paradoxes of Tourism”

Emilienne Baneth,

Attaché for Education, Ministry of Foreign Affairs, Embassy of France in Indonesia

Abstract

This paper will focus on the tensions, economic and ethical, that irrigate the tourism industry. First developing at the fringes of most countries’ economies, tourism rapidly became, in the second half of the Twentieth century, a major economic force of “globalization”, enabling the transfer of wealth, the circulation of people and cultures, and the commodification of resources, tangible and intangible, that had sometimes not even been considered as such.

In this context, the notion of sustainability, which is increasingly adopted by the industry (hotels, travel agents, community developments) carries its own paradox: how “sustainable”’ is the capitalization of a resource that, until the advent of touristic activity, was not perceived as one? How “sustainable” or authentic can a cultural activity remain when its aim is to transform heritage into capital? The need for well-articulated policies and frameworks is increasingly pressing, as growing tourism flows are accompanied by rising security issues, new consumer behaviors, and the exponential challenges of environmental stress and climate change. How far can the industry juggle competitiveness and sustainability?

From the perspective of the Humanities, and mainly focussing on “cultural tourism”, I shall attempt to point out some of the paradoxes that policy-makers, educators and professionals need to address urgently if this key economic sector is to keep its promise in the 21st century.

Philippine IPs Culture for Sustainable Development: A Paradigm for Green Industry

Esmeralda F. Sanchez, PhD
President, PASCHR[1]

The Indigenous Cultural Communities or Indigenous Peoples of the Philippines refer to groups of homogenous societies identified by self-ascription, communally bounded and who have, under claims of ownership since time immemorial, occupied, possessed and utilized such territories, sharing common bonds of language, customs or who have, through resistance become historically differentiated on account of their descent from the populations which inhabited the country at the time of conquest or colonization, or who retain some or all of their own social, economic, and political institutions , displaced or resettled from their traditional/ancestral domains (Paraphrased from Section 3h, Republic Act 8371:Indigenous Peoples Right Act)

For the Indigenous Peoples, "Land is Life" and this is deeply rooted in their hearts. The land is their home-based, their immediate environment and the foundation of their culture since time immemorial, their only means of survival and their collective identity as indigenous people. The Indigenous Peoples' holistic concept of an ancestral domain includes the land and its resources such as the rivers, forests, flora and fauna, the minerals underneath and the air above. Therefore, this is not a commodity to be sold or exchanged but a nurtured resource for future generations. Properties are primarily inherited. Therefore access to it and its resources are traditionally regulated by customary laws and traditions. It is viewed as their legacy to be maintained across many generations since it is the source of life and livelihood for its occupants.

Indigenous peoples' communities are located in areas that are rich repositories of high biodiversity. But their indigenous knowledge and systems as well as their view on land and their beliefs on the Supreme Being preserved and sustained this natural wealth and resources within their ancestral domain. Their holistic way of life and views on the ancestral domain could serve as our guide in the use and management of our land and environment, a paradigm for **green industry.**

[1] Philippine Association for the Study of Culture, History and Religion, Inc(PASCHR)
PASCHR is a member of **National Associations of IAHR** (International Association of the History of Religions) under the auspices of the CIPSH , affiliated to the UNESCO

MoS2 Nanostructures and Its Composites for Supercapacitors

Jyh-Ming Ting*

Department of Materials Science and Engineering
National Cheng Kung University
Tainan, Taiwan
*Corresponding author e-mail: jting@mail.ncku.edu.tw

Abstract

MoS_2 nanostructures and its composites have been fabricated through several methods. MoS_2 nanoflowers having either 1T or 2H phase have been fabricated using microwaved assisted-hydrothermal (MAH) method. It was found that the molar ratio of MoS_2 precursor and the time reaction of hydrothermal controlled the formation of 1T phase. MoS_2 nanolayers containing MoO_3 have been fabricated using a partial oxidation process. The resulting MoO_3 decorated MoS_2 nanolayers were found to contain amorphous carbon (a-C) intercalated in between the MoS_2 nanolayers under all the fabrication conditions used. Direct growth of MoS_2 nanowalls on vapor-grown carbon fibers (VGCNFs) has been achieved using a MAH method under an acidic condition. We demonstrate that the HCl used not only modifies the pH value but also leads to the formation of NaCl, which is the key for the direct and unique growth of MoS_2 on the VGCNF surface. MoS_2-PPy composites have been fabricated using in situ oxidation polymerization of pyrrole in the presence of MoS_2 suspension. These MoS_2 nanostructures and its composites were characterized for the material characteristics and made into electrodes for use in supercapacitors. The capacitor performance was evaluated. Also, the formation mechanisms of 1T MoS_2, MoO_3 decorated MoS_2 nanolayers containing a-C, and MoS_2/VGCNF composites are reported.

Solar micro-grids – powering seawater desalination and localised water micro-nets for small island sustainability

Martin Anda PhD, BSc (Hons), BE (Mech), MIEAust
Academic Chair of Environmental Engineering
School of Engineering & Information Technology Murdoch University
Perth, Western Australia 6150
m.anda@murdoch.edu.au

Abstract

The emerging electric microgrid concept, best defined as a grid within a grid, is increasingly gaining traction as an alternative to centralised power provision that includes renewable energy sources, battery and other forms of storage as well as smart control systems. Comparable to the micro-grid, the micro-net aims to provide water resilience in a changing climate while reducing infrastructure cost and the maintenance burden that large centralised water networks impose. The micro-grid and micro-net can be applied to sites simultaneously and in connection with existing electricity and water networks, thereby avoiding the need for expensive augmentation of these existing infrastructures. Therefore, with their use of renewable energy sources such as solar and wind and various alternate water sources, the micro-grid and micro-net can be cost-saving measure in new urban and industrial developments. There are many parallels between the electric grid and water infrastructure network, as both are utilities that generate, store, and distribute an essential commodity. Paying close attention to the water and energy nexus provides an opportunity to drive sustainable decentralised water and energy efficiency outcomes. Indonesia is working with the solar-wind micro grid concept at a number of sites and Murdoch University in Western Australia and Indonesia's BPPT are collaborating on research in the lab and the field. This paper will profile the research and some case studies.

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

A Conceptual Model of Internet of Things (IoT) for E-Participation

Muhammad Yusuf[1], Devie Rosa Anamisa[2], Ach Khozaimi[3]
[1,2,3]Faculty of Engineering University of Trunojoyo Madura
Raya Telang Road PO BOX 2 Kamal, Bangkalan, Madura, Indonesia
Email:[1]muhammadyusuf@trunojoyo.ac.id,[2]devros_gress@yahoo.com, [3]khozaimi@trunojoyo.ac.id

Abstract. Participation is compulsory for every activity. It is always needed for encouraging people and related stakeholders for supporting the activity to achieve the goal(s). Nowadays, growth of technologies supports and make the citizen participation activities easier. There are more than 1.5 billion internet-enabled PCs and over 1 billion internet-enabled mobile phones will move towards an Internet of Things (IoT) as massive devices by 2020. IoT can be defined as the networked interconnection of everyday objects and often equipped with ubiquitous intelligence. IoT will improve the ubiquity of the Internet by integrating every object for interaction via embedded systems and leads to a highly distributed network of devices communicating with human beings as well as other devices. Therefore, IoT will be interesting research field in the future. Literature reviews show that there is still limited research on the use of IoT regarding to E-Participation. This paper aims to examine IoT for supporting citizen participation. Hopefully, this paper makes contribution by providing a new conceptual model regarding to utilization IoT for encouraging citizen participation. This research also has implications for theory and practices. For theory, the model can be added to the body of knowledge of IoT and E-Participation fields. It also complements and enhances the existing models of IoT and E-Participation. In addition, practitioners and related stakeholders can consider the elements of the new model for successful implementation.

Keywords: Internet of Things (IoT), E-Participation, a new conceptual model

1. INTRODUCTION

Participation is compulsory for every activity. It is needed to achieve the goal(s) set by the stakeholders. Nowadays, participation can be done through electronic technologies, such as email, Facebook, WhatsApp, Twitter, Mobile Phone and others. Different societies and countries have own technologies for supporting participation. The sort of technologies depends on the context, environment, stakeholders, activities and other complex factors. Furthermore, technology is always changing and IoT is one of the latest technology that has potential to support participation. IoT has been used in various fields, such as industry, environment, society [1]. In the society domain, IoT can be applied regarding to the development and inclusion of societies, cities, and people, such as e-participation, e-inclusion and others. There are lots of model regarding to IoT, e-participation and its applications. Details about this will be explained in the literature review below. The review shows that there is still limited research about a model related to use of the IoT in the E-Participation field. Therefore, this paper aims to examine and propose a new conceptual model of IoT for supporting citizen participation. Hopefully, this research makes contribution by providing a new conceptual model of IoT for encouraging citizen participation. This model can be added to the body of knowledge of IoT and E-Participation fields. This paper consists of Introduction, literature reviews about IoT and e-Participation, a new conceptual model of IoT for

ISBN : 978-602-99806-3-9

supporting e-Participation, analysis and discussions, then finally conclusion, contribution and further research.

2. LITERATURE REVIEW

2.1. Internet of Things (IoT)

The term of Internet of Things (IoT) was found first time by the founders of the original MIT Auto-ID Centre, Kevin Ashton in 1999 and David L. Brock in 2001 [1]. IoT can be explained as "*the networked interconnection of everyday objects, which are often equipped with ubiquitous intelligence"* [2]. IoT will increase the ubiquity of the Internet by integrating every object for interaction via embedded systems, which leads to a highly distributed network of devices communicating with human beings as well as other devices. In another references, [1] explained IoT as "*a dynamic global network infrastructure with self-configuring capabilities based on standard and interoperable communication protocols where physical and virtual "things" have identities, physical attributes, and virtual personalities and use intelligent interfaces, and are seamlessly integrated into the information network"*.

The phrase of IoT has vision about the future machines: the machines in the nineteenth century learned to do; in the twentieth century, they learned to think; in the twenty-first century, they are learning to perceive, sense and respond. Moreover, Future Internet has vision to merge computer networks, Internet of Media (IoM), Internet of Services (IoS), and IoT into a common global IT platform of seamless networks and networked "things". There are some domains for IoT applications, such as Industry, Environment and Society. In the Industry domain, IoT activities involve financial or commercial transactions between companies, organisations and other entities. For example, manufacturing, logistics, service sector, banking, financial governmental authorities and others. Furthermore, IoT also can be applied into Environment domain regarding to the protection, monitoring and development of all natural resources, such as agriculture and breeding, recycling, environmental management services, energy management and others. Additionally, IoT can be implemented in the Society for development and inclusion of societies, cities, and people. The examples of IoT in the Society are e-participation, e-inclusion (aging and disabled people), and others. Moreover, IoT can be implemented in the aerospace and aviation, automotive, intelligent buildings, telecommunications, medical technology, independent living, pharmaceutical, and others [1].

There are several references about model or framework regarding to IoT, such as [3] capture the integrated morphology of IoT. The model consists of Application interface, service management, device management, security, platform abstraction and devices. Each layer has several components, such as Service management has two components: composed services runtime and service monitor; [4] examine security concerns of IoT, such as user identification, temper resistant, Secure software execution, secure content, secure network, secure data communications, identity management and secure storage; [5] proposed cooperative IoT model. The model consists of Persons, Source node, Sink Node, Wireless Node, Gateway, Future Internet and The Rural Healthcare Centre (RHC) Doctor; [6] emphasize the architecture of unit IoT. The architecture has two types: a man-like nervous (MLN) with a centralized data centre. It has three main parts: brain (management and centralized data centre: M&DC), spinal cord (distributed control nodes), and a network of nerves (IoT network and sensors). Another type is a modified MLN model. Its distributed data centre not only in the M&DC but also in some distributed cord nodes; [7] examine that the IoT system is generally divided into three layers: the perception layer, the network layer, and the service layer (or application layer). Each layer has many elements, such as Perception layer consist of optical fibre, card reader, camera, transducer, smart sensor and other facilities; [8] capture the IoT schematic showing the end users and application areas based on data. The application domains in this model are chosen based on the scale of the impact of the data generated. The users span from individual to national level organization addressing wide range issues; [9] proposed model about IoT infrastructure from some domains, such as Sensing paradigm, Addressing schemes, Connectivity model and Quality of Service (QoS).

ISBN : 978-602-99806-3-9

2.2. E-Participation

E-Participation basically consist of two elements: electronic technology and participation. There are three definitions of e-participation as following: [10] explain *"The "e (lectronic)" in eParticipation has a clear association with earlier "e" disciplines (eBusiness, eGovernment) and refers to the use of new information and communication technologies (particularly the Internet), with the implication that the technology has the ability to change or transform citizen involvement in deliberation or decision-making processes;* [11] defined e-participation as: *"Fostering civic engagement and open, participatory governance through Information and Communications Technologies (ICTs). Growing evidence points to the rapid expansion of e-Participation as a tool for engagement and strengthened collaboration between governments and citizens. Its objective is to improve access to information and public services as well as to promote participation in policy-making, both for the empowerment of individual citizens and the benefit of society as a whole";* [12] also defined e-participation as *"the various dynamic activities of interaction, communication, participation and management through several electronic technologies, implemented by numerous stakeholders, such as internal, external, dominant and less dominant stakeholders, which are supported by support systems, influencing and influenced by many complex factors, changes, laws and policies as well as financial capital".*

Furthermore, there are previous works that capture E-Participation frameworks which will be explained as following: [13] proposed three levels of participation for characterizing e-democracy initiatives and examine high-level stages involved in policy making from agenda setting, analysis, policy creation, and implementation through to monitoring; [14] proposed a framework includes layers, such as the democratic processes, participation areas, participatory techniques, categories of tools and any ICT technologies involved; [10] developed a model consists of elements as following: e-Participation actors, activities, effects, evaluation, contextual factors and the research approach involved; [15] also developed a domain model of e-participation consists of three main domains: the stakeholder, participation process and ICT Tool; [16] proposed a framework of ICT exploitation for E-Participation initiatives consist of three-steps procedure for an E-Participation initiative implementation presented; [17] examined a framework consists of 7 phases: Policy and capacity building, planning and goal settings, programs and contents development, process and tools, promotion, participation, post-implementation analysis; [18] developed a hands-on guideline consist of six-step iterative that will help to develop and implement E-Participation initiatives successfully; [19] proposed a reference framework for E-Participation Projects that captures the holistic engineering approach to provide the requirements of various E-Participation development projects from different organisations. It also supports communications between project actors with different levels of technical and political backgrounds from different perspectives; [20] used Actor-Network Theory (ANT) Approach to develop Malaysia E-Participation Framework; [21] proposed a Metamodel for the e-participation framework; [22] also developed a model of e-participation within school; [12] proposed a generic model of e-participation using ANT perspective based on the UK and Indonesia case studies.

3. RESEARCH METHODS

This paper was conducted based on desk research. This type of research was chosen as it still limited IoT implementation in Indonesia. Therefore, we have limited resources for empirical research. Firstly, we developed research design consist of set up the aim of this research, literature reviews, analysis, develop a new model, discussion and conclusions. Secondly, the actual research as shown in the table 1 below is started by set up the aim of this research, collection of the previous model or framework of IoT and e-participation, development of a new conceptual model of IoT for supporting citizen participation, discussion of the model, advantages, limitations and other important points related to the new model.

ISBN : 978-602-99806-3-9

Table 1. Step by step research method

Step	Activity	Output
1	Set Up Aim of the research	Aim of the research
2	Collect the previous frameworks of IoT and e-participation	List of the existing IoT and e-participation frameworks
3	Develop a new model of IoT for supporting e-participation	A New model of IoT for e-Participation
4	Discuss about the advantages and limitations of the model	Explanation about the advantages and limitations of the model
5	Emphasize the conclusion, conclusion and identify the further research regarding to IoT and e-Participation	Conclusion, contribution and further research

The previous frameworks of IoT and e-Participation was collected from various references, such as conference proceedings, journals, books and PhD dissertation. We searched the references from the Google Scholar engine by typing the keywords Internet of Things (IoT) or/and e-Participation, framework, model. Furthermore, the relevant references were accessed and analysed. Lastly, we emphasized the conclusion, contribution and identify further research opportunities related to IoT and e-Participation.

4. ANALYSIS AND DISCUSSION OF THE NEW MODEL

Based on the literature reviews above, a new conceptual model of IoT for supporting e-Participation has been developed as shown in the figure 1 below. The model below consist of some elements, such as stakeholders, existing electronic technologies, IoT, object/planning actions, support systems, complex factors, changes, financial capital, laws and policies. The element of stakeholders could be citizens, government institutions, researchers and scholars, politicians, voluntary organizations as identified by [23] as well as non-government organization (NGO), industries and others. The stakeholders, such as citizen, government, NGO and others could have two ways participation, interaction, communication and management of the object/plannig actions through the existing electronic technologies and IoT. The two ways participation, interaction, communication and management are supported by some support systems that are influencing and influenced by various compex factors, changes, financial capital, laws and policies. The financial capital is also emphasized by [24] related to infrastructure funding and ICT investment. The support systems are trainings, organization structure, procedures and others. The object/planning actions could be government or non-government activities, such as politics, education, planning, business and others. The complex factors consist of common and specific factors. The common factors are social, politics, economics, and culture. The specific factors are something that influence the participation process depends on the context, such as weather in specific area, psychology of specific people, communities, natios, laws of specific country and others. Changes are something that influence the participation after the change happened. For example, the change of regulation influence the way of participation for the government activities. This new model enhances the generic model of e-participation by [12] by adding IoT component. The previous generic model is based on ANT perspective, Indonesia and UK case studies as well as only use electronic technologies without IoT. The existing electronic technologies are website, mobile, social media, radio, and others. In the future, citizen should consider and can use IoT for supporting their participation in the government or non-government activities. This new model also complements the existing model or framework of e-participation and IoT developed by other researchers as explained in the literature review above.

ISBN : 978-602-99806-3-9

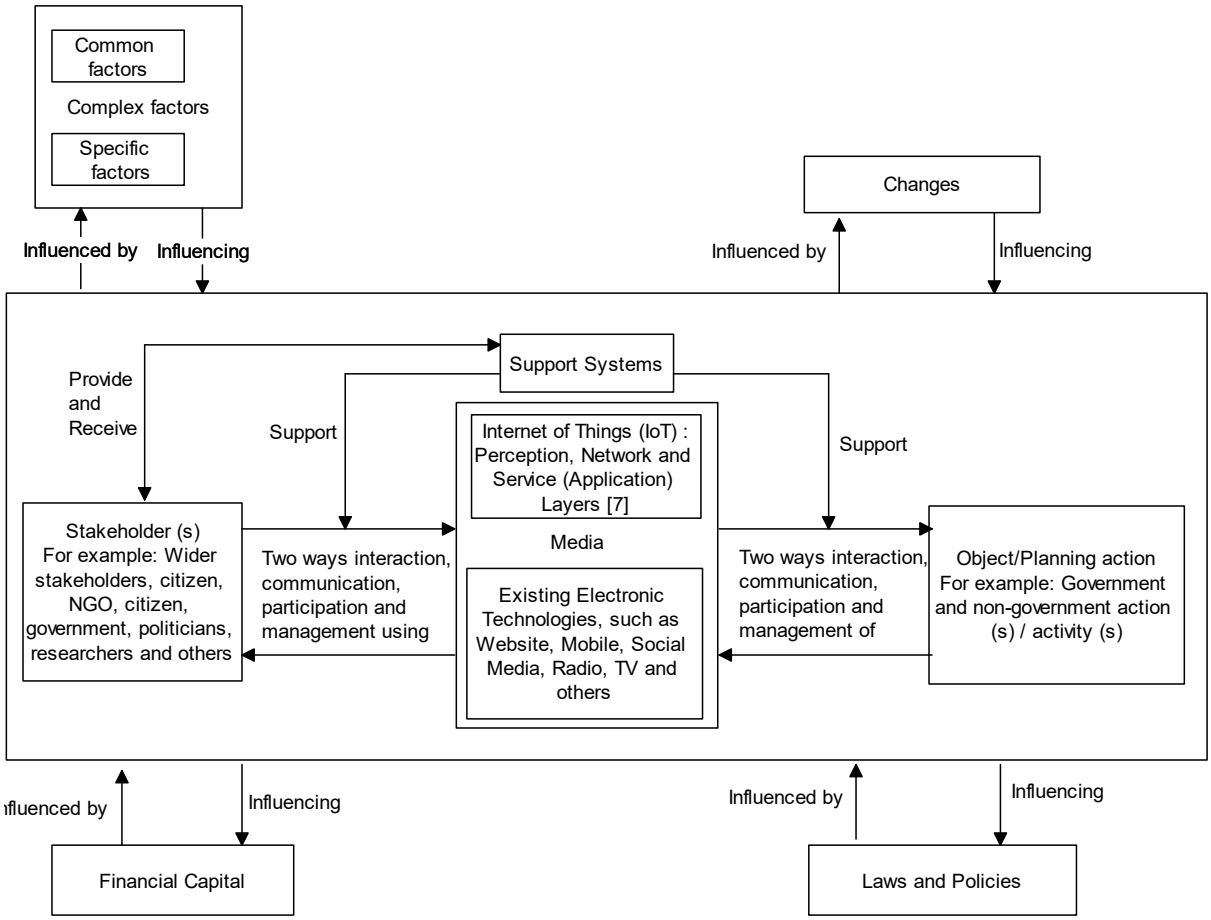


Figure 1. Model IoT for supporting e-Participation

The novel model above captures the object and the process from macro perspective and interdisciplinary approach, such as computing, finance, public administration, politics, culture. This interdisciplinary model complements the major findings by [25] Also, the model considers non-technological factors as well as described in the figure above, such as financial capital, laws and policies, complex factors and changes. The importance of non-technological factors is also identified by [26]. The architecture of IoT could be refer to the work of [7] which consist of three layers: perception, network and service (or application) layers. However, this model also has limitations, such as it has not been applied in the empirical research and details of the IoT can be referred to the has been captured in this paper. The IoT as part of participation media hopefully improve data transparency, open participation, open collaboration and ubiquitous engagement as stated by [27].

5. CONCLUSIONS, CONTRIBUTONS AND FURTHER RESEARCH

IoT can be implemented in various areas, such as industries, environment and society. It is still limited research capturing the use of IoT for encouraging citizen participation. Additionally, IoT application for supporting citizen participation need to consider not only technological factors, but also non-technological factors. Different context may have different sort of IoT application as well as the specific/contextual factors as part of complex factors. IoT in this new model is the additional technologies besides the existing electronic technologies, such as website, mobile, social media, radio and others.

ISBN : 978-602-99806-3-9

The main contribution of this research is a new conceptual model of IoT for supporting e-Participation. This research also has implications for theory and practice. For theory, the model can be added to the body of knowledge of IoT and e-Participation fields. For practice, the policy makers or practitioners should consider the elements in the model, such as stakeholders, the existing electronic technologies, IoT, object/planning actions, financial capital, complex factors, changes, laws and policies for the IoT implementation project in order to support citizen participation.

ACKNOWLEDGMENT
We would like to thank our colleagues at University of Trunojoyo, Madura, Indonesia, particularly Department of Multimedia and Network Engineering for all supports. Thank you very much also goes to the reviewers for the constructive feedback for improving the quality of this paper.

REFERENCES

[1] H. Sundmaker, P. Guillemin, P. Friess and S. Woelffle, Vision and Challenges for Realising the Internet of Things, Brussels: European Commission - Information Society and Media DG, 2010.

[2] F. Xia, L. T. Yang, L. Wang and A. Vinel, "Internet of Things," *International Journal of Communication Systems,* vol. 25, no. 1, pp. 1101-1102, 2012.

[3] M. Yun and B. Yuxin, "Research on the Architecture and Key technology of Internet of Things (IoT) Applied on Smart Grid," in *International Conferences on Advances in Energy Engineering*, 2010.

[4] S. Babar, A. Stango, N. Prasad, J. Sen and R. Prasad, "Proposed Embedded Security Framework for Internet of Things (IoT)," in *The 2nd IEEE International Conference on Wireless Communication Vehicular Technology, Information Theory and Aerospace & Electronic Systems Technology (Wireless VITAE)*, Chennai, India, 2011.

[5] V. M. Rohokale, N. R. Prasad and R. Prasad, "A Cooperative Internet of Things (IoT)for Rural Healthcare Monitoring and Control," in *The 2nd IEEE International Conference on Wireless Communication, Vehicular technology, Information Theory and Aerospace & Electronic Systems Technology (Wireless VITAE)*, Chennai, India, 2011.

[6] H. Ning and Z. Wang, "Future Internet of Things Architecture: Like Mankind Neural System or Social Organization Framework," *IEEE Communication Letters,* vol. 15, no. 4, pp. 461-463, 2011.

[7] X. Jia, Q. Feng, T. Fan and Q. Lei, "RFID Technology and Its Application in Internet of Things (IoT)," in *The 2nd International Conference on Consumer Electronics, Communications and Networks (CECNet)*, Yichang, 2012.

[8] J. Gubbi, R. Buyya, S. Marusic and M. Palaniswami, "Internet of Things (IoT): A vision, architectural elements, and future directions," *Future Generation Computer Systems,* vol. 29, pp. 1645-1660, 2013.

ISBN : 978-602-99806-3-9

[9] J. Jin, J. Gubbi, S. Marusic and M. Palaniswami, "An Information Framework of Creating a Smart City through Internet of Things," *IEEE Internet of Things Journal,* vol. 1, no. 2, pp. 112-121, 2013.

[10] O. Saebo, J. Rose and L. S. Flak, "The shape of eParticipation: Characterizing an emerging research area," *Government Information Quarterly,* vol. 25, pp. 400-428, 2007.

[11] D. M. D. E. a. S. A. United Nations, "Public Administration," 2016. [Online]. Available: https://publicadministration.un.org/en/eparticipation.

[12] M. Yusuf, C. Adams and K. Dingley, "Towards a Theory of E-Participation: An Actor-Network Theory (ANT) Perspective," University of Portsmouth, Portsmouth, 2017.

[13] A. Macintosh, "Characterizing e-Participation in policy making," in *Proceedings of the 37th Annual Hawaii International Conference on Systems Sciences*, Hawaii, 2004.

[14] E. Tambouris, N. Liotas, D. Kaliviotis and K. Tarabanis, "A Framework for Scoping eParticipation," in *The 8th Annual International Digital GOvernment Research Conference*, Philadelphia, Pennsylvania, USA, 2007.

[15] E. Kalampokis, E. Tambouris and K. Tarabanis, "A Domain model for e-Participation," in *3rd International Conference on Internet and Web Applications and Services*, 2008.

[16] C. W. Phang and A. Kankanhalli, "A Framework of ICT Expolitation for E-Participation Initiatives," *Communications of the ACM,* vol. 51, no. 12, pp. 128-132, 2008.

[17] M. S. Islam, "Towards a sustainable e-Participation implementation model," *European Journal od ePractice,* vol. 5, no. 10, pp. 1-12, 2008.

[18] S. Scherer, M. A. Wimmer and S. Ventzke, "Hands-On Guideline for E-Participation Initiatives," in *Joint IFIP TC 8 and TC 6 International Conferences*, Brisbane, Australia, 2010.

[19] S. Scherer and M. A. Wimmer, "Reference Framework for E-Participation," in *International Conference on Electronic Participation*, Delft The Netherlands, 2011.

[20] M. A. Bin Salamat and S. Bin Hassan, "An Actor-Network Theory (ANT) approach to Malaysian e-Participation framework," in *International Conference on Social Science and Humanity*, SIngapore, 2011.

[21] S. Scherer and M. A. Wimmer, "A Metamodel for the E-Participation Reference Framework," in *The International Conference on Electronic Participation*, Guimaraes Portugal, 2016.

[22] M. Yusuf, C. Adams and K. Dingley, "Digital citizen participation within schools in the UK and Indonesia: An Actor-Network Theory (ANT) Perspective," *Information,* vol. 7, no. 4, pp. 1-27, 2016.

[23] R. Medaglia, "eParticipation research: Moving characterization forward (2006-2011)," *Government Information Quarterly,* vol. 29, pp. 346-360, 2012.

ISBN : 978-602-99806-3-9

[24] P. Panagiotopoulos, M. M. Al-Debei, G. Fitzgerald and T. Elliman, "A business model perspective for ICTs in public engagement," *Government Information Quarterly,* vol. 29, pp. 192-202, 2012.

[25] I. Susha and A. Gronlund, "eParticipation research: Systematizing the field," *Government Information Quarterly ,* vol. 29, pp. 373-382, 2012.

[26] D. Epstein, M. Newhart and R. Vernon, "Not by technology alone: The "analog" aspects of online public engagement in policymaking," *Government Information Quarterly,* vol. 31, pp. 337-344, 2014.

[27] G. Lee and Y. H. Kwak, "An Open Government Maturity Model for Social media-based public engagement," *Government Information Quarterly,* vol. 29, pp. 492-503, 2012.

ISBN : 978-602-99806-3-9

Audit Energy and Developing Photovoltaic (PV) Model for Refrigeration Laboratory Building Application

I G.A. B Wirajati, I D.M.C. Santosa, N.K. Muliati

Mechanical Engineering Department, Politeknik Negeri Bali , Bukit Jimbaran, Kuta Selatan Badung, Bali-80364, Indonesia

Corresponding: igabwirajati@pnb.ac.id and idmcsantosa@gmail.com

Abstract. Based on National energy policy, Blueprint National energy management 2005-2025 and Bali clean energy forum recommendation that building should be doing save energy efforts and apply renewable energy. Strategy and efforts to decrease energy consumption in building significantly can be done if the energy demand profile is known. Furthermore, depend on the audit energy result (energy demand) so it can be designed and analysis a photovoltaic model with good accuracy. As we known that in tropical countries such as Indonesia, the solar energy will be very beneficial because the peak energy load of the building occurs during the day where the use of the dominant energy of air conditioning system (AC) and at the same intensity of sunlight radiation is high. While at night most of the commercial building, such as laboratory are not used so that no operational use of energy and solar cell energy will not contribute because there is no sunlight. More specifically, Bali State Polytechnic as a leading institution in green building concept research should be more aggressive to conduct research in this field. This research will be carried out in two stages: energy building utility assessment /audit and photovoltaic application design. Detailed data retrieval will be conducted and the assessment is done by zoning and statistical analysis method, where the building is divided into several zones based on the difference of cooling load. Measurements will be conducted on room and environment temperature and humidity, power consumption of each building utilities, the intensity of radiation and sunlight temperature to get a detailed profile every hour of the day. Thus, it can be mapped profile of building energy usage so that it can be formulated efforts to get energy saving from the building and then can be planned the use of photovoltaic (PV) with Building Integrated Photovoltaic (BIPV) system. The output energy calculation method adopts the calculation model developed by RET Screen, the analysis is done by Life Cycle Cost (LCC) and Life Cycle Assessment (LCA) method, so that it will be get the right model from solar energy

1. Introduction

Because of global environmental issues, especially related to the increase of greenhouse gases (carbon dioxide) as a result of excessive use of energy from fossil fuels, the efforts of fossil energy efficiency and renewable energy applications will become excellent solutions. This is in line with the Indonesian Government program with Regulation no. 5 of 2006 on National Energy Policy and has been followed up by preparing the National Energy Management Blueprint (BP-PEN) 2005 – 2025 [1], which set the role of new and renewable energy by 5% in 2025. However, global climate change is very fast and in accordance with the existing developments then in 2014, the House of Representatives set a target for

ISBN : 978-602-99806-3-9

renewable energy in the energy mix of 23% by 2025 and by 31% by 2050 and currently, about five percent of energy is renewable energy [2].

With regard to energy use in commercial buildings in tropical countries such as Indonesia, energy consumption is dominant for air conditioning system, so energy efficiency effort in building become very important. With an average outdoor temperature of 23ºC -32ºC and average relative humidity ranging from 70% -90% yearly (Data: BMKG Year 2015)[3] then commercial buildings (as an example of hotels and offices) will operate its air-conditioning system for 24 hours full day to get the comfort zone of the room ranging from temperature and humidity of 24ºC-60% [4], causes the high load of AC system. In addition, the awareness of the user is still low in energy saving efforts within the building.

As large buildings in the Politeknik Negeri Bali is a building with light construction where every room in direct contact with the surrounding environment (ambient condition). Besides, the conventional building (wall and roof) construction is still conventional with relatively high thermal conductivity, the building with such construction has a relatively high refrigeration load[4]. Thus detailed assessment is indispensable for this type of building to obtain significant energy-saving strategies.

Furthermore, Bali State Polytechnic as the leading institution in developing green campus concept must have strong character as the development of green building concept. Demonstrating that strong character is the development of new and renewable energy use for energy supply in the building. One of the most eligible energy to apply is solar energy with the Building Integrated Photovoltaic System (BIPV)[5]. Where photovoltaic applications can be integrated with the power grid from the national grid. It is therefore necessary to plan with detailed data and calculations to get the feasibility study appropriate for the application of BIPV system at the Building of Refrigeration Lab Polytechnic of Bali.

2. State of the art

The use of energy in buildings at this time influenced by various factors, including internal and external factors. Lam et al. [6] examined the influence of climate on energy use in building. They formulated the characteristic of annual energy use in each different climate (cold, medium and warm climates). It was found that Hong Kong, which has a temperate climate (subtropical) get the lowest peak energy compared to other regions that have a hot, cold and quite cold climate. Utama and Gheewala [7] conducted research on the choice of materials for building places in Indonesia related to energy needs, especially energy for air conditioning needs (AC). It was explained that the construction of residential buildings in Indonesia is very influential on the energy demand of air conditioners. This is caused by high heat gain, especially from the roof and wall, with a total heat gain of 50-60% of the total heat gain in the building. To overcome this matter examined model of wall with cavity to decrease requirement of AC energy. However, the results obtained are still not applicable in Indonesia because the costs incurred to make walls with low U-value are still relatively expensive compared to the monthly electricity bill. This is because at that time electricity is still subsidized by the government so the awareness of people to use the building with good isolation is still low. Zhao and Magoulès [8] reviewed the prediction of energy consumption in buildings. Energy in the building is determined by many factors such as the surrounding environment, structure and characteristics of the building, lighting operation and HVAC (Heating Ventilation Air conditioning), the number of occupants and the behavior of the occupants. So the prediction of energy consumption is still complicated to be determined precisely. The study was conducted in France and they recommend the easiest and most effective method for building energy assessment is the statistical method.

Building energy assessments for energy saving efforts are also conducted by designing controls on the use of lamps by daylighting saving time [9] and can reduce the peak demand of electricity by 0.14% from government buildings, commercial or household, while with more detailed auditing from Roslizar et al. [10] get 20% energy saving mostly from air conditioning system. Industrial requirements are also investigated by applying automation systems to lighting, heat recovery and door opening and obtaining a significant energy derivative [11]. While Campaniço et al. [12] conducted an energy assessment of the building by applying the method of passive cooling (direct night ventilation, water-soil heat exchangers, controlled thermal phase-shifting, evaporative cooling and found that the best energy saving estimates

ISBN : 978-602-99806-3-9

at the resolution of the day (31%) and also the energy decrease on monthly data ranges from 6% -11%. The retrofit measured method can be made 33% annual energy saving for lighting and 37% for air conditioning [13].

Along with the policy of most countries in the world to encourage the use of renewable energy, various modifications of solar technology (photovoltaic) are applied to buildings with Building Integrated Photovoltaic (BIPV) system [14],[15],[16]. This system can integrate energy sourced from renewable energy with energy from national power grid (PLN). In tropical countries such as Indonesia, this system will be very useful during the day, where the intensity of sunlight is very high and on the other hand the need for cooling system (AC) is also high [5], and it is found that photovoltaic is more advantageous to used in the building because of its stable output energy, low maintenance and operational cost and free from noise pollution compared to energies from wind turbines. Braun and Rüther [17] conducted research by applying BIPV to commercial buildings. Associated with the seasonal energy building load and regulation in a country, it is found that BIPV system is very profitable applied especially in hot and sunny season. Commercial buildings operated during the day have a profile of energy consumption that matches the trend of solar radiation. In accordance with the space available for BIPV in the building, there is a sufficient supply of energy supply for the building's energy needs. In this study, BIPV can generate 1 MWp of electric power. Based on the electricity requirement in 2016 and simulation profile observed within a year it is found that with 1MWp can meet the energy needs of 30% of the total electrical needs of the building concerned. Another advantage of peak load during the day can be lowered by the BIPV system because at the same time the solar radiation for PV is the maximum.

3. Methodology

This research will be carried out with two main stages, the first is the next energy assessment of photovoltaic (PV) modeling for energy supply that is integrated with PLN power supply. For the energy assessment and PV modeling needs to collect primary and secondary data are needed and then performed the assessment by statistical methods. Once the energy profile is obtained in detail then the energy saving strategy and photovoltaic system modeling are in accordance with the building requirements and cost optimization (LCC)[21].

3.1. Data acquisition

The data required are primary and secondary data for conducting assessment and designing a photovoltaic design model that is appropriate to the real condition of the building being the object. Taking primary data by experimenting on photovoltaic trainer unit in TPTU Prodi Lab, by measuring on, solar intensity, solar cell surface temperature, ambient air temperature, PV power output profile, additional data is required from some solar power that has been installed in the area of Bali Province so that required several field surveys. These data will be used to validate the designed PV calculation model.

While for the data retrieval is done by measuring every utility of buildings that require electrical energy that includes: air conditioning, lights, tools practicum, water heater, computer, etc. While additional data of environmental conditions consist of room temperature, humidity of the room and the surrounding.

Secondary data were obtained from previously published journals and references as well as data from BMKG on weather covering sun intensity and clearness index. Other data required are the specification of PV products designed in accordance with the needs of the building.

3.2. Audit energy

The general audit method also disrupts the audit methods and standards developed by ASHRAE. More specifically the method is the statistical method in which analysis includes the mean energy profile, the

ISBN : 978-602-99806-3-9

highest (peak) energy and the minimum daily and monthly energy. Variations in energy requirements can be described in detail and are very clear. So is the energy consumed by each building utilities and the energy needs profile of each room based on zoning, which is based on the direction of the sun (facing) north, east, south and west. And the type of construction of insulation from the space in the building (there are two types of insulation that dies in the building).

Air conditioning in air-conditioned rooms in sets of 24°C and RH 60% (comfort zone based on SNI workspace is with temperatures ranging from 24°C to 27°C with relative humidity between 55% to 65%). Data taken for 24 hours include temperature and humidity data of the room, temperature and humidity environment, electric power consumption of each building utility, radiation intensity and sunlight temperature. Observations made on all rooms and types of rooms within the building. Measurements are made with standard equipment that has a high accuracy, with data logger system recorded in the computer per unit of a certain time.

4. Results and discussions

4.1. Energy demand of the building and Building Integrated Photovoltaic Design

Energy calculation result for energy requirement data from building which include energy usage for air conditioning system, lighting, etc. obtained from one of the energy audit results of refrigeration lab building where the power requirement is 10 kW, as shown in Figure 1.

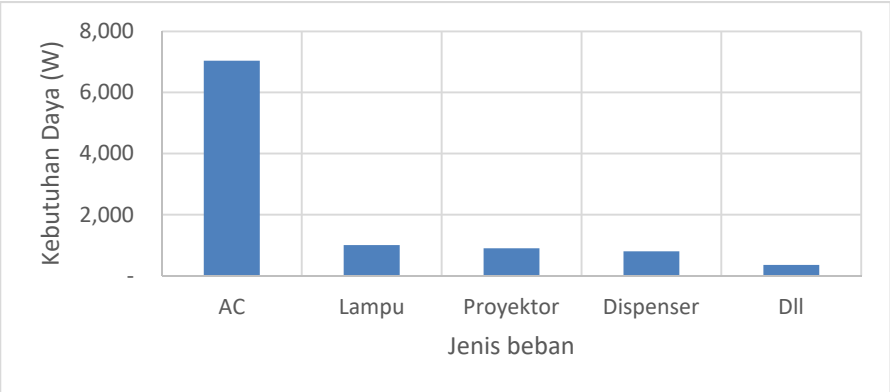


Figure 1. Energy demand of Refrigeration Laboratory Building

BIPV model was done by designing a photovoltaic system for buildings. The next design steps are done by adopting from the modeling system developed by BP Solar, RETScreen, PV Watts[18][19][20], whereas the data needed is the acquisition data for the solar beam especially related to the intensity of light radiation and daily temperature then analyzing the output energy produced by the PV system. The system consists of a series of photovoltaic (PV), power conditioner (PCU) and the required measurement / meter (e.g. a two-way meter). Power conditioners generally consist of inverters with control equipment and security protection systems. The design of the BIPV system is shown in the figure below.

ISBN : 978-602-99806-3-9

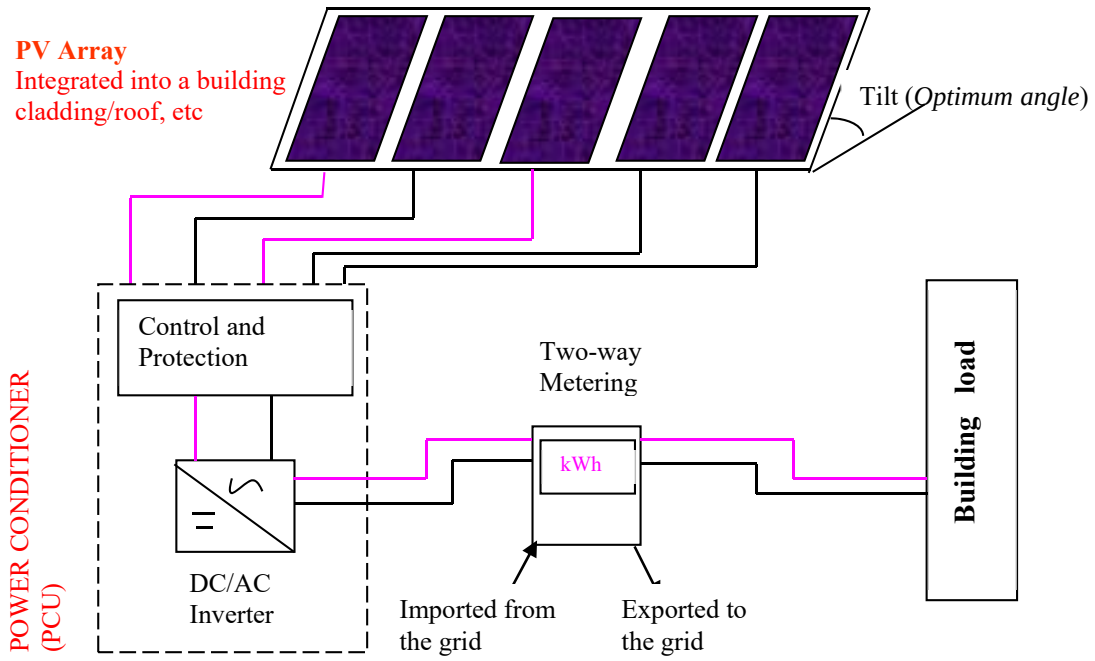


Figure 2. Building Integrated Photovoltaic design

4.2. Photovoltaic energy output and cost

Depend on survey result obtained that the photovoltaic that were installed in Bali (Bangli regency) has a total efficiency approximately 13.8% . In this model the photovoltaic was modelled with capacity of 10 kWp and the output approximately 4.3 kW. So, the additional energy should be fed by national grid. The proportion of photovoltaic and national grid yearly are constant as shown in Figure 3.

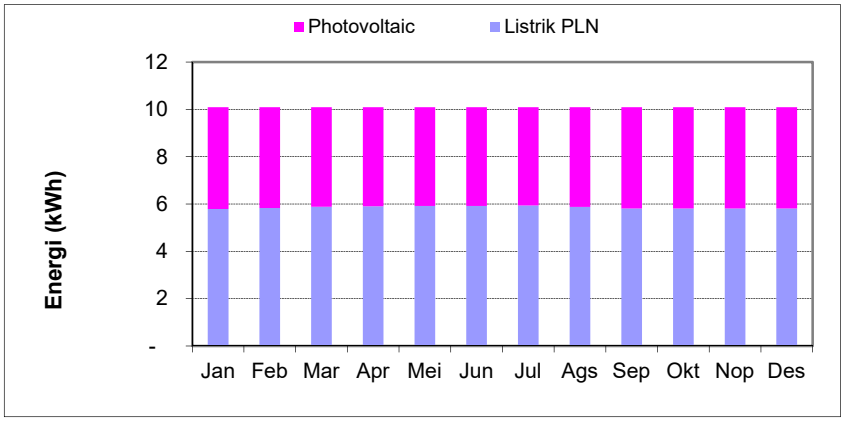


Figure 3. Photovoltaic and national grid proportion

Using life cycle cost (LCC) with life time of the photovoltaic of 25 years and considering some main cost item as i) initial cost including: feasibility study, engineering design, equipment, balance of plant and misc. ii) operation and maintenance cost. It was obtained the electricity cost from photovoltaic as much as 2500 IDR and comparing with the electricity tariff of national grid is 1.467,28 IDR per kWh.

ISBN : 978-602-99806-3-9

5. Conclusions

- In terms of climate and intensity of the sun Bali is perfect for developing photovoltaic in buildings with BIPV (Building integrated Photovoltaic) system.
- Photovoltaic also very eligible in building because this building use in the daytime and the photovoltaic getting peak energy output also in the daytime , because the main energy demand of the building is form air conditioning.
- Cost of electricity from photovoltaic compare with the national grid tariff is still more expensive, this problem need to be solved by government by incentives.

References

[1] Blue Print Pengelolaan Energi Nasional 2006 – 2025, 2006. Jakarta
[2] Bali Clean Energy Forum –Prssentation and Discussion available at www.bceforum.org
[3] BMKG, 2015 . available at www.bmkg.go.id
[4] ASHRAE, 1993. ASHRAE Energy Code for Commercial and High-Rise Residential Buildings. ASHRAE, Inc., Atlanta. ISBN 1-883413-09-5.
[5] Santosa I.D.M.C,, 2016. Studi Kelayakan Aplikasi Teknologi Energi Surya Dan Energi Bayu Pada Gedung Komersial , MATRIX Vol.6,No.3 :260-268.
[6] Lam J.C., Wan K.K.W., Tsang C.L., Yang L. 2008. Building energy efficiency in different climates, Energy Conversion and Management 49: 2354–2366.
[7] Utama A., Gheewala S.H., 2009. Influence of material selection on energy demand in residential houses, Materials and Design 30 : 2173–2180.
[8] Zhao H.X., Magoulès Z., 2012. A review on the prediction of building energy consumption, Renewable and Sustainable Energy Reviews 16: 3586-3592.
[9] Krarti M., Hajiah A., 2011.Analysis of impact of daylight time savings on energy use of buildings in Kuwait, Energy Policy 39:2319–2329.
[10] Roslizar A., Alghoul M.A., Bakhtyar B., Asim N., and Sopian K., 2014. Annual Energy Usage Reduction and Cost Savings of a School: End-Use Energy Analysis, The Scientific World Journal Volume 2014, Article ID 310539.
[11] Katunsky D., Korjenic A., Katunska J., Lopusniak M., Korjenic S., Doroudiani S., 2013. Analysis of thermal energy demand and saving in industrial buildings: A case study in Slovakia, Building and Environment 67: 138-146.
[12] Campaniço H., Hollmuller P., Soares P.M.M., 2014. Assessing energy savings in cooling demand of buildings using passive cooling systems based on ventilation, Applied Energy 134 : 426–438.
[13] Mohit O.K., Oree V., 2013. Assessing the energy savings potential in public buildings through retrofit measures in tropical climates – A case study in Mauritius, 978-1-4673-5943-6/13/, IEEE.
[14] Yoon J.H., Song J., Lee S.J., 2011, Practical application of building integrated photovoltaic (BIPV) system using transparent amorphous silicon thin-film PV module, Solar Energy 85: 723–733.
[15] Good C., Andresen I., Hestnes A.G., 2015. Solar energy for net zero energy buildings – A comparison between solar thermal, PV and photovoltaic–thermal (PV/T) systems, Solar Energy 122: 986–996.
[16] Shum K.L., Watanabe C., 2009. An innovation management approach for renewable energy deployment - the case of solar photovoltaic(PV) technology, Energy Policy 37:3535–3544.
[17] Braun P., Rüther R.., 2010. The role of grid-connected, building-integrated photovoltaic generation in commercial building energy and power loads in a warm and sunny climate, Energy Conversion and Management 51: 2457–2466.
[18] BP Solar, 2014. Solar Products, United Kingdom. Available from: www.bp.com/sectiongenericarticle.do?categoryId=3050422&contentId=3060195 [Accessed 5 June 2014].

ISBN : 978-602-99806-3-9

[19] RETScreen International, 2014. Clean Energy Project Analysis Tools and decision centre. Canada. Available from: www.retscreen.net [Accessed 10 June 2014].
[20] PV Watts, 2006. A Performance Calculator for Grid-Connected PV Systems, USA. Available from : http://rredc.nrel.gov/solar/calculators/PVWATTS/ [Accessed 7 June 2014].
[21] Zheng G., Jing Y., Huang H., Zhang X., Gao Y., 2009. Application of Life Cycle Assessment (LCA) and extenics theory for building energy conservation assessment, Energy 34: 1870–1879.

Acknowledgments
In this respect we would like to extend our gratitude to Center for Research and Community Service (P3M) Bali State Polytechnic for the main funding of this research and Head of Bali State Polytechnic for administrative support for the smoothness of this research. Colleges and students who provide assistance either directly or indirectly.

ISBN : 978-602-99806-3-9

Effects of concrete ages and reinforcement at the measurement of ultrasonic pulse velocity (UPV)

I Made Suardana Kader[1] and Fajar Surya Herlambang[2]
[1,2]Lecturer at Civil Engineering Department of Bali State Polytechnic
Jl. Kampus Udayana, Bukit Jimbaran, Badung Selatan, Bali, Indonesia

[1]suardana_kader@yahoo.com, [2]suryaherlambang@pnb.ac.id

Abstract. Knowing the compressive strength of a reinforced concrete structure that has been casted can use non-destructive test that is Ultrasonic Pulse Velocity (UPV). Where the wave propagation velocity will be the main variable on the equation in estimating the value of compressive strength. UPV wave velocity is strongly influenced by the density of the object under test. Research to get compressive strength of a reinforced concrete structure with UPV measurement has been done. The study immediately found the value of concrete compressive strength without considering the effect of reinforcement. It is also based on the fact that concrete and reinforcing steel are different characteristics. Therefore, this research was conducted to determine the effect of concrete age and reinforcement on ultrasonic wave propagation velocity on UPV testing. The ultrasonic wave velocity in UPV test with concrete test object should be performed after the concrete is 28 days or in dry conditions. The reinforcement sequence within the reinforced concrete structure do not have a significant effect on the ultrasonic wave velocity.

1. Introduction

Knowing the compressive strength of concrete in a reinforced concrete structure can be done by Ultrasonic Pulse Velocity (UPV) test. The data obtained from this UPV test is the wave propagation velocity by determining the distance of the transducer and the travel time. The velocity of the wave is strongly influenced by the density of the object under test. The more dense objects are tested, the wave velocity will be higher. This speed data becomes the main variable in determining the value of compressive strength of reinforced concrete.

Concrete compressive strength research with UPV test has been done. Fajar Surya Herlambang conducted concrete compressive strength test on building structure for capacity improvement analysis using Hammer, UPV and Core drill test. The result obtained by compressive strength of 205.74 kg / cm2. Estimates of compressive strength of reinforced concrete structures were also performed on buildings with age above 25 years. This study aims to assess the feasibility of reinforced concrete structure in accordance with its current function. Measurement of compressive strength using the Hammer and UPV methods. The result is obtained by compressive strength of 152.24 kg / cm2 and there is a spread of compressive strength on the elements under test but the structure is still feasible according to its current function [1] [2]. The same is also done by L. Chandrakanthamma, et al who do concrete compressive strength test using Hammer, UPV and Core Drill. Tests are conducted on structural buildings that are damaged by earthquakes or other natural disasters. Test results obtained by compressive strength of 33.2 - 42.2 N / mm2. This happens because the damage suffered by the building is quite light [3]. Aswin S. Balwaik measured the age of the building with UPV. This is done because the concrete is made from a mixture of cement, aggregate and water that is strongly affected by the

ISBN : 978-602-99806-3-9

surrounding environmental conditions. The sample of this study is the structure that has been damaged and then retrofitted. Testing done before and after repair. The test results showed an increase in strength after the repair [4]. Jason Maximino C. Ongpeng conducted a study using UPV to find out the compressive strength of the concrete that was affected by the reinforcement. Where the reinforcement is rusted at 8 mm per year. The results showed that UPV can detect the occurrence of rust on the reinforcement. The sensitivity of UPV measurements especially when the transducer is placed between the two reinforcing bars. This also indicates the occurrence of cracks in the concrete around the reinforcement due to rust on the reinforcement. Concrete compressive strength results in a 20% decline in reinforced rust and down 15% in areas where there is no reinforcement [5].
The similarity of all previous studies of concrete compressive strength was obtained from the UPV test but in the study [1] [2] [3] [4] did not review the effect of reinforcement within the concrete that may affect ultrasonic wave velocity so that the compressive strength of the concrete is not compressive strength of pure concrete but already affected by reinforcement. In research [5] the influence of reinforcement has been taken into account but the reinforcement used is rusted and placed in the concrete not in the form of a sequence of reinforcement.
Based on these descriptions, it is necessary to conduct research to determine the influence of reinforcement in concrete against ultrasonic wave velocity measurement on UPV test. In this research, the reinforcement is placed in the concrete in the form of a series of reinforcement and in non-corrosive condition because concrete damage can occur before there is rust on the reinforcement. Given the concrete and steel reinforcement has different characteristics then, also reviewed the influence of concrete age on ultrasonic wave velocity.

2. Methodology

This research is experimental. This study compared the ultrasonic wave velocity on concrete without reinforcement with reinforced concrete. The velocity of the wave at the concrete without reinforcement is the comparator while the speed on the concrete with the reinforcement is the speed that is affected by the reinforcement. Another variation of this study is the age of concrete because the concrete hardened over time while the reinforcement is not. Thus it will be known the influence of concrete age and the influence of reinforcement on wave velocity.
The specimens in this research are concrete beams without reinforcement and with reinforcement. Dimensions of beam 150x150x600 mm. The reinforcement used is non-deformed and deform. The diameter of the reinforcement is 10 mm and the stirrup is 6 mm. The reinforcement sequence is shown in Figure 1 below.

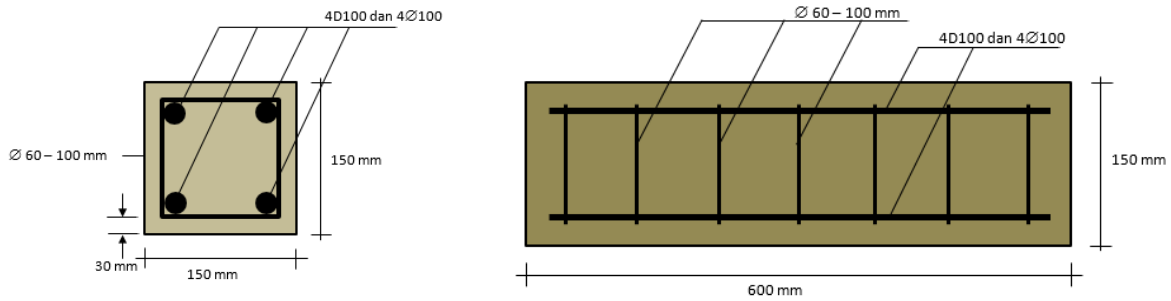


Figure 1. Plan of concrete beam

UPV test method used is direct as shown in Figure 2 below. UPV setting is to set the length of wave path (L), number of pulse and weight of concrete volume. Thus measured is the wave velocity from the transducer to the receiver.

ISBN : 978-602-99806-3-9

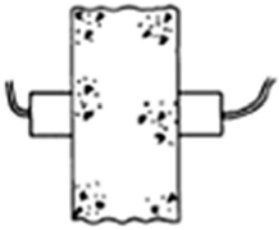


Figure 2. UPV direct method

3. Discussion

The research was started by designing the concrete mixture and the resulted concrete weight of volume 2245 kg / cm3 and the quality of f'c 30. The result of compressive strength test by press machine on the mixture design was obtained result of average 30.52 MPa. The sequence of reinforcing steel is shown in Figure. 3 whereas the preparation for pouring fresh concrete is shown in Figure 4. The sequence of reinforcement according to plan is in Fig. 1 above.

Figure 3. Reinforce sequence

Figure 4. Preparation of pouring fresh concrete

UPV test is done by setting the length of wave path is (L) 150 mm, weight of concrete volume is 2245 kg / cm3, and the number of pulse 5. Each beam is done 4 times UPV test. The tests were performed at 7, 14, 28, 42 and 56 day concrete ages.

Figure 5. UPV test with direct method

From the UPV test series the following results are obtained,

Table 1. Ultrasonic wave velocity on UPV test

Concrete Age	UPV Velocity (m/s)		
	With no bar	With deform bar	With undeform bar
7	3575.81	3624.53	3680.44
14	3662.48	3606.49	3688.73
28	3641.10	3695.65	3668.53
42	3759.93	3737.88	3734.27
56	3756.78	3514.20	3662.32

ISBN : 978-602-99806-3-9

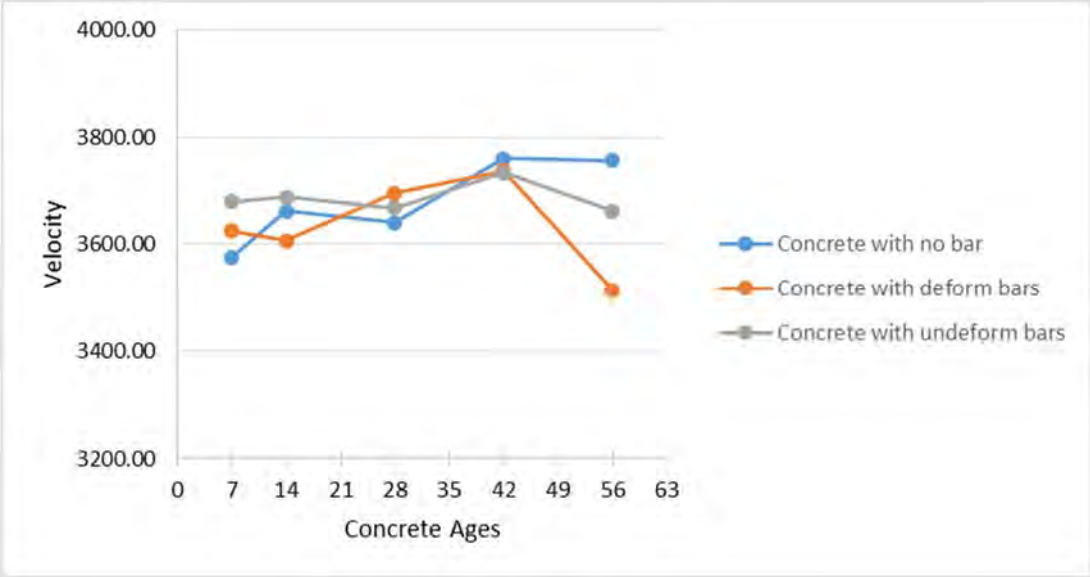


Figure 6. UPV velocity of the beam with ages and bar variation

From the test results shown in Table 1 and Figure 6 it can be seen that ultrasonic wave velocity in UPV test is always changing. Changes are not always faster sometimes slower. This, of course, is less suited to the concrete theory that concrete is getting stronger with age. The strength of concrete increases very quickly before 14 days and then slows down to tend to flat (Figure 7) [6].

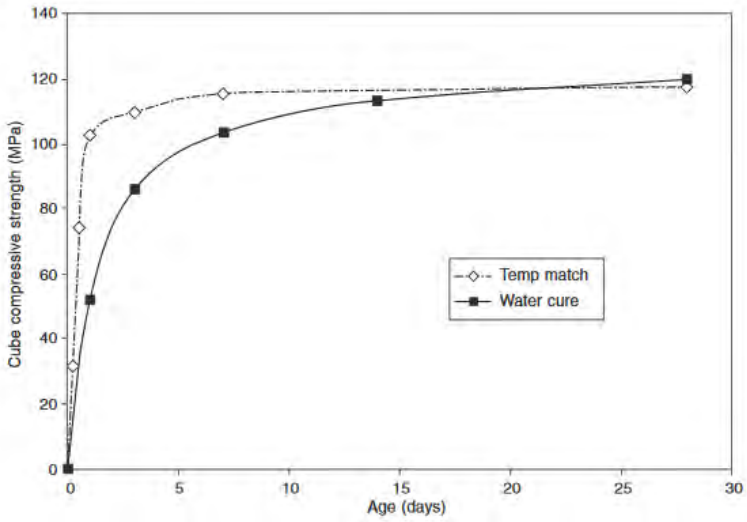


Figure 7. Strength development of a high strength concrete slab
(John Newman and Ban Seng Choo, 2003)

In the graph "concrete with no bar" it can be seen that the wave velocity has a corresponding trend of concrete theory, where the speed trend increases with age. This speed increase is quite large and can be said to be significant but tends to remain at age above 28 days ie 42 and 56.
In the "concrete with deform bars" graph, an increase in wave velocity also occurs and has a tendency to rise slowly. But on 56 days there are things that can not be explained yet because the sudden speed decreased very drastic.

ISBN : 978-602-99806-3-9

For the "concrete with undeform bars" graph, the relative speed increases are smaller than others. Fluctuations in speed tend to be small. At 56 days decreased speed as well as "concrete with deform bars".

According to the above conditions it can be seen that at the concrete age of less than 28 days the speed changes can not increase regularly. It is possible to estimate the influence of water that may still exist in the concrete and each specimen does not have the same evaporation rate. It is therefore advisable not to test UPV on concrete age less than 28 days. For the influence of reinforcement in concrete, wave velocity is almost the same for all test specimens and in general the presence of reinforcement within the concrete does not have a significant effect on the UPV test, in this case the age of 28 and 42 days. However, research is still needed in longer timeframes because UPV testing is often applied to existing and decades old structures.

Another thing that can be delivered on this occasion is that the UPV test must be done very carefully because the test equipment needs a fixed setting during the test and should always be adjusted if changing the test method. Included here is a calibration. When placing the transducer and receiver on the surface of the specimen it is necessary to note the consistency of measurement because very small motion makes the speed changeable. This makes it very difficult to determine the right and constant speed. This condition makes space for research to create a tool to hold the transducer and receiver so that it does not move.

4. Conclusion

The ultrasonic wave velocity in UPV test with concrete test object should be performed after the concrete is 28 days or in dry conditions. Because if the concrete is still contains water or wet, it is feared to affect ultrasonic wave velocity.

The reinforcement sequence within the reinforced concrete structure do not have a significant effect on the ultrasonic wave velocity. Thus the value of compressive strength obtained by UPV test can be directly used.

5. References

[1] Fajar Surya Herlambang dan I Nyoman Ardika, 2016, Jurnal POLI-TEKNOLOGI, "*Penyelidikan struktur untuk mendapatkan data bagi analisis peningkatan kapasitas gedung*", Vol. 15, No. 1, Jakarta.

[2] Fajar Surya Herlambang dan I Nyoman Ardika, 2015, Prosiding SENAPATI, Seminar Nasional dan Pertemuan Peneliti 17-18 September, "*Estimasi kuat tekan beton pada struktur beton bertulang pada gedung berusia di atas 25 tahun*", Jimbaran-Bali, P. 267-273.

[3] L. Chandrakanthamma, dkk, 2015, IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE), "*Assessment of concrete on structure using non-destructive testing*", P. 01-04.

[4] Ashwin S. Balwik, 2015, IOSR Journal of Mechanic and Civil Engineering (IOSR-JMCE), "*Efficiency of ultrasonic pulse velocity test in life of concrete structure*", Vol. 12, Issue 4 Ver. II, P. 01-06.

[5] Jason Maximino C. Ongpeng, 2017, ASEAN Engineering Journal part C, "*Ultrasonic pulse velocity test of reinforced concrete with induce corrosion*", Vol. 6, No. 1, P. 5-12.

[6] John Newman and Ban Seng Choo, 2003, "Advanced concrete technology", Butterworth-Heinemann, London.

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

An Increase In Literate Statistics, (Statistical Reasoning And Statistical Thinking Through The Development Of Teaching Materials And Assessments Based E-Learning

I Wayan Putrana[1], Ni Made Kariati[2]

Jurusan Administrasi Niaga Politeknik Negeri Bali

Kampus Bukit Jimbaran Bali. Telp.+620361 701981 ext. 196

E-mail : [1]wayan_putrana@yahoo.com, [2]dekariati@yahoo.com

Abstract. Issues on literacy statistics (Statistical Literacy), reasoning statistics (statistical reasoning) and thinking statistics (statistical thinking) for students are not extensively studied in Indonesia. Instead, it needs a more serious attention for policy-makers in education and needs improvement so that statistics learning are more meaningful. A teaching learning process must integrate science with technology such as through E-learning. E-learning has the advantage of not being limited to a particular classroom (accessible from anywhere), is not limited to a specific time (can be accessed at any time) and is not limited to a specific platform (accessible from any operating system). The purpose of this research is to develop instructional materials and assessments based on E-Learning for students of Business Administration department, Bali State Polytechnic to improve the literacy of Statistics (Statistical Literacy), Reasoning Statistics (Statistical Reasoning) and Think Statistics (Statistical Thinking). We are adopted a development model developed by Thiagarajan (Four-D). This model consists of four stages of development; Define, Design, Develop and Disseminate or adapted into a 4-D model, namely the definition, design, development, and deployment. This research is a second year reserach, the first year focuses on the design of learning modules and online learning tools

What the researchers do in the second year is to focus on the development of teaching materials in accordance with the given riviwer. Some improvements were made to perfect the teaching materials of the statistics lecture. The next process is to disseminate learning materials using online media. Appropriate students will take learning materials, study according to the time they set independently. As the material of online learning evaluation also conduct evaluation by conducting quiz and test for. The results of online learning will be compared with traditional learning outcomes with face-to-face in the classroom. Until now the evaluation is still done continuously. The expected result after the completion of this research process is, providing material and instructional media online statistics.

Keywords: statistic, elearning, edmodo, statistical thinking, statistical reasoning, thinking statistical

ISBN : 978-602-99806-3-9

1. Introduction.

Studies development statistika as and in line with developments in science, technology, and information system. The main advantage of web-based education is its flexibility, allowing students to access content from diverse locations, at a convenient time[1][2][3]. It encourages learning self-management, with the ability to exchange links to related information In the first year research has suggested that well organized online classrooms[7]. Statisticians have long used scientists, engineers, and others to use statistical functions to improve their work. It is time for experts to practice and utilize what they know about behavioral science and how people learn to improve the content and delivery of education Statistics (Snee 1993: 1)[1,19 Based on the results of the preliminary tests (pre test) and observation in the academic year 2014/2015 for the course of the Department of Business Administration, Bali State Polytechnic (not Department of Statistics), obtained about 74%, 5 students get an range C; the remaining 24% get a B grade and only 2% (Students from high school graduates concentrate physics class or "IPA class") get an A. Based on the paradigm it shows that the students are still lacking in the matter of Statistical Literacy, Statistical Reasoning, and Statistical Thinking (theory of thinking) which leads to the low achievement of statistical learning. One of the causes is the conventional learning media using Module, basic statistical learning, because it is not innovative (Waciko, 2011), students are not accustomed to accessing up to date data or data in large or large capacity data (Waciko, 2006)[23].

Learning which is dominated by the role of educator (the era of teacher) has long been transformed into a learning dominated by the role of educator and book (the era of teacher and book), but nowadays the trend has changed with the entry of technology (the era of theacher, book and technology) (Yaniawati, 2014)[12]. To improve these three factors is required an innovative learning that is e-learning based learning. Linde (2004) said that e-learning is a learning, both formally and informally conducted through electronic media, such as internet, intranet, CDROM, video tape, DVD, TV, mobile phone, PDA, and others[4][5]. Expected products are teaching materials and e-learning based assessment system that leads to the development of its content to be more interesting, animative, and communicative tailored to the curriculum, the characteristics of Vocational Education and the needs of the students of Bali State Polytechnic.

Based on the background and urgency of the research, the main issues of the second year of research are:

1. How is the expert's assessment of draft teaching materials and descriptive statistics based on E-Learning?
2. What needs to be revised on the draft of the teaching materials and the descriptive Statistics based e-learning assessment and how are the guidelines for their use?
3. What are the constraints found in the results of individual trials, small group tests, and field tests of resource drafts and descriptive e-learning descriptive Statistics?

2. Research Methodology

The objective of this research is to develop teaching materials and E-Learning based assessment for students of Department of Business Administration, Bali State Polytechnic to improve Statistical Literacy, Statistical Reasoning and Statistical Thinking. The purpose of this research is to develop teaching materials and E-Learning based assessment for students of Department of Business Administration, Bali State Polytechnic to improve Statistical Literacy, Statistical Reasoning and Statistical Thinking. This research is carried out with a clear and systematic development model such as Thiagarajan (Four-D) model development[14][15][19]. This research development model consists of four stages, namely: 1) .Stage Define (activity): front end analysis, student analysis, lecture material analysis, analysis of course assignments and lecture specification analysis; 2) .Stage Design (Design) activities include selection of learning resources, a series of tests, the selection of style selingkung and wake up; 3) Development phase (Develop) activities include: expert and practitioner validation; and 4) Dissemination Stage (Desseminate) teaching materials and statistical assessment Descriptive based e-

ISBN : 978-602-99806-3-9

learning and proseding national / international seminars. Merangcang facilities and module materials module materials, EDMODO Program and test Statistics uploaded to EDMODO.

Four D development model consists of four stages[9]: define, design, development and disseminate, e-learning system development procedures in this research can be seen in the steps taken as follows:

1. Definition Step (Define)
   This stage aims to define and define lecture requirements. In determining and defining the terms of the lecture begins with the analysis of the objectives of the limitations of material to be developed teaching materials and assessment. Activities in this phase are front-end analysis, student characteristic analysis, material analysis, task analysis, and lecture objectives specification
2. Design Step (Design)
   The design step is intended to design teaching materials and e-learning assessment. Activities undertaken at this stage are resource selection, preparation of teaching materials, preparation of assessment, format selection, and design of e-learning systems.
3. Development Step (Develop)
   Development stage to produce prototype of teaching materials and assessment based on e-learning which have been revised based on result of prototype-1 analysis, expert input and practitioner as well as analysis result of lecturing activity. Activities at this stage are the assessment of experts and practitioners as well as field trials.
4. Stages of Dissemination (Desseminate)
   The dissemination stage (Desseminate) is carried out by carrying out the dissemination activities of the device. The core of activities at this stage is to socialize the products of development through the presentation of results in national / international seminars.

The subjects of the study were students of second semester of academic year 2016/2017 majoring in Business Administration Politeknik Negeri Bali in Year Programmed Descriptive Statistics as much as 184

Given the number of research population is quite limited then the sampling technique using sampling technique saturated / census which is the technique of determining the sample when all members of the population as a sample in other words all members of the population in the sample [6]. So in this study the sample amounted to 184 students

3. Result and Discussions

E-learning or online learning is a learning that its implementation is supported by electronic services such as telepone, audio, videotape, satellite or computer transmissions. Various terms used for electronic learning, among others are: on-line learning, Internet-enabled learning, virtual learning, or web-based learning. Thompson (in cute, 1999)[11][22], states that "E-learning is instructional content or learning experiences delivered or by electronic technology." Then Thompson also mentioned the advantages of e-learning can provide flexibility, interactivity, speed, visualization through the various advantages of each technology.

Kamarga (2002) suggests the benefits of e-learning in organizational learning as follows[13]:

1. Increase productivity. Through e-learning the passage of time can be reduced so that the productivity of learners and educators will not be lost due to travel activities that must be done to obtain the learning process.
2. Accelerate the process of innovation. Competence of human resources can be depreciated. Such co-competence updates can be done through e-learning so that co-opency always gives value through creativity and innovation of human resources.
3. Efficiency; the competence building process can be done in a relatively shorter time and includes a larger amount.

ISBN : 978-602-99806-3-9

4. Flexible and interactive; e-learning activities can be done from any location as long as it has connections with the source of such knowledge and interactivity is possible either directly or indirectly and in full visualization (multimedia) or not.
5. E-learning can be utilized and developed in forming a new learning culture that is more modern, democratic and educational. Learning culture is a small part of the culture of society. The culture of society is defined as the integration of all objects, ideas, knowledge, institutions, ways of doing things, habits, patterns of behavior, values, and attitudes of each of its predecessor generations and is continued frequently in a form that has changed to its successor generation (Kartasasmita, 2003).

The research results obtained after going through step 4d are as follows:

1. Module teaching materials

Module of descriptive statistics course, which has been riview by statistician from Udayana University. the process of obtaining validation has gone through the steps of analysis, riview and improvement of the records provided by the expert. This teaching material has been adapted to the curriculum of statistics and descriptive courses applicable to the department of Business administration. Tthis module is covered with material-appropriate exercises in each chapter. as an evaluation material in each chapter that is discussed, this module is equipped with quis questions. it is expected that this textual learner material can strengthen students' understanding of statistical material.

2. Online learning tool

Along with the timing of expert judgments, this study also provides online learning tools. by this is done to achieve the results of research achievements in the field of dynamic learning media. Online learning media is designed using edmodo. Teachers / lecturers can also send grades, assignments and quizzes to students. Students can apply for homework and see their grades and comments teachers / lecturers may have posted about their assignments. Teachers / lecturers can also make polls and post topics for discussion among students. Teachers / lecturers can differentiate and create independent learning through the creation of subgroups in the course. After each course period is completed, the teacher / lecturer closes out the network and creates a new one for the next course. emodo has a colorful appearance, so it is expected to provide an interesting atmosphere for students. edmodo use is very easy for students, because the buttons are displayed simple and clear. The form of teaching material appearance that is displayed using edmodo looks as follows.

The first step, teacher must desain class, end the the student can interaction in the page, but prior to arranging classes, students are required to enroll on the edmodo page of statistical material. The example of upload material in the edmodo page as follow figure 1

ISBN : 978-602-99806-3-9

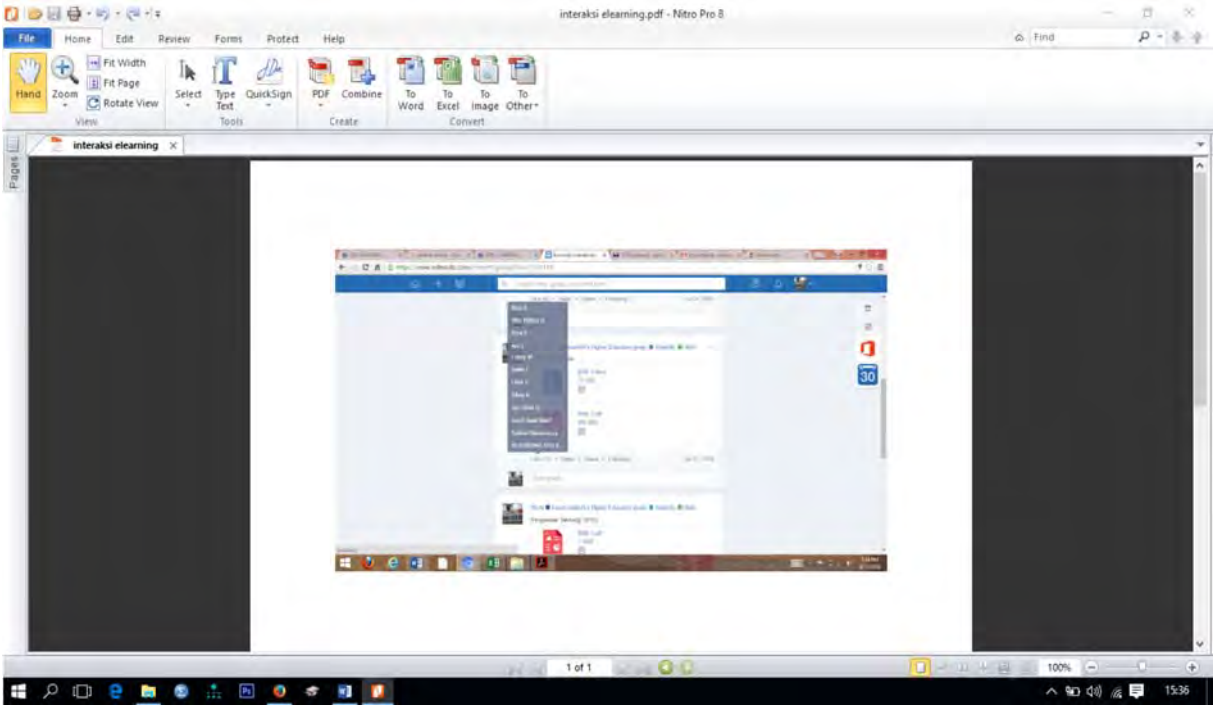


Figure 1. teacher upload materia statisc

Every student who has registered registration can be monitored by using class management. Figure 2 shows the page containing the data of students who have registered to the statistics class

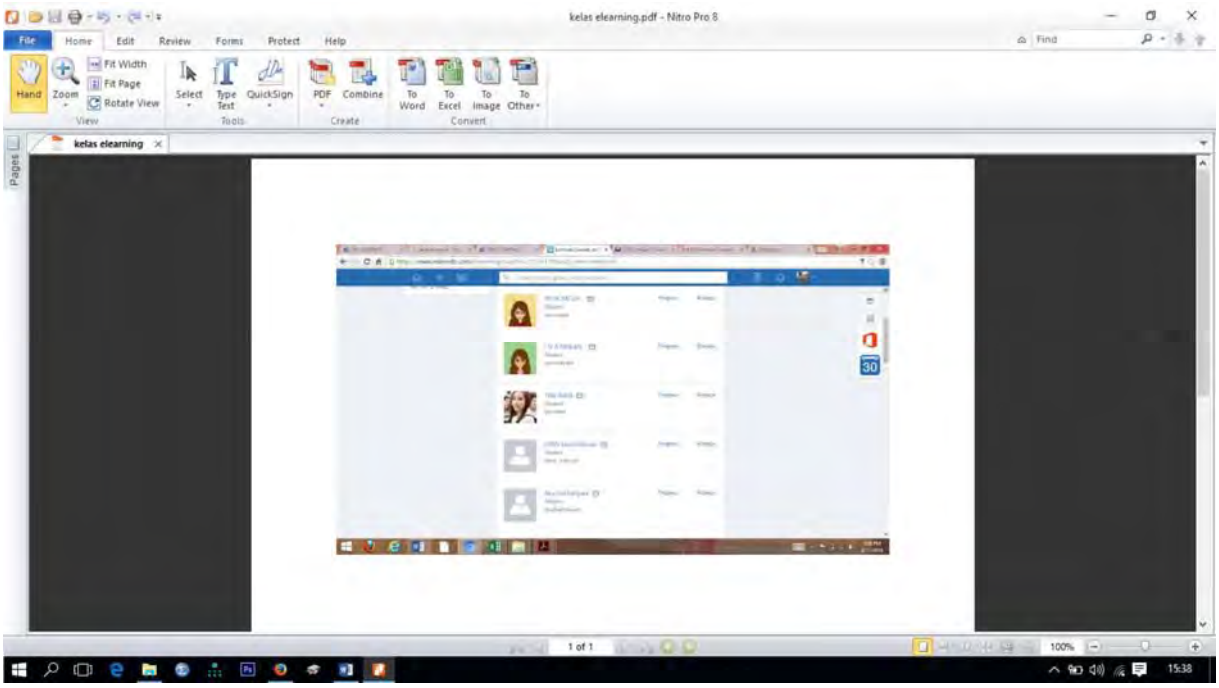


Figure 2. data of students who have registered to the statisctics class.

ISBN : 978-602-99806-3-9

After the student has access rights to the online statistic class, then the student can follow the whole interaction of teaching and learning. students can take the material, then learn independently. in interactive classroom learning students can ask questions about material that can not be understood independently. here the topic of discussion can be answered in discussion by other students who already understand or lecturers who are interacting with the class. as an evaluation material in the online statistics class, lecturers upload quis materials. students will work on the quis in accordance with the length of time provided. the advantage of this test is that students can work on the quis dynamically, can access from anywhere as long as connected with internet network. they can work in their time as long as they do not exceed the lecturer's specified date limit. Figure 3, shows the appearance of the upload quiz in multiple-choice form.

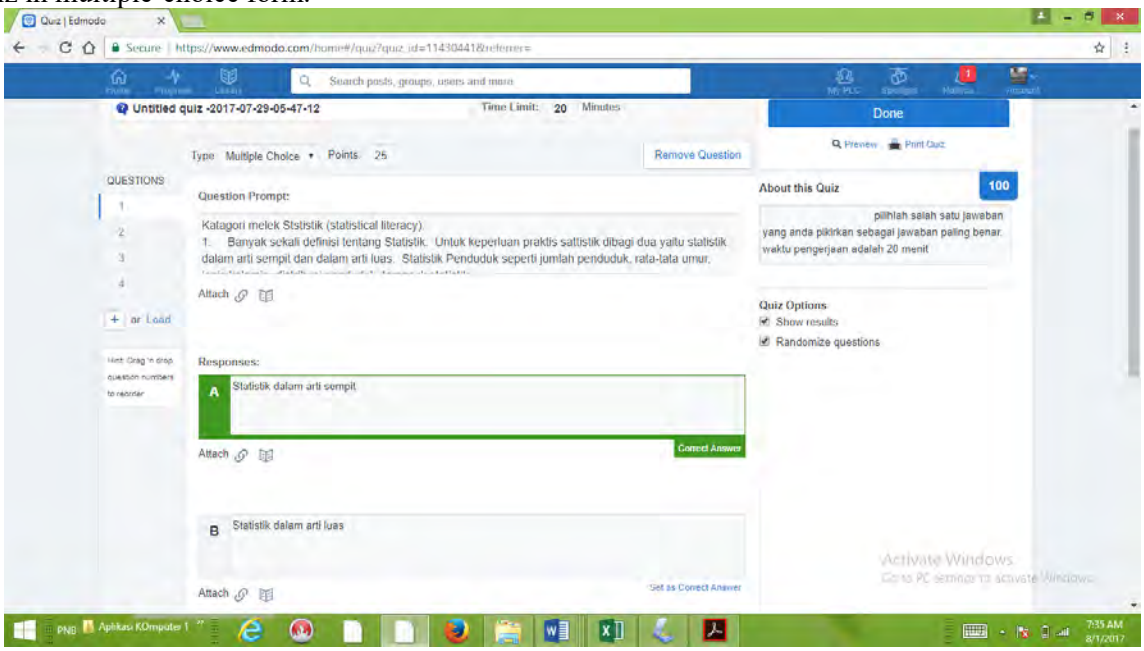


Figure 3. quis online

Figure 2 is an example of a quis scene screenshoot that the student will do. The time period given is 20min, the student can work freely during the time span required by the system. Free means is that they do not have to work simultaneously in one room, but wherever at any time within 24 hours within the intended date and within 20 minutes. From the observation of researchers there is an increase in value compared with conventional methods.

4. Conclusions and Recommendations

The conclusions in this study are

Riviwer gives a positive response, Things that need to be revised according to the reviwer notes in the brief section of the formulation of growth and in real written media required learning, Constraints that during the trial period, folded in campus environment with an u -down internet connection, There is an increasing response from students in online-based learning, Valid statement until progress is 70% valid and reliable in statistical learning

ISBN : 978-602-99806-3-9

References

[1] Ben-Zvi D. & Garfield J. (Eds.). (2004). *The challenge of developing Statistical literacy, reasoning and thinking*. Dordrecht, The Netherlands: Kluwer Academic Publishers.
[2] Britz, G., Emerling, D., Hare, L., Hoerl, R. and Shade, J. (1997). *How to teach others to apply Statistical thinking*. *QualityProgress*, June 1997 issue, 67-79.
[3] Cute, a., Thompson, M., and Hancock, B. (1999). *Handbook of Distance Learning*, The McGraw-Hill.
[4] Chance, B. (1997), *"Experiences with Alternative Assessment Techniques in Introductory Undergraduate Statistiks Courses',"*Journal of Statistics Education[Online],5(3).(www.amstat.org/publications/jse/v5n3 /chance.html)
[5] Chance, B. L. (2002) Components of Statistical Thinking and Implications for Instruction and Assessment" Journal of Statistics Education [Online], 10(3) www.amstat.org/publications/jse/v10n3/ chance.html
[6] delMas, R., Garfield, J., and Chance, B. (1999), *"A Model of Classroom Research in / Reasoning,"*Journal of Statistiks Education [Online], 7(3).(www.amstat.org/publications/jse/secure/v7n3/ delmas.cfm)
[7] delMas, Robert C. (2002). Statistical Literacy, Reasoning, and Learning: A Commentary. Journal of Statistiks Education Volume 10, Number 3 (2002).www.amstat.org/publications/jse/v10n3/delmas_discussion.html.
[8] Hair et al. (2006). *Multivariate Data Analysis*. New Jersey. Prentice-Hall
[9] Garfield, J. (2002) The Challenge of Developing Statistical Reasoning" Journal of Statistiks Education [Online], 10(3). www.amstat.org/publications/jse/v10n3/garfield.html
[10] Garfield, J., & Ben-Zvi, D. (2004). Research on Statistical literacy, reasoning, and thinking: Issues, challenges, and implications.
[11] In D. Ben-Zvi & J. Garfield (Eds.), *The challenge of developing Statistical literacy, reasoning and thinking* (pp. 397-409). Dordrecht: Kluwer Academic Publishers
[12] Indrawan & Yaniawati. (2014). *Metodologi Penelitian*.Bandung: Refika ADITAMA.
[13] Kamarga, H. (2002). *Belajar Sejarah melalui e-learning*: Jakarta : Intimedia
[14] Pfannkuch, M., & Wild, C. (2004). Towards an understanding of Statistical thinking. In D. Ben-Zvi, & J. Garfield, (Eds.), The challenge of developing Statistical literacy, reasoning, and thinking (pp. 17-46). Dordrecht, Netherlands: Kluwer Academic Publishers. 38

[15] Siahaan, S. (2003). *E-Learning (Pembelajaran Elektronik)* sebagai Salah Satu Alternatif Kegiatan Pembelajaran. Jurnal Pendidikan dan Kebudayaan. No.042. tahun ke-9. Mei 2003
[16] Shaughnessy, J. M. (1997). *Missed opportunities in research on the teaching and learning of data and chance*. In F. Biddulph & K. Carr (Eds.), Proceedings of the Twentieth Annual Conference of the Mathematics Education Research Group of Australia, (pp. 6-22). Sydney: MERGA.
[17] Shaughnessy, J.M. (2006). *Research on statistiks learning and reasoning.* Manuscript submitted for publication.
[18] Shaughnessy, M. & Pfannkuch, M. (2002). How faithful is Old Faithful? Statistical thinking: A story of variation and prediction.Mathematics Teacher, 95(4): 252-259.
[19] Snee, Ronald. D. (1990), *"Statistical Thinking and Its Contribution to Total Quality,"* The American Statistikian, 44, 116-121.
[20] ____ (1993). *Article: What's missing in Statistical education?* The American Statistician, eds

ISBN : 978-602-99806-3-9

May 1, 1993.

[21] ____ (1999), "Discussion: *Development and Use of Statistical Thinking*: A New Era," International Statistical Review, 67, 255- 258.

[22] Thompson (2000). *Perspective in Quality online Education.* [Online] tersedia : http://www.sloan-c.org/publications/view/v2n7/pdf

[23] Waciko (2011). Pengaruh Kesiapan Individu pada Niat Keperilakuan menggunakan E-Learning Pada Universitas Terbuka Denpasar. Jurnal SOSHUM, Vol 1 No 3, Politeknik Negeri Bali.

[24] _____(2011).Pengembangan Buku ajar Matematika Terapan berbasis Kompetensi untuk Meningkatkan Pencapaian Standar Kompetensi pada Mahasiswa Politeknik Negeri Bali. Hibah Bersaing DP2M DIKTI.

[25] _____(2006).Aplikasi SPSS dalam meningkatkan motivasi Belajar Statistik bisnis mahasiswa jurusan Administrasi Niaga, Hibah Bersaing, TPSDP. Politeknik Negeri Bali.

[26] Wild, C. J., and Pfannkuch, M. (1999), "*Statistical Thinking in Empirical Enquiry," International Statistical Review*, 67, 223-265.

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

Web based information system for job training activities using Personal Extreme Programming (PXP)

Sri Andriati Asri[1], I Gusti Agung Made Sunaya[2], Elina Rudiastari[3]
[1,2,3]Electrical Department of Politeknik Negeri Bali, Kampus Bukit Jimbaran, Kuta Selatan Badung 80361 Bali, Indonesia

sriandriati@pnb.ac.id

Abstract. Job training is one of the subjects in university or polytechnic that involves many users and reporting activities to be managed. This research tried to develop a web based information system that can used to manage and help users during job training process. This system was developed using Personal Extreme Programming (PXP). PXP is one of the agile methods consists of requirements, planning, design and implementation phases. This information system runs on a web platform using PHP 5.6 scripting language and MYSQL 5.6 as database management system that can be accessed anytime and anywhere. The information system that has developed helps user to manage the data and activity reports.

1. Introduction

Job training is one of the subjects for university or polytechnic's students. Job training process involves three parties i,e student, supervising lecturer and coordinator and consists of many activities reporting task. Sometimes they had difficulties and problems to do many activities and reporting task. This is caused by the distance and time and also manual reporting process during the job training. A web based information system is the solution to overcome the problems.

There are two approaches methodology in information system or software development, well-documented traditional heavyweight methodology and lightweight or agile methodology. Agile methodology introduced in the earlier 2001. The agile movement officially began with the creation of the agile manifesto. This manifesto was written and signed by seventeen lightweight methodologists. Agile methods are growing very rapidly. Agile methods rapidly replacing traditional methods. A brief research about the successful adopting agile methods are conducted by Maarit Laanti Many [1].

Many A comparative study between agile method and traditional methods was conducted, agile methods was developed to provide customer satisfaction, to shorten the development life cycle, to reduce bug rates and to accommodate changing business requirement during development [2]. Agile methods emerged, such SCRUM and eXtreme Programming (XP). SCRUM methodology was initiated by Ken Schwaber in 1995. SCRUM has been used with the objective of simplifying project control through simple processes, It focuses on project management in situation where is difficult to plan ahead, with importance on feedback mechanisms [3]. While XP is a lightweight, based on addressing constraint in software development and can work with teams in any size [4]. Another research about agile methods was conducted by Sriram Rajagopalan [5]. The research gave brief information about almost all agile methods on vendor perspective. As agile methods XP has been widely used and most popular for software development methods. A detail study of software development with XP has been conducted by Manis Kumar in [6]. The research also explained the differences between traditional software development methods and the agile.

As the popular one XP methods was extended for particular purpose by doing a combination with other methods i e Personal Software Process (PSP). PSP is a method that provided a disciplined personal

ISBN : 978-602-99806-3-9

framework for doing software work [7]. PSP is designed for with any programming language and design methodology. The PSP has been effective in helping engineers to achieved the zero defect product on schedule and within planned cost [8].

Related research about XP and PSP has been done by several researcher. Ravikant Agarwal and David Umphrees develop a new method based on XP combined with PSP [9], they focused on XP practices for a single person programmer instead a pair programmer. Yani Dzhurov cs was created a new frame work of Personal Extreme Programming (PXP) [10]. Nazir Igbal cs have modified XP by inserting in Personal Software Process which is easy to follow and keep the software development process lighten [11]. All research combined the Personal Software Process and XP method. PXP by Ravikant and Nazir have some focuses in common. They used twelve XP practices to fit in single programmer. On the other hand PXP by Dzhurov created PXP framework. PXP aims to reducing the number scripts being followed and the amount of data to be filled in the form. PXP introduced a subset of the XP development practices which are appropriated to be performed by autonomous programmer or developer. PXP offered a new framework to develop software or an information system.

Web based information system lately has grown rapidly, caused by ease and flexibility. There for we developed a web based information system that can manage the data and administration goods and provided features for job training activities. The software development methods we used PXP by Dzhurov, because it's benefits. The web based information system eventually can help coordinator, students and supervisor lecturers to do their job easily.

2. Methodology

An information system must provided features or tools correctly and helped user to do their job fast and easily. This research aims to develop an information system to manage job training and to provided features for the students and supervisor lecture during the job training's time using PXP by Dzhurov. This method chosen because its efficient developments practices of Extreme Programming in other to support better project planning and product quality control and can be used by autonomous developers. PXP process phase is shown in figure 1.

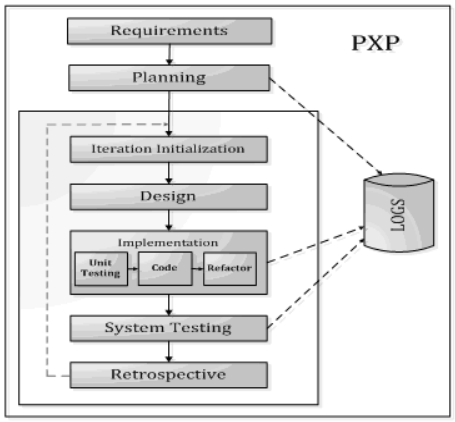


Figure 1. PXP process phases [10]

2.1. Requirements and Planning

Requirements phase in this research is done by spreading questionnaire to students and lecturers involved job training process. After the recapitulation process, we created a user story and estimated the times (days) need for developing each user story.

2.2. Iteration Initialization and Design

According to Dzhurov the iteration initialization indicates the beginning of each iteration. The iteration length could vary from 1 – 3 weeks depending on project scope. Design phase, developer created modules or classes to be implemented in the on going iteration.

ISBN : 978-602-99806-3-9

2.3. Implementation
Implementation is where the actual code generation takes place. The application is develop using PHP and MYSQL 5.6. We are implementing all objects defined in the previous phase, and testing them. Implementation consist of three sub-phases; unit testing, code generation and refactoring.

2.4. System Testing and Retrospective
All features developed from the beginning are tested during system testing phase. In this phase we should verify whether the implemented solution meets the initial requirements. All found defect or error are fixed and recorded. The last phase is retrospective. All data from the previous phase analysed. The aim of this phase to mark the end of the project when whether all requirements have been determined and there are no defects or errors.

3. Result

3.1 Requirements and planning
They are 65 responders and the questionnaire consist of several questions that ask the responder about their activities during the job training, features should be provided by the application and ranked them with number 1 – 4 witch is number 1 representing the highest priority. The results as follows

Table 1. Features must be provided by application

Feature	Priority Score
Guidance	1,86
Reporting activities	2,09
Monitoring	2,12
Assessment	2,85

Guidance has highest priority should be provided by the application and assessment feature is the lowest one. Based on the user responds the functional and non-functional for the system are created. Types of user are determined. There are three types of user, students, supervisor lecturer and job training coordinator. The system or the application divided into four modules according to the questionnaire's result. User stories created for each module. Writing the user story can use the formula "*As a [role] I can [function] so that [rationale]* "In other reference [12] "As a (role) I want (something) so that benefit)". A good user story writing should be independent, negotiable, valuable to users or customers, estimatable, small and testable [13]. Table 2 shows user story for guidance module.

Table 2. User stories of modules

Module	User	User Story
Guidance	Student	As a student I can get guidance from supervisor so that I can ask about the job training topic
	Supervisor Lecturer	As a supervisor lecturer I can give guidance to the student so that I can give advice to job training's students
	Coordinator	As coordinator I can assign a supervisor lecturer for the student so that I can make report of job training easily
Reporting Activities	Student	As a student I can reporting my daily activity so that my supervisor lecturer knows.
Monitoring	Supervisor lecturer	As a supervisor lecturer I can monitor the student activity so that I can know daily activity of the job training's student
Assessment	Supervisor lecturer	As a supervisor lecturer I can entering the assessment score so that I don't need to fulfil on the paper
	Coordinator	As a coordinator I can make the assessment report so that the reporting job training process more easily

ISBN : 978-602-99806-3-9

Each story can be split into two or more small user stories [14]. This is to facilitate developer working on programming, with small user story easy to run unit test. During the planning phase, the major decisions are made. The application is web based and was developed using PHP 5.6 and MYSQL 5.6 for the database. The story points or estimation times of each iteration is determined, and so does the iteration's velocity. Table 3 shows the iteration's times estimation.

Table 3. Time estimation of iterations

No	User Story (US) code	Description	Estimation (day)
Iteration 1			
1.	US 01	Login	3
2.	US 02	Edit and view profile	3
3.	US 04	Add guidance	2
4.	US 05	Send a question text	2
5.	US 06	Upload a file	2
6.	US 07	Send an answer text	2
		velocity	14
Iteration 2			
1.	US 08	Add activities	3
2.	US 09	Approve activities	2
3.	US 10	Add assessment score	5
4.	US 11	Edit assessment score	4
		velocity	14
Iteration 3			
1.	US 12	set supervisor lecturer	5
2.	US 13	Import data from excel	5
3.	US 14	Download the assessment score	2
4.	US 15	Download the guidance recapitulation	2
		velocity	14
Iteration 4			
1.	US 16	Download Job Training regulation	2
2.	US 17	Download Job Training report template.	2
3.	US 03	Change Password	2
		velocity	6

3.2 Iteration Initialization and Design

With the 48 story points and the iteration velocity is 14, so it needed 4 iterations to finish the 48 points. During the design phase developer modelling the system, including database and user interface. Simpler design means less development time and it is cheaper replacing code when little time has been employed on it.

3.3 Implementation

The implementation phases began with the implementing user story with their TDD and Acceptance Test Driven Development (ATDD) named Acceptance Test Story. TDD rules defined by Kent Beck a very simple [15]. Acceptance tests are from the user's point of view-the external view of the system [16]. The overview of TDD Research project and experiments has been conducted by Aleksandar Bulajic[17]. This research ran ATDD for user stories. Table 4 shows the Acceptance Test Story for US 01 Login.

Table 4. Acceptance test story for US 01 login

Acceptance Test Story US 01
1) Checking user's type
2) Validating username and password
3) Save user's data to database

ISBN : 978-602-99806-3-9

When the implementing code passed the acceptance test criteria and the unit tests are performed, the next step is code development and refactoring. In the implementing phase all unit testing passed successfully and the code compiled without any error. Figure 2 shows login user interface and the implementing user interface login shown in figure 3.

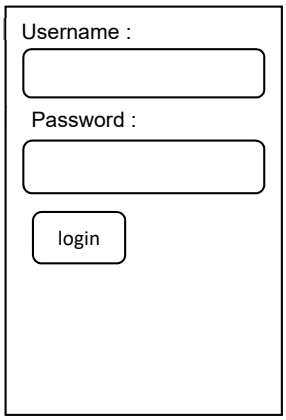


Figure 2. Login user interface

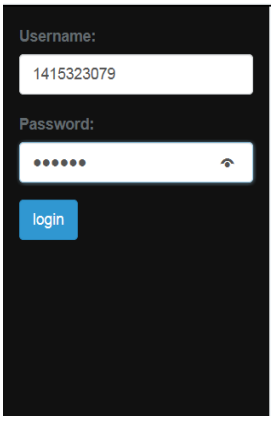


Figure 3. Implementing login user interface

3.4. Burn-down chart

A burn-down chart is used to understand and track the progress of development sprint or iteration. Burn-down chart also used to see how many works to do. The planning iteration burn-down chart are made from Table 3 with total 48 story point and 4 iterations. The velocity determined 14. The burn-down chart shows in figure 4. The actual iteration burn-down chart is shown in figure 5. Burn-down chart on this research follows the burn-down chart scheme in [18]. During the process development several user story are done faster than the time estimation. US 05 and US 7 on the Iteration 1, US 8 and US 11 from Iteration 2, US 12 and US 13 are one day faster than the time estimation. If the velocity is 14 than US 8 in Iteration 2 moved into the iteration 1, and so did the user story from Iteration 3. Overall actual development requires only 3 iterations.

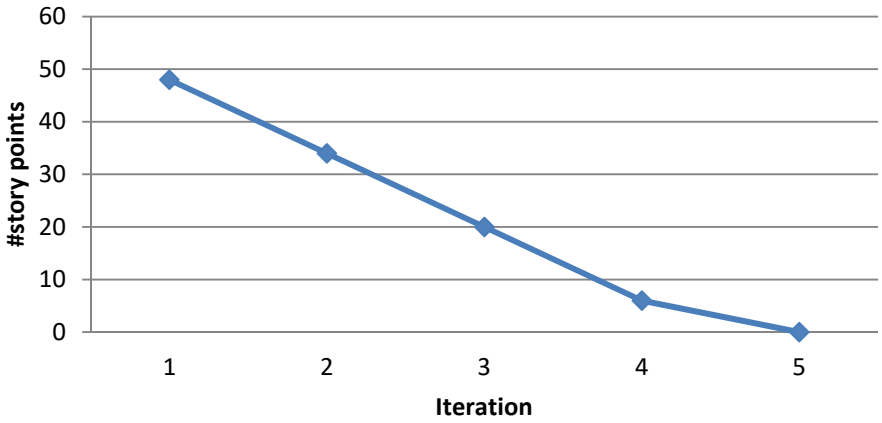


Figure 4. Planning iteration burn-down chart

ISBN : 978-602-99806-3-9

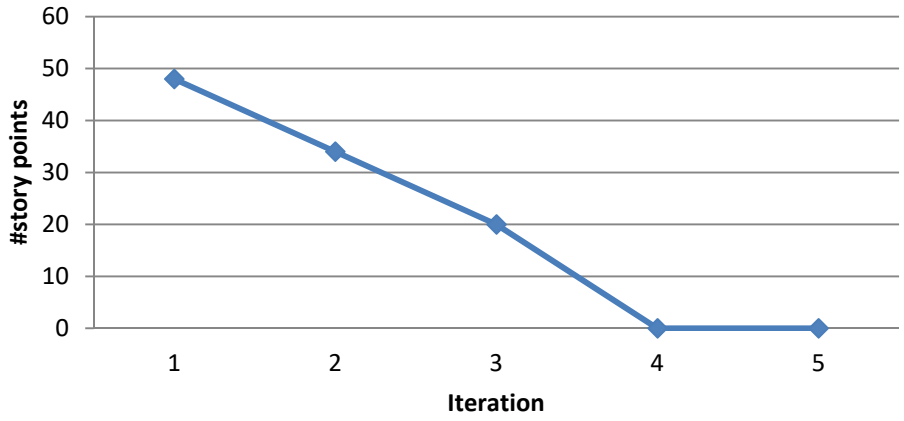


Figure 5. Actual iteration burn-down chart

3.5. Release

The information system is already launched for release 1 and tested by 40 users (students and supervisor lectures) to find out whether the system met all the requirements or not. The user's responses of the information system through several questions are shown in table 5.

Table 5. User responds

No.	Question	Agreed	Strongly Agreed	Disagreed	Strongly Disagreed
1.	Is the application very useful	18%	83%	0%	0%
2.	Is the application easy to use	25%	75%	0%	0%
3.	Is the application met the requirements	15%	85%	0%	0%
4.	Is the application has attractive design	7.5%	90.0%	2.5%	0%
5	Is the application fast accessed	25%	75%	0%	0%
	Average	19%	81%	1%	0%

4. Conclusion

The development web based job training information system using PXP has been successful and in a relatively short time. The information system met all requirements generated from questionnaire. The result of release 1 average 81 of users are agreed, 19% users are strongly agreed about of the system functionality and only 1% said disagreed about attractive design. The applying PXP method has provided convenience to determining the duration of development cycle and facilitated the developer to build the code directed according to user stories. Time estimation on iteration planning burn-down chart is 48 days work, but the actually burn-down chart is 42 days work.

References

[1] Maarit Laanti, Outi Salo, Pekka Abrahamsson 2011 Agile methods rapidly replacing traditional Methods at Nokia: A surveyof opinions on agile transformation *Information and Software* Technology 53 Elsevier p 279-290.

[2] Rupali Pravinkumar Pawar 2015 A Comparative study of Agile Software Development Methodology and Traditional Waterfall Model IOSR Journal of Computer Engineering e-ISSN:2278-0661, p-ISSN:2278-8727 p 01-08.

[3] Schwaber K, Beedle M 2001 *Agile Software Development with Scrum* (Nevada: Prentice Hall).

[4] Beck K, Andres C 2004 *Extreme Programming Explained Embrace Change* (Boston: Addis.on Wesley) chapter 1 p 3

ISBN : 978-602-99806-3-9

[5] Sriram Rajagopalan, Saji K Mathew 2016 Choice of Agile Methodologies in Software Development: A Vendor Prespective *Journal of International Technology and InformationManagement* Vol 25 Issue 1p 39-54.
[6] Manish Kumar, Santosh Kumar Singh, Dr.R.K. Dwivedi 2015 A Detail Study of Agile Software Development with Extreme Programming *Int Journal of Advanced Research in Computer Science and Software Engineering* ISSN 2277 128X Vol 5 Issue 10 p719-725.
[7] Humphrey W 2000 *The Personal Software Process (Technical Report ESC-TR-2000-022)* (Carnegie Mellon University)
[8] Abdul Kadir Khan 2012 Impact of Personal Software Process on Software Quality *IOSR Journal of Computer Engineering ISSN 2278-0661* Vol 1 Issue 5 p 21-25.
[9] Ravikant Agarwal & David Umphrees 2008 Extreme Programming For Single Person Team *Proc. of Annual Southeast Regional Conf. 2008 (Auburn)* p 82-87.
[10] Dzuhrov Y, Krastieva I & Ileava S 2009 Personal Extreme Programming – An Agile Proccessfor Autonomous Developers *Proc.of Int. Conf. on Software, Services and Semantic Technology (Sofia)* (Bulgaria) p 252-259.
[11] Nazir Iqbal cs 2013 A Framework for Partial Implementation of PSP in Extreme Programming *Int. Journal of Engineering Research and Application (IJERA)* ISSN: 2246-9622, **vol. 3** issue 2 p 604-607.
[12] Victor Schetinger, Cesar Sauza, Lisanda M Fontoura, Cesar T. Pozzer 2011 User Story as actives for games development *Proc of SBGames* p 1-4
[13] Cohn M 2004 *User Stories Applied : For Agile Software Development* (Boston: Addison Wesley) p 17.
[14] Borrego Bernabe, R., Alvares Navia,I., & Garcia Penalvo, F.J. 2015 Faat – Freelance as a Team *Proc. of the 3 rd Int. Conf. Technological Ecosystem for Enhanced Multiculturality* p 687- 694.
[15] Kent Beck 2002 *Test Driven Development by Example* (Boston: Addison Wesley)
[16] Ken Pugh 2011 *Introduction to Acceptance Test Driven Development Net (Objectives Essential White Paper)* (Seattle)
[17] Aleksandar Bulajic, Samuel Sambasivam, Radoslov Stojic 2012 Overview of The Test Driven Development Research Projects and Experiments *Proc. of Informing Science & IT Education Conf.* p 165-187.
[18] Alistair Cockburn 2004 Earned-value and burn charts *Human and Technology HaT Technical ReportTR 2004.04*

Acknowlegements
This research supported by DRPM Ministry of Research, Technology and Higher Education of the Republic of Indonesia contract no. 01612/PL8/LT/2017

ISBN : 978-602-99806-3-9

Determining net single premium for credit life insurance at civil servants cooperative of State Polytechnic of Bali

Tri Tanami Sukraini[1,2], Ketut Vini Elfarosa[1]

[1]Study Program of International Business Management
State Polytechnic of Bali

[2]tritanami@pnb.ac.id

Abstract. Credit life insurance is a kind of term life insurance, which is the debtor's life is insured and the amount of coverage is limited by the value of the loan. This study aims to calculate the value of single net premiums, where things that taken into account are mortality and interest rates. This research was conducted in the unit of savings and loan of Civil Servant Cooperative at State Polytechnic of Bali (KPN PNB). In the calculation of premiums, there are two systems of payment of benefits, namely the system of instantaneous payment at death (continuous) and at the end of the year of death (discrete). This study links the two systems by analyzing the value of Actuarial Present Value (APV). The rate of interest is referring to the Bank of Indonesia rate of 6.5%. The results of the calculation analysis showed, by sex, the value of female APV is lower than men this is due to the probability of death of men greater than women. The higher the age, the increased chance of death. Women are considered to have better insurance risk than men. The age factor and the loan term affect the value of a single net premium.

1. Introduction

Savings and Loans Cooperative is one non-bank financial institution that serves to provide services to the community in the form of loans and also as a place of money savings. In general, the scope of business activities of savings and credit is the collection of funds and channeling of funds in the form of loans. Therefore, lending is the main source of income, in the form of service income (interest).

Cooperatives is one form of non-Bank micro finance institutions (LKM) that plays an important role in efforts to increase economic growth in Indonesia. In general, one of the factors in the success rate of developing LKMs in Indonesia is the the capacity of micro borrowers to payback thier credit on time (or zero non-performing loan) [12]. An LKM is vulnerable to the risk or a condition that results in damage or loss. The risk of financial loss of a Micro-entrepreneurs identified their primary concerns as the financial losses associated with death, illness and injury, natural disasters, theft or property damage [2].

In the Savings and Loans unit of the Civil Servant Cooperative of State Polytechnic of Bali (KPN PNB), the most serious risk is the death of the borrower (member of the cooperative) which has an impact on loan repayment or bad credit. There are many ways that co-operative protect themselves from the death risks of their clients, which are expect the group to repay and write off the loan [2]. One of the ways in which KPN PNB to overcome the problem of loan repayment due to the risk of death from cooperative customers is to pass on the additional expenses to clients in the form of a higher fee, which they place in a reserve fund. If a client dies, the balance is written off and deducted from the fund or, otherwise, implements credit life insurance.

ISBN : 978-602-99806-3-9

The readiness of the KPN PNB's savings and loan unit to self-manage the insurance fund is based on the consideration of human resources in State Polytechnic of Bali (PNB), where the age of the customer is considered still healthy and able to work and have a relatively low chance of mortality. Besides, the financial health of the Cooperative is considered good because there are no arrears on loan repayment and no claims to date. In this case the risk is considered low. Self-managing the insurance fund is also one of the strategies to maximize the benefits of cooperatives. Therefore the determination of the cost of credit insurance premium is the most important part of this credit insurance. If the premium set is too low this will be detrimental to the finances of the cooperative. But if the price is set too high, then the cooperative is not competitive and bring disadvantages to customers.

The insurance premium applicable to the KPN PNB's savings and loan unit is currently only based on the loan period, so the premium value for all ages is the same. The KPN PNB's unit of savings and loan in determining the premium does not take into account the mortality factor of the debtor. This study tested the calculation of credit insurance premiums on the unit of savings and loans of KPN PNB by looking at the mortality factor (chance of death) and the loan period. A person who has an older age will have a higher risk of death so that the premiums charged will vary by age. Because the risk used is the risk of mortality of the debtor and the difficulty of predicting a person's mortality, this study uses the analysis of actuarial survival and mortality tables in search of a person's chance of death. Survival analysis is a statistical method used to analyze survival data, such as preliminary data of patients infected with the disease to death or cure of patients. Mortality census becomes the most important part in the calculation of insurance premiums. A mortality table contains the annual probabilities of death at each age and sex for a given population [2]. The mortality table is based on the characteristics of the population.

For example the South African mortality table prepared by the Actuarial Society of South Africa (ASSA) which estimates the mortality rates from all causes, including HIV/AIDS, smoking is also associated with mortality rates which will form a mortality model as in the testing of the difference in mortality rates in some developed countries based on smoking prevelence [5]. The majority of interstate variation in mortality among white working-age adults in the United States is associated with a combination of mortality and obesity, substance abuse and rural/ urban residence [13]. The mortality table in Indonesia has undergone several changes that are adapt to the situation and the condition of the population, whether in terms of health, mortality rate, the existence of urbanization and other factors. The mortality table currently used in Indonesia is the mortality table III (2011) which is a change from mortality table II (2009). The mortality table III (2011) was prepared by the Indonesian Life Insurance Association (AAJI) and Society of Actuaries of indonesia (PAI). Completion of mortality table is as a reference to help the insurance company in the determination of the right premium rate. The premium value will be different according to the mortality table.

. The credit life insurance is essentially a life insurance product [9], where the borrower is liable to the life of the debtor / borrower and the sum insured is limited to the principal amount of the loan. The right of claim arises if the debtor dies within the coverage period that is equal to the remaining outstanding debt in accordance with the repayment schedule, so the credit elimination insurance is also a term life insurance. An n year term life insurance provides for a payment only if the insured dies within the n year term of an insurance commission at issue [1].

Determination of single premium net credit removal insurance in this study using term life insurance concept by analyzing Actuarial Present Value (APV). APV is the present value of the money that must be paid to obtain the same amount of value at the time of death within a period of time up to t years [1]. The mortality and interest rate tables have an effect on the calculation of APV values. This study uses the Indonesian Mortality Table of 2011, and the interest rate is assumed with reference to Bank of Indonesia interest rate of 6.5%. The APV result is used in finding a single net premium value. APV value is the most important part in determining a single net premium. Therefore it is necessary to formulate with both mortality and interest rates to get the right premium value.

ISBN : 978-602-99806-3-9

2. Research Methodology

The objective of this research is to calculate insurance premium for credit abolition in KPN PNB's savings and loan unit. The approach used in calculating these premiums is the 2011 Indonesian Mortality Table and the actuarial survival model in determining the chance of death. The factors affecting mortality are age and gender. Single net premiums are calculated based on the concept of actuarial values, i.e actuarial present value of term life insurance of n-years.

The stages in determining the single net premium rate in this research are collecting information, tabulating the data, determining the calculation method and calculating the value of APV. The study was conducted at the Savings and Loans Unit of The State Polytechnic of Bali's Civil Servant Cooperative (KPN PNB). The type of data used is the data of Civil Servants of Polytechnic Bali (PNB) of year 2016 which is obtained from PNB staffing, borrower age data, loan term, and data of loan amount obtained from KPN PNB. Borrowers/ loaners data are using loan transaction data from 2013 to 2016.

The survival model is used in the probability analysis of death, where the survival model indicates a person's chances of surviving over a certain time [1]. A Survival model is a probability distribution for a special kind of random variable [6]. The survival model which is related to the survival time, obtained from survival events such as failure, death, recurrence of a disease etc, is a random variable. The survival analysis was used in the study of mortality rate of HIV AIDS patients following antiretroviral therapy in Ethiopia, the time of survival used was the time from antiretroviral therapy to the time of death of HIV / AIDS patients where the reduction of death rate due to HIV / AIDS through timely therapy and treatment regularly [10]. The survival analysis was also used to determine the contribution of low birth weight to neonatal mortality in Indonesia, the time of child survival is the time of survival. The result is, children born in low birth weight and born from younger mothers had higher risk of neonatal mortality [11].

The distribution of survival time is indicated by three functions, namely the Survival function, the probability density function and the hazard function. If the random variable we are considering here, called T, is defined to be the time of failure of the entry known to exist at time t = 0, and is therefore frequently called the failure time random variable. Now if T is the time of failure, than the probability of still functioning at time t is the same as the probability that the failure time is later than the value of t. Probability that failure (death) will occur after time t. [6]. Another point, probability that failure (death) will occur after time t as explained in the model as in equation (1).

$$S(T) = \Pr(T > t) = 1 - \Pr(T \le t) = 1 - F(t) \tag{1}$$

The probability density function is defined as the derivative of F (t) [6]. In the actuarial survival model, the symbol (x) is used to denote a life-age-x and X is age (x) at death, then the future lifetime of (x), Xx, is denoted by T (x). So with the survival model obtained as in equation (2) and equation (3).

$$_tq_x = \Pr\left[T(x) \le t\right], t \ge 0 \tag{2}$$

$$_tp_x = 1 - {}_tq_x = \Pr\left[T(x) > t\right], t \ge 0 \tag{3}$$

$_tq_x$ Probability that a life observed at age x will die between ages x and x+t, meanwhile $_tp_x$ state the probability that (x) will atain age x+t

[7] Hazard function as in equation (4).

$$\lambda(t) = \lim_{\Delta t \to 0} \frac{\Pr(t \le T \le t + \Delta t \mid T \ge t)}{\Delta t} \tag{4}$$

Declared a mortality rate or a temporary failure at time t up to the subject observed for life t. the hazard function of the actuarial survival model is also called force of mortality denoted by $\mu(x)$.

The chances of a person's death can be sought even when the death is not known with certainty so that the amount of death benefit that will be paid can be known. The expected value of the random variable is the present value *E[Z]* called *actuarial present value* (APV). Insurance payable at the moment of death (continue) is denoted by $\bar{A}^{1}_{x:\overline{n}|}$, with Z as a fungction of T. Insurance payable at the

ISBN : 978-602-99806-3-9

end for the year of death (discreet) denoted with $A^{1}_{x:\overline{n}|}$ with Z is the function of K [1]. Each formula is as in equation (5) and equation (6).

$$\bar{A}^{1}_{x:\overline{n}|} = E[Z] = \int_0^{\infty} z_t f_T(t)dt = \int_0^{n} v^t \, {}_t p_x \mu_x(t)dt = \int_0^{n} e^{-\delta t} \, {}_t p_x \mu_x(t)dt \tag{5}$$

$$A^{1}_{x:\overline{n}|} = E[Z] = \sum_{k=0}^{n-1} v^{k+1} \, {}_k p_x q_{x+k} \tag{6}$$

[4] Where v is a discount function as in equation (7).

$$v = \frac{1}{1+i} \tag{7}$$

Duration will affect the value of APV, the longer the time period will be the higher the value of APV. As in calculation of APV retirement programs, where longer tenure shows higher APV scores [3]. APV value is also influenced by interest rate. On the calculation of continuous life annuities for life insurance using life table with uniform assumption, seen increasing of interest rate cause lower APV value [8].

On the principle of calculating a single net premium, the obligations of the insurance company are equal to the rights received by the customer. The net single premium equation as equation (8).

$$b_t \bar{A}^{1}_{x:\overline{n}|} \tag{8}$$

3. Result and Discussions

In this study the data used is employee data with the status of Civil Servants (PNS), because the special conditions of loaners in the KPN PNB is as civil servants. Based on the data obtained at the Bali State Polytechnic (PNB) staff, the number of civil servants (staff and lecturers) in PNB in 2016 is 535 people. Based on tabulation results of civil servant's age data at the PNB as shown in Figure 1, the lowest age is 26 years and the highest age is 65 years, with the most age of 53 years with 39 people.

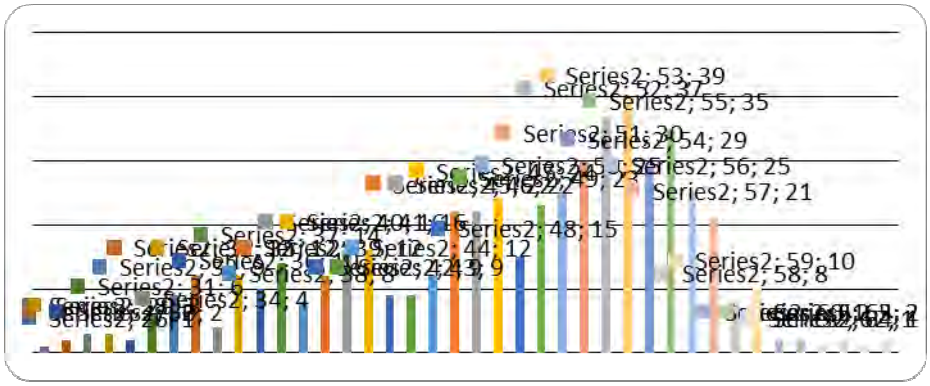


Figure 1. Bali State Polytechnic's Civil Servants Age Graphic

The result of data analysis of loan transaction from year 2013 until 2016, obtained the age of debtor in KPN PNB is 26 years to 60 years, as seen in the Figure 2, shows the percentage of the number of debtors by age group. The largest age group of borrowers performing loan transactions is aged 46 to 55 years with 44%, followed by ages 56 to 65 years by 36%, age group 26 to 45 by 16% and age group 26 to 35 years with 26%.

ISBN : 978-602-99806-3-9

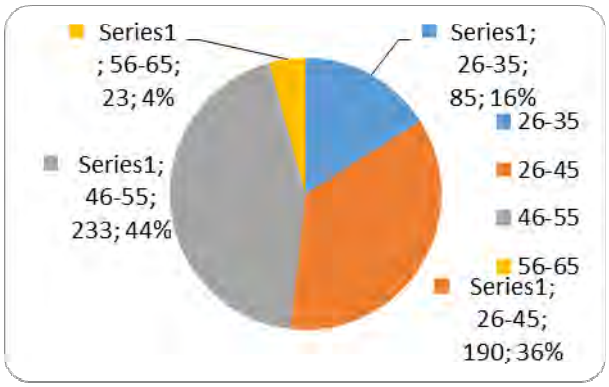


Figure 2. Percentage of Data of Debtor Age of KPN PNB

Based on the loan period, shown in Figure 3, the longest loan period is 15 years. The most time borrowed is 10 years.

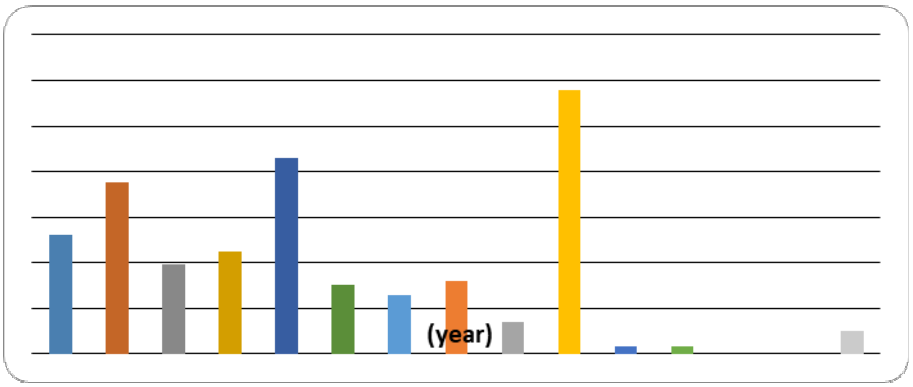


Figure 3. Graph of Loan Time Data

From the analysis of this data is known age range of debtors is aged 26 to 60 years. Referring to the Indonesian mortality table 2011, for ages 26 to 60 years by sex, the chances of male deaths greater than women. Women are considered to have better insurance risk than men. In credit insurance with mortality risk, in addition to mortality factor, loan term factors also affect the amount of premium. For example, a person is more likely to die for a period of 10 years than for 1 year.

In the 2011 mortality charts, seen from the age factor, the higher the age, the chances of death are increases or life opportunity decreases. So it can be assumed that the life chance denoted by linear function, where assumptions for fractional age can use the uniform distribution assumption, with linier interpolation as equation (9) [1].

$$S(x+t)=(1-t)S(x)+t\cdot S(x+1),\ 0\le t\le 1 \tag{9}$$

The respective equations obtained for mortality, life chances and the acceleration of mortality are as in equation (10), equation (11) and equation (12).

$${}_tq_x=1-{}_tp_x=1-\frac{S(x+t)}{S(x)}=\frac{S(x)-S(x+t)}{S(x)}=t\cdot q_x \tag{10}$$

$${}_tp_x=\frac{{}_{x=t}p_0}{{}_xp_0}=\frac{S(x+t)}{S(x)}=1-t\cdot q_x \tag{11}$$

$$\mu(x+t)=\frac{-S'(x+t)}{S(x+t)}=\frac{q_x}{1-t\cdot q_x} \tag{12}$$

ISBN : 978-602-99806-3-9

$$q_{x+t} = \frac{q_x}{1 - t \cdot q_x}, \tag{13}$$

The relationship between instantly paid insurance at the time of death (continuous) and insurance paid at the end of the year of death (discrete) can be obtained by analyzing the value of Actuarial Present Value (APV). In some life insurance cases, the most important information can be obtained from the discrete opportunity distribution T which is expressed as an opportunity distribution of K, so that the relation analysis of continuous and discrete model benefit payments is as equation (14).

$$\bar{A}^{1}_{x:\overline{1}|} = \int_0^1 v^t q_x dt = q_x \int_0^1 e^{-\delta t} dt = \frac{i}{\delta} v q_x = \frac{i}{\delta} A^{1}_{x:\overline{n}|} \tag{14}$$

Interest rate (i) used in this study refers to Bank of Indonesia (BI) rate. The latest BI rate for July 21, 2016 is at 6,50% [14]. Force of interest $\delta = -\ln v = 0,063$. APV scores for each age vary by age and loan period, for 45 years of age (female) with a 5-year loan term will be different from the age of 50 years.

$$\begin{aligned}
\bar{A}^{1}_{45:\overline{5}|} &= \frac{i}{\delta} A^{1}_{45:\overline{5}|} = \frac{i}{\delta} \sum_{k=0}^{5-1} v^{k+1} {}_k p_{45} q_{x+45} \\
&= \frac{i}{\delta} \left(v^1 {}_0 p_{45} q_{45} + v^2 {}_1 p_{45} q_{46} + v^3 {}_2 p_{45} q_{47} + v^4 {}_3 p_{45} q_{48} + v^5 {}_4 p_{45} q_{49} \right) \\
&= 0,010216 \\
\bar{A}^{1}_{50:\overline{5}|} &= \frac{i}{\delta} A^{1}_{50:\overline{5}|} = \frac{i}{\delta} \sum_{k=0}^{5-1} v^{k+1} {}_k p_{50} q_{x+50} \\
&= \frac{i}{\delta} \left(v^1 {}_0 p_{50} q_{50} + v^2 {}_1 p_{50} q_{51} + v^3 {}_2 p_{50} q_{52} + v^4 {}_3 p_{50} q_{53} + v^5 {}_4 p_{50} q_{54} \right) \\
&= 0,018027
\end{aligned}$$

With the same step obtained the value of APV 45 years and 50 years for men, ie for the age of 45 years and for the age of 50 years. If it is assumed that the loan amount is Rp. 20.000.000, - then based on equation (8) obtained a net premium value as in Table 1.

Table 1. Comparison of Single Net Premium Value

Age	APV		Net Single Premise	
	Female	Male	Female	Male
45	0,010217	0,015463	204.328	309.251
50	0,018027	0,029257	360.543	585.136

Single net premium value will be charged to the debtor with loan amount of Rp. 20,000,000, - with 5-year loan period, when viewed by age 45 and 50 years old, 50 years old is subject to a higher premium than the age of 45, male or female. Based on gender, it is also seen that the premiums charged to male debtors are higher than female debtors. Both of these are due to differences in APV values where female APV is lower than male and so does the value of APV at age of 45 years is lower than the age of 50 years. This calculation based on rate imposed by KPN PNB at recent time it will have different value.

ISBN : 978-602-99806-3-9

KPN PNB in determining the premiums imposed on the debtor does not take into account the factors of age and gender, so the premium value for all age and sex is the same, as in Table 2, age of debtors 45 and 50 years with loan value Rp. 20.000.000, - 5 year period the premium value is Rp. 306,600, - while for actuarial calculation, there are different net premium value according to age, gender and loan period.

Table 2 Comparison of Premium Value at KPN PNB and Actuarial Calculations

Age	KPN PNB	Actuarial Calculations	
		Female	Male
45	306.600	204.328	309.251
50	306.600	360.543	585.136

4. Conclusions and Recommendations

The calculation of a single net premium value using actuarial concepts consists of several stages. First determine the chances of survival and mortality based on mortality table and survival analysis. Further determining the interest rate, in this case using the interest rate of Bank of Indonesia and calculating Actuarial Present Value (APV)

The results of the calculation analysis showed, by sex, the value of female APV is lower than men this is due to the probability of death of men greater than women. The higher the age, the increased chance of death. Women are considered to have better insurance risk than men. In term of loan term, the risk of mortality of debtor is also higher with the length of loan period. The older a person and the longer the loan period, the greater the value of a single net premium.

The single net premium calculation in this study has different results at the age, gender and loan term. Unlike the case with the current premium in KPN PNB. KPN PNB in determining the premiums imposed on the debtors only on the basis of the loan period does not take into account the factors of age and gender, so the value of premiums for all ages and sex the same.

In this study the calculated premium is a single net premium so that only the mortality and the interest rate are calculated. Single net premiums are only enough to pay benefits, but not enough for operational costs. For further research, it is expected to develop this research with pay attention to load factor to cover other expenses incurred by cooperative.

5. References

[1] Bowers, N.L., Gerber, H.U., Hickman, J.C., Jones, D.A., Nesbitt, C.J., 1997. *Actuarial Mathematics Second Edition*, The Society of Actuaries, United States of America.

[2] Churchill, C.F., Liber, D., McCord, M.J., and Roth, J., 2003. *Making Insurance Work: for Microfinance Institutions*, Switzerland: International Labour Organization.

[3] Ibiwoye, A., 2012. *An Actuarial Analysis of the Payout Options in Nigeria's Contributory Pension Scheme*. International Journal of Business Administration. Vol. 3, No. 6, ISSN 1923-4007.

[4] Kellison, S.G., 2009. *The Theory of Interest*, Third Edition. McGraw-Hill International Edition.

[5] Kleinow, T., Cairns, A., 2013. *Mortality anda Smoking Prevalence: An Empirical Investigation in Ten developed Countries*. British Actuarial Journal, Vol 18, Issue 2, pp. 452 – 466.

[6] London, Dick., 1988. *Survival Models and Their Estimation*, Third Edition, ACTEX, Winsted, Connecticut.

[7] Lawless, J.F., 1982. *Statistical Models and Methods for Lifetime Data*. New York: John Wiley and Sons.

[8] Li, S., Yin, C., Zhao, X., Dai, H., 2017. *Stochastic Interest Model Based on Compound Poisson Process and Application in Actuarial Science*. Research Article. Hindawi, Mathematical Problems in Engineering, Volume 2017, Article ID 3472319.

[9] Modi, A., Patel, M., Patel, K., 2012. *Credit Life Insurance for Home Loan Customers in India*. Indian Streams Research Journal, Volume 2, Issue.11, ISSN: -2230-7850.

ISBN : 978-602-99806-3-9

[10] Seyoum, D., Degryse, J.M., Kifle, Y.G., Taye, A., Tadesse, M., Birlie, B., Banbeta, A., Aguirre, A.R., Duchateau, L., Speybroeck, N., 2017. *Risk Factor for Mortality among Adult HIV/AIDS Patient following Antiretroviral Therapy in Southwestern Ethiopia: An Assesment through Survival Models*. International Journal of Environment Research and Public Health, 14, 296.

[11] Suparmi., Chiera, B., Pradono, J., 2016. *Low Birth Weight and Risk of Neonatal Mortality in Indonesia*. Health Sience Journal of Indonesia, Vol. 7, No. 2

[12] Tambunan, Tulus, 2014. *The Importance of Microfinance for Development of MSMEs in ASEAN: Evidence from Indonesia*. Journal of ASEAN Studies 2 (2014), 2, pp. 80 – 102.

[13] Tenesa, C., Stokes, A., Preston, S., 2014. *Factors Responsible for Mortality Variation in the United States: A Laten Variable Analysis*. Demographic Research, Vol. 2, Article 2, p. 27-70.

[14] www.bi.go.id

Proceeding International Joint Conference
on Science and Technology (IJCST) 2017
ISBN : 978-602-99806-3-9

Analysis of seaweed cultivation business in Ped village, Nusa Penida district, Klungkung regency

Ni Nyoman Supiatni[1]*, A A A Mirah Kencanawati[2], Sagung Mas Suryaniadi[3]
[1,2,3]Jurusan Administrasi Bisnis, Politeknik Negeri Bali, Bukit Jimbaran Bali

*Email : nyoman.supiatni@yahoo.com

Abstract. Seaweed is one of the potential marine biological resources which functions as a source of income for the government and community. Ped village located in Nusa Penida has a relatively wide seaweed cultivation area covering around 32 ha, with the number of farmers being 325 families. The kinds of seaweed suitable to be cultivated using the off-bottom method in Nusa Penida is Euchema spinosum and euchema cottonii. Seaweed cultivation is very easy, requiring no fertilizers and pesticides as in rice plantation. Another advantage is that it can be planted throughout the year, and it has a short harvest age, which is about 42 days. The quality of seaweed is largely influenced by the type of seeds, the age of harvest, and, most importantly, the drying process. Drying is done using the following method: the seaweed is placed on a tarp put on the ground and exposed it to the sun. As a consequence, the amount of dirt contained in the dried seaweed is still high, leading to its low price. This research was conducted using survey method. The data collected consisted of primary and secondary data. Primary data relating to socioeconomic and business circumstances are collected through interviews and questionnaires. Secondary data were obtained from the Nusa Penida Sub-district, and the Central Bureau of Statistics of Klungkung Regency, as well as other references related to the study. The results of this study showed that the cultivation of seaweed using off-bottom method was quite effective, RCR = 1.29, meaning that such method was profitable and reasonably feasible. The net income derived from an area of 4 acres was Rp. 1.800.000 per period. This opens up business and employment opportunities for the surrounding community, although this income is still highly dependent on the national tend-to-fluctuate market price of dried seaweed.

Keywords: seaweed, off-bottom method, business feasibility, return cost ratio.

1. Introduction

Seaweed is one of potential bio-resources of Indonesian sea. Seaweed cultivation and fishing activities has potential to increase people's income, widening job opportunity and business chance as well as the state foreign exchange producer (Pontoh, 2012).

Nusa Penida is a Sub-district that consists of three islands those are the Lembongan Island, Ceningan Island, and the biggest is the Nusa Penida Island. The three islands are located at South-eastern side of Bali Island which is included in Klungkung Regency territory, which in the present time has succeed in developing seaweed cultivation by targeting for export. Nusa Penida Sub-district territory area is 202.84 km^2, with total population of 47,786 (Klungkung in Number, 2012). By the success of seaweed cultivation, many farmers change to be seaweed cultivator, especially those who are living in the North coastal area of Nusa Penida. Seaweed cultivation is very easy, by using simple equipment and local materials, except for the nylon rope and raffia that should be bought. Seaweed cultivation does not need any fertilizer or pesticide like in those for rice and other plants (Anggadiredja et al., 2006; Aslan, 2002).

Seaweed cultivation in the present time has become the main activity to people of north coastal area of Nusa Penida Island, because seaweed demand to fulfill export market is high. Dried seaweed is sent

ISBN : 978-602-99806-3-9

to Denpasar or Surabaya, and furthermore to be exported to destination countries such as Japan, China, Taiwan, Australia, the United States, England, and other countries.

To find out whether a business in this case is seaweed cultivation business has any good prospect or in contrary, it needs financial analysis which is related to the cultivation activity such as availability of seed, equipment, manpower, materials, etc. Until today there has not found yet a scientific report that analyze the financial matter about investment cost and operational cost and feasibility analysis of a seaweed cultivation business at Ped Village, Nusa Penida Sub-district of Klungkung Regency. The aims of this research were to estimate the return cost ratio (RCR) of seaweed cultivation business, as indicator of the efficiency of project investment.

2. Research Method

This research was performed at Ped Village, Nusa Penida Sub-district of Klungkung Regency. Subject or respondents in this research are the seaweed cultivators who cultivate seaweed by using off-bottom method (Poncomulyo et al., 2006), with total respondents of 18 people (Colton, T. 1984). This research was performed by using survey method. Data collected consist of primary data and secondary data. Primary data are related to the social economy condition and the condition of the business until the present time and they are collected through direct interview and questionnaire filling in. Secondary data are collected from the head village office, Nusa Penida Sub-district in Number, and the Central Bureau of Statistic (BPS) of Klungkung Regency and other references related to the research.

The primary data obtained from the subject or respondents of seaweed cultivator are furthered to be processed and analysis descriptively. According to Waldiyono (2008) whatever the business is there is only known two types of cost those are the fixed cost and the variable cost. Furthermore, financial analysis is to find out the business feasibility counted by using the following formula (Abdelrhman HA et al., 2016; Elida et al., 2012; Waldiyono, 2008):

$$\begin{aligned} \Pi &= TR - TC \\ &= TR - (TVC + TFC) \\ &= (Y.PY) - (X1.PX1 + TFC) \\ &= (Y.PY) - [(X1.PX2) + (X2.PX2) \\ &\quad + (X3.PX3) + D\} \end{aligned}$$

Where:

Π : net income (Rp/acre/ production period)
TR : gross income (Rp/acre/ production period)
TC : total cost (Rp/acre/production period)
Y : total production (kg/acre/ production period)
Py : product price (Rp/kg)
TVC : total variable cost (Rp/acre/ production period)
TFC : total fixed cost (Rp/acre/ production period)
X1 : total seaweed seed (kg/acre/ production period)
PX1 : cost of seaweed seed (Rp/kg)
X2 : total of maintenance width (acre/production period)
PX2 : cost of maintenance (Rp/acre)
X3 : total of manpower (HOK/acre/production period)
PX3 : salary of manpower (Rp/HOK/ production period)
D : depreciation (Rp/unit/ production period)

To find out business efficiency it is used the criteria of Return Cost Ratio (RCR), which is analyzed with the following formula:

$$RCR = TR/TC$$

Where:

RCR = return cost ratio
TR = total demand (Rp/acre/ production period)
TC = total cost (Rp/acre/production period)

ISBN : 978-602-99806-3-9

With criteria, if RCR > 1, seaweed cultivation business is said to be efficient and profitable, and it is proper to be developed; RCR < 1, the seaweed cultivation business is not efficient and not profitable; RCR = 1, the seaweed cultivation business is in breakeven (not profitable neither loss).

3. Result and Discussion

The seaweed cultivation business with off-bottom method is started from area preparation that is to clean the bottom of the sea, installing of stakes, tying seed to plastic rope, tying plastic rope to stakes, maintenance, harvesting after 42 days old, drying, storing, and marketing. Financial analysis has purpose to find out whether a business is feasible or not to be developed. Analysis basic uses the calculation of fixed cost, variable cost, total cost, gross income, and net income (Haron AJ, 2016). Calculation of fixed cost for an area with size of 1 acre or 10 m x 10 m showed in Table 1.

Table 1. Fixed cost calculation

Description	Unit		Unit Price (Rp)	Total (Rp)
Field cleaning	1	Are	100.000	100.000
wood pole	40	Pcs	20.000	800.000
Nylon rope	3	Rol	250.000	750.000
Plastic rope	2	Rol	50.000	100.000
Total				**1.750.000**

`The greatest fixed cost component is the wood stake supplying which take portion for about 45.71% from total fixed cost. And the second position is the nylon plastic rope supplying for 42.85%. Considering that the stake supplying cost is big then it needs to do regular maintenance in order that the stakes are able to hold out longer by cleaning the stick dirt.

Furthermore, calculation of variable cost is done such as shown in Table 2. Deprecation is calculated based on supposition depreciation that occurs about 20% per period (Rochmanhadi, 1984). The greatest production cost component is the seed supplying cost for about 45.16% from total production cost, followed by the maintenance cost for 32.25%.

Table 2. Production cost and income per period

No	Description	Unit		Price piece (Rp)	Total (Rp)
1	Production cost				
	Wet seaweed seed	140	Kg	5.000	700.000
	Maintenance personal	1	People	500.000	500.000
	Tool's depreciation	0,20		1.750.000	350.000
				Production cost	**1.550.000**
2	Income				
	Dried seaweed sale	250	Kg	8.000	2.000.000
	Net income				450.000
3	Eficiency				
	RCR				**1.29**

ISBN : 978-602-99806-3-9

Whereas, income is influenced by total dried seaweed produced, and price in market is around Rp. 8,000/kg. Calculation of RCR efficiency value obtained around 1.29 or greater than 1 which means that the seaweed cultivation business with off-bottom method is quite profitable and suitable to be developed.

A seaweed cultivator can work the land for about 4 acres (400 m^2) so net income obtained is about Rp. 1,800,000.00 per period, where one period duration is 42 days.

4. Conclusion and Suggestion

Conclusion

1. From the calculation of above table the cost needed in area preparation with width of 1 acre (10 m x 10 m) with off-bottom method is Rp. 1,750,000, and the operational cost (production cost) needed is Rp. 1,550,000 per period.
2. With RCR value = 1.29 it means that 1.29 > 1 is feasible to be developed to open business opportunity and job chance for surrounding people.

Suggestion

To improve seaweed production it needs to give training and illumination in order that the seaweed cultivators will have proper knowledge and skill in seaweed cultivation technique by using off-bottom method, and also the marketing management expected can improve people's income and welfare.

Acknowledgments

The authors are highly thankful to Politeknik Negeri Bali for providing financial support to carry out the research work, under the scheme of Research Grant Year 2017.

References

[1] Abdelrhman HA, Shahwahid M, Paridah MT, Samad ARA, Habib MAAEI, 2016. Financial and Technical Assessment of Kenaf Cultivation for Producing Fiber Utilized in Automotive Component. *Bus Eco J* 7:4, pp 1-8

[2] Anggadiredja, J.T., Zatnika, A., Purwoto, H., Istini, S. 2006. *Rumput Laut*. Jakarta: Penebar Swadaya.

[3] Aslan, L.M. 2002.*Budidaya Rumput Laut*. Yogyakarta: Penerbit Kanisius.

[4] Colton, T. 1984. *Statistika Kedokteran*. Terjemahan R. Sanusi. Yogyakarta: Gadjah Mada University Press.

[5] Giatman, 2007.*Ekonomi Teknik*. PT. Raja Grafindo Persada

[6] Haron AJ, 2016. Factors Influencing Pricing Decision. *Int J Econ Manag Sci* 5:1 pp 1-4

[7] Klungkung Dalam Angka. 2012. Bappeda Kabupaten Klungkung, Badan Pusat Statistik Kabupaten Klungkung.

[8] Poncomulyo, T., Maryani, H., danKristiani, L. 2006. *Budi Dayadan Pengolahan RumputLaut*. Jakarta Agro Media Pustaka.

[9] Rochmanhadi, 1984. Perhitungan Biaya Pelaksanaan Pekerjaan dengan Menggunakan Alat-alat Berat. Departemen Pekerjaan Umum. Jakarta: Badan Penerbit Pekerjaan Umum.

[10] SNI, 1998. *Standar Nasional Indonesia – SNI 01-2690-1998 untuk Rumput Laut Kering*. Jakarta: Badan Standardisasi Nasional-BSN.

[11] Statistik Perikanan Budidaya Propinsi Bali, 2010-2013. Pemerintah Propinsi Bali Dinas Kelautandan Perikanan.

[12] Waldiyono, 2008. *Ekonomi Teknik (Konsepsi, Teoridan Aplikasi)*. Yogyakarta.Pustaka Pelajar.

Proceeding International Joint Conference on Science and Technology (IJCST) 2017
ISBN : 978-602-99806-3-9

Development of quality of educational service model based on student satisfaction inventory (a case study at Bali State Polytechnic)

I Wayan Siwantara[1], I Komang Sugiarta[2]
[1]Business Administration Department., Politeknik Negeri Bali
[2]Accounting Department, Politeknik Negeri Bali
Jl. Kampus, Bukit Jimbaran, Badung, Bali, Indonesia

siwantarapnb@gmail.com

Abstract. The aim of the present study was three-fold: (i) to determine the level of student satisfaction on the quality of educational services offered by Bali State Polytechnic (BSP) based on Student Satisfaction Inventory, (ii) to design an appropriate strategy to improve the quality of educational services in BSP, and (iii) to develop an appropriate educational service quality model for BSP. The participants were 421 students recruited using Stratified Proportional Random Sampling technique. The data were analyzed with the help of descriptive statistics, Importance Satisfaction Matrix, and Pattern Matching. It was found that the level of student satisfaction on the quality of educational services offered by BSP was in the category of "satisfied" with the average score of 2.78, quite far below the target stated in the 2017 BSP Strategic Plan, which is 3.3. This finding suggests that BSP authorities should increase Wi-Fi bandwidth within the campus, improve routine maintenance of campus facilities and infrastructure, provide training on service excellence for administrative staff, update course materials in accordance with the advancement of science and technology, simplify the administrative process of applying for the cover letter needed for on-the-job training and research, provide some communication channel to accommodate students' suggestions and complaints, make ID card for administrative staff and lecturers.

1. Introduction

Quality of service is defined as excellent or superior service that customers receive relative to what they expect (Zeithaml dan Bitner, 2000). Quality of service, according to Lewis and Booms in Tjiptono (2005), constitutes a measure of how well the level of service is delivered, and the extent to which the service delivered meets customers' expectations. Kotler and Keller (2009) stated that consumers create service expectations from past experience, word of mouth communication and advertising. The consumer compares the perceived service to the expected one. Consumers will be disappointed if the perceived service does not meet the expected service, and vice versa.Tjiptono (2005) argued that the two main factors that affect the quality of service are: (1) Customers' perception of the service they actually receive (perceived service). (2) The service that is actually expected / desired (expected service).

Parasuraman et al. (1988) in Kotler and Keller (2009), stated that there are five dimensions of service quality called Servqual, namely: (1) Tangibles, i.e. physical appearance, equipment, employees, and communication materials. (2) Reliability, i.e. the ability to perform the promised service in a convincing and accurate manner. (3) Responsiveness, i.e. willingness to help customers and provide services quickly. (4) Assurance, i.e. employee knowledge and decency as well as their ability to convey trust and confidence. (5) Empathy, i.e. the willingness to give a special attention to each customer.

ISBN : 978-602-99806-3-9

Quality in education services is complex in its facets, and there exists a lot of scope for sharpening and clarifying its definition (Choudhury, 2015). DeShields et al. (2005) noted that the higher education sector must endeavor to deliver high service quality and student satisfaction, in order to ensure sustainability in a competitive service environment. Jain et al. (2013) in a study of the fast growing technical education sector in India found that the current competitive environment for enrolling students has forced institutions to adopt a "students as a customer" approach to educational delivery.

Student Satisfaction Inventory (SSI) is a method of measuring student satisfaction in higher education services developed by Noel-Levitz since 2003 which is now widely used in universities in the world (Carabajal, 2012), which contains ten dimensions (Noel-Levitz, 2016), namely: (1) Academic advising and counseling effectiveness, i.e. the extent to which academic guidance and counseling programs can help solve problems faced by the students. (2) Academic support services, which include a wide range of support services available on campus to help students achieve their academic goals. (3) Campus support service, i.e. campus services which make the students' learning experience meaningful and productive. (4) Tuitition fee and financial aids effectiveness, i.e. campus services which relate to the ease of payment of tuition fees and the availability of scholarships provided by higher education institutions. (5) Recruitment and registration effectiveness, i.e. the effectiveness of recruitment methods and ease in conducting registration. (6) Instructional effectiveness, which is related to the implementation of learning process, curriculum, and campus commitment to academic excellence. (7) Campus climate, i.e. the extent to which the campus provides a conducive atmosphere and enhances ownership. (8) Concern for the individual, i.e. the attention and treatment of campus given to individual students and to what extent the students are considered important and accepted and valued by the institution. (9) Safety and security, i.e. safety and security of students while on campus. (10) Service excellence, i.e. the attitude of lecturers and administrative staff in providing services to students. The SSI's publisher indicate that the satisfaction and importance ratings can be use to calculate gap scors between importance and satisfaction (

Bali State Polytechnic (BSP) as one of higher vocational education institution in Indonesia, certainly has to pay attention to quality of education service. Improving the quality of educational services, be it academic or non academic, should constantly be implemented so that student satisfaction can be improved.

The result of the survey on the level of student satisfaction on the BSP education service by BSP Academic Quality Assurance Unit for the years 2015 and 2016 revealed that there has been a decrease in student satisfaction index in all departments and units related to the services delivered to the students, with the average decrease being 0.76 (BSP Academic Quality Assurance Unit, 2016). It is therefore necessary to develop strategies and models to improve the quality of education services to improve student satisfaction on the quality of education services in BSP.

The purposes of this study are: (1) To examine the level of student satisfaction on the quality of education services in BSP as measured by student satisfaction inventory. (2) To design strategies to improve the quality of education services in BSP. (3) To develop the quality model of education services to increase the satisfaction of BSP students.

2. Method

This research was conducted at BSP. The population of this study was all students of BSP which at the end of 2016 amounted to 3,886 people. The sampling technique used was stratified proportional random sampling based on the proportion of the number of population members in each sub-population (Sugiyono, 2012). The best sample size is 5-10 observations for each parameter (indicator) estimated (Sugiyono, 2012). There were 79 indicators in this study, so the minimum sample size should be 5 x 79 = 395. A total of 421 respondents participated in the study. So the number of samples taken exceeded the minimum required sample limit. Data collection was done through observation, questionnaire, and interview (Sugiyono, 2012).

The instrument used in this study was a closed questionnaire consisting of a set of statements based on the indicators of Student Satisfaction Inventory. Each statement was measured using a Likert scale used to measure attitudes, opinions and perceptions of a person or group of people about social events or symptoms (Riduwan, 2002). Each statement was given a score: 1 for the category of not important

ISBN : 978-602-99806-3-9

(dissatisfied), 2 for less important (less satisfied), 3 for important (satisfied), and 4 for very important (very satisfied).

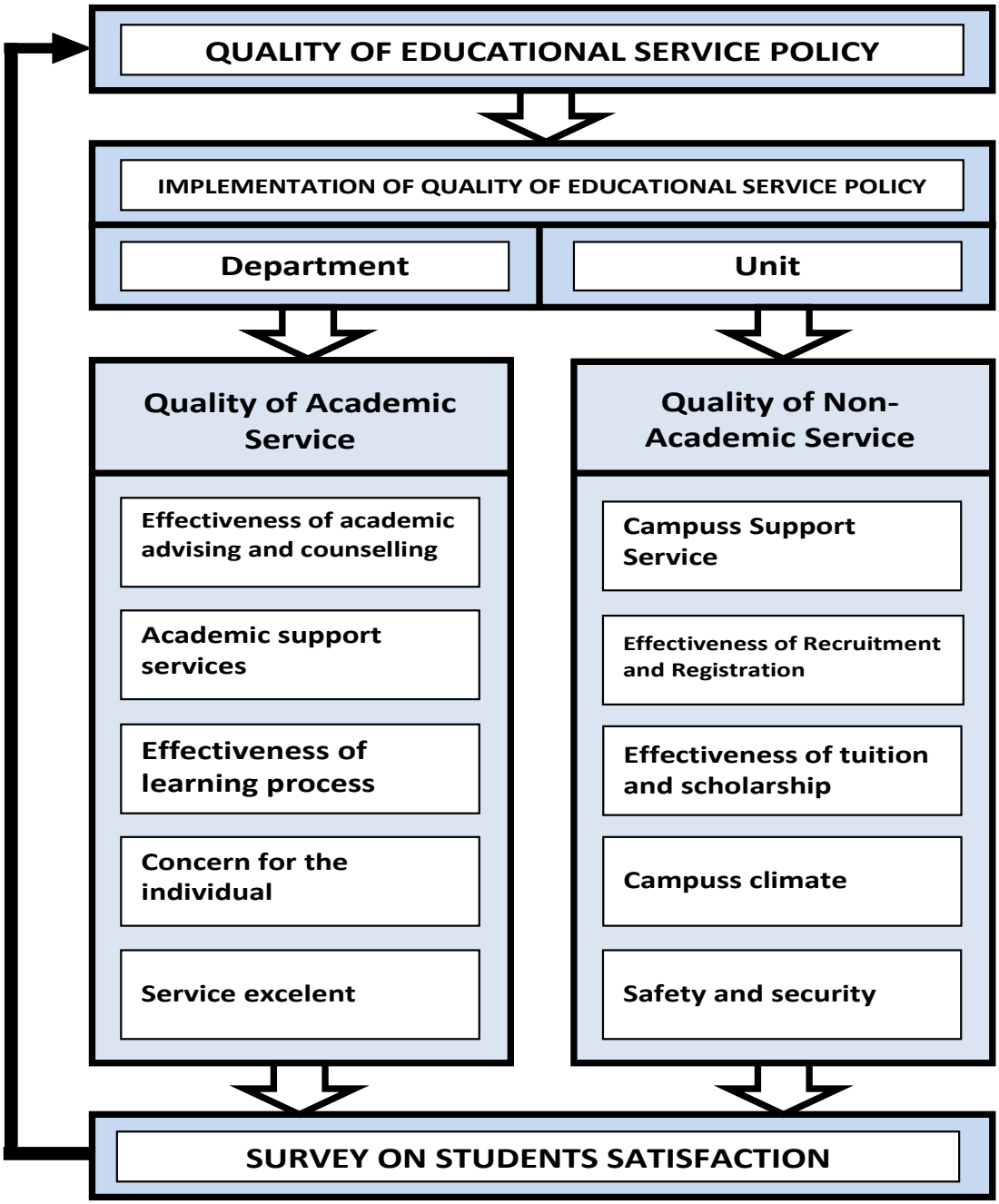


Figure 1. Design of BSP Quality of Educational Service Model
Based on Student Satisfaction Inventory

Before the research instrument was distributed to all respondents, it was first tested for its validity by using product moment correlation, the value of $r \geq 0.3$ indicating that the instrument was valid and $r < 0.3$ indicating that the instrument was not valid (Sugiyono, 2012). Furthermore, the instrument was also tested for its reliability using Cronbach Alpha (α) and the instrument was determined to be reliable if the value of Cronbach $\alpha > 0.6$ (Riduwan (2006).

ISBN : 978-602-99806-3-9

Data analysis techniques used in this study were: (1) Descriptive statistical analysis, which was used to compute the average value of importance and level of satisfaction of each indicator and dimension and performace gap of each indicator and dimension. (2) Imfortant-Satisfaction Matrix Analysis, which was used to analyze the strategy of developing the quality of education service (Hayati, et al, 2008), as shown in Figure 2. (3) Pattern Matching Analysis, which was used to develop the realistic quality model of education service to be applicable in BSP.

The design of strategies based on the position of each indicator located in the four quadrants, were as follows:

Quadrant I : (Concentrate These) This quadrant contains the factors that are considered important by the customers, but in fact these factors are not in accordance with customer expectations (satisfaction level is still low), so the service performance of these factors should be improved through continuous improvement so that the performance indicators in this quadrant increases.

Quadrant II : (Keep Up the Good Work) This quadrant is the region that contains the factors that are considered important by the customers and is in accordance with expectations (satisfaction is relatively high), so the quality of service for these factors must be maintained because it makes the product / service superior in the eyes of the customers.

Quadrant III : (Low Priority) This quadrant is the region that contains factors that are considered less important by the customers and its performance is also not very good. Increased performance of the factors included in this quadrant needs to be reconsidered because the effect on the benefits perceived by the customers is very small.

Quadrant IV : (Posible Overkill) This quadrant is an area that contains factors considered less important by the customers, but it has a high degree of satisfaction. Factors included in this quadrant are considered to have excessive service quality for low importance so that it can be reduced in order to save costs.

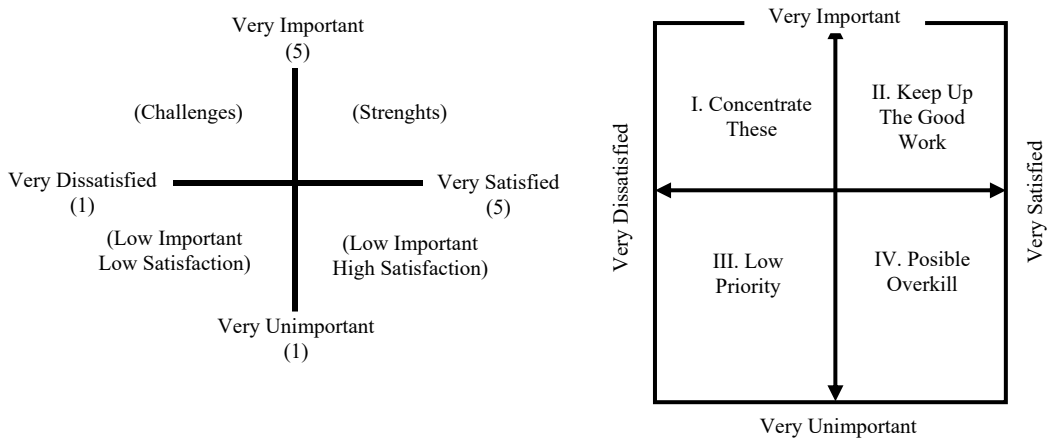


Figure 2. Improtant-Satisfaction Matrix
Source: Hayati, et al (2008)

3. Findings and discussion

The criteria of rating of respondents as satisfied or dissatisfied with the quality of BSP educational services was determined based on the average score of satisfaction level of each quality indicator of BSP educational service, which were as follows: 1.00 - 1.75 = dissatisfied (DS); 1.76 - 2.50 = less satisfied (LS); 2.51 - 3.25 = Satisfied (S); 3,26 - 4,00 = Very satisfied (VS) (Umar, 2005).

ISBN : 978-602-99806-3-9

Statistical analysis on the level of student satisfaction on the quality of educational services in BSP showed that the average score of student satisfaction level on indicators of each dimension of quality of educational services as meassured by Student Satisfaction Invntory was in the category of satisfied, with the average score being 2.87 as shown in Table 1, though this figure was still below the target of BSP Strategic Plan for the year 2017 (3.3).

Table 1. Level of Student Satisfaction on the Quality of Educational Service in BSP

No.	Dimmension	Average Score	Remark
1	The effectiveness of academic advising and counseling	2,95	S
2	Academic support services	2,69	S
3	Campus support services	2,81	S
4	Student recruitment and registration	2,89	S
5	Tuition and scholarships	2,78	S
6	Effectiveness of learning process	2,94	S
7	Campus environment	3,11	S
8	Attention to individual students	2,83	S
9	Safety and security	2,75	S
10	Service excellent	2,98	S
Average Scor Quality of Educational Service in BSP		**2,87**	**S**

Source: Results of Analysis Descriptive Statistics

Based on the result of analysis of Important-Satisfaction Matrix, the indicators for each dimension of educational service quality in BSP considered important by the students, which did not yet meet their expectation, could be determined (see Table 2 below).

Table 2. Indicators for Dimmension of the Quality of Educational Service in BSP Considered Important by the Students which did Not Meet Their Expectations

No	Dimenssion	Indicator
1	The effectiveness of academic advising and counseling	• Personal attention given by academic adviser to academic problems faced by students
2	Academic support services	• Ease of internet access for various purposes
3	Campus support services	• Ease of access to information about job vacancies, on-the-job training, and internship • Availability of facilities and public infrastructure (restroom, water, electricity, etc.) • Maintenance of campus facilities and infrastructure
4	Student recruitment and registration	• Administrative service in student registration
5	Tuition and scholarships	• The suitability of tuition fees with what is obtained during study
6	Effectiveness of learning process	• Conformity of work load (number of meetings, assignments, practicum, etc.) to the course semester credit system • Students' knowledge of the benefits and objectives of the course • The ability of lecturers when teaching in the classroom or in the laboratory • Conformity of course materials to the development of science and technologyTransparansi dalam sistem penilaian • Ease of applying academic cover letters (for assignment, on-the-job training, research, etc.) • Improvement of skills required in teaching process
7	Campus environment	• Availibity of communication facilities to convey students' suggestions, opinions, and complaints
8	Attention to individual students	• Fair treatment of individual students

ISBN : 978-602-99806-3-9

9	Safety and security	• -
10	Service excellence	• Hospitality and courtesy shown by administrative staff • Ease of identifying administrative staff from uniform or identification

Source: Results of Important-Satisfaction Matrix Analysis

The strategy formulated to improve the quality of BSP educational services to increase the level of satisfaction of BSP students is as follows: (1) Increasing the effectiveness of academic guidance and counseling by promoting personal attention by the academic advisers to their students on academic problems. (2) Improving the academic support services by increasing Wi-Fi bandwidth on campus. (3) Improving campus facilities and infrastructure by increasing the availability of water and electricity to meet various demands on campus and increasing routine maintenance of campus facilities and infrastructure. (4) Improving the effectiveness of recruitment and registration by improving the quality of service provided by academic and student affairs staff in student registration. (5) Improving the effectiveness of the learning process by changing course semester credit system to the system appropriate for Polytechnic education, that is every course has practicum load; providing understanding to the students about the benefits and objectives of the course by each lecturer; improving the ability of lecturers in teaching in the classroom or in the laboratory; regularly updating the course materials to suit the development of science and technology; enhancing transparency in the assessment process by returning the results of assignments and test to the students; and simplifying the bureaucracy in the application of cover letter for academic matters (for assignment, on-the-job-training, research, etc.) which can be handled at the department level. (6) Improving campus environment by providing a means of communication that accommodates student suggestions and complaints. (7) Increasing attention to individual students by giving rewards and punishment in a fair manner to the students. (8) Improving administrative staff services by improving hospitality and courtesy of administrative staff in serving students, as well as making identification marks for them.

Quality of BSP educational services are grouped into two areas of service quality, namely the quality of academic services and the quality of non-academic services. The quality of academic services consists of: the effectiveness of academic guidance and counseling, the effectiveness of academic support services, the effectiveness of the learning process, the attention to individual students, and excellent service. While the quality of non-academic service consists of: campus facilities and infrastructure, effectiveness of tuition and scholarship, the effectiveness of recruitment and registration of students, campus support service, and safety and security of students. If the elements of the quality of BSP educational services meet the expectations of students they will be satisfied with the quality of educational services. Conversely, if the elements of the quality of BSP educational services do not meet student expectations then the students will not be satisfied with the quality of BSP educational services.

4. Conclusion

The level of student satisfaction on the quality of educational services in BSP is in the category of satisfied with the average score being 2.87, although it was still below the target of the 2017 Strategic Plan (3.3).

The strategy to increase student satisfaction on the quality of BSP educational service includes increasing the ease of internet access for various academic purposes; dissemination of information on job vacancies, on-the-job training, and internships; improving routine maintenance of campus facilities and infrastructure; improving the hospitality and courtesy of administrative staff in serving students; changing the curriculum to the philosophy of polytechnic education, i.e. every course has practicum credit; improving the ability of lecturers in teaching in the classroom or in the laboratory; regularly updating the course materials to suit the development of science and technology; improving transparency in the assessment process by returning exam results and student assignments; simplify the administrative process in administering cover letters for assignments, on-the-job training and research; providing a means of communication that can accommodate student suggestions, opinions, and complaints; giving fair rewards and punishments to students; and making identification cards for administrative staff.

ISBN : 978-602-99806-3-9

The quality of BSP educational service model refers to the quality policy of BSP educational service implemented by department / study program for academic service quality and by unit / section for non academic service quality whereby student satisfaction survey is the basis in reformulating quality policy.

References

Carabajal, Kayleigh. 2012. *Noel-Levitz Student Satisfaction Inventory Report.* Retrieved on 1 March 2017 from https://www.fvtc.edu/portals/0/pdfs/about%20us/fvtc%20facts/fvtc2014 noellevitz studentsatisfaction report.pdf

Choudhury, Koushiki. 2015. "Evaluating customer-perceived service quality in business management education in India". *Asia Pacific Journal of Marketing and Logistics*, Vol. 27 No. 2, 2015 pp. 208-225 © Emerald Group Publishing Limited

DeShields, O.W. Jr, Kara, A. and Kaynak, E. (2005). "Determinants of business student satisfaction and retention in higher education: applying herzberg's two-factor theory", *International Journal of Educational Management*, Vol. 19 No. 2, pp. 128-139.

Firdaus, Abdullah. 2005. "Measuring Service Quality in Higher Education : Hed PERF Versus SERVPERF". *Journal Marketing Intelligence and Planning.* Vol.24. No.1, pp 31-47.

Hayati, Neunung R; Tanti Irawati Muchlis; Mardi. *Kepuasan Pelanggan (Mahasiswa) Dalam Pelayanan Pendidikan Tinggi (Studi Kasus di UniversitasWidyatama).* Retrieved on 2 March 2017 from http://repository.widyatama.ac.id/xmlui/bitstream/handle/123456789/ 1269/ content.pdf?sequence=1

Jain, R., Sahney, S. and Sinha, G. (2013), "Developing a scale to measure students' perception of service quality in the Indian context". *The TQM Journal*, Vol. 25 No. 3, pp. 276-294.

Gaspersz, Vincent. 2011. *Total Quality Management untuk Praktisi Bisnis dan Industri.* Bogor: Vinchristo Publication.

Kotler and Fox, KFA. 1995. *Strategic Marketing for Educational Institutions.* Englewood Cliffts NJ: Prentice Hall.

Kotler dan Keller.K.L, 2009. *Manajemen Pemasaran*. Edisi Kedua Belas. Jilid I & II. Jakarta: PT. Indeks.

Luca.P, Angela.M.D, Salvatore.R. 2006. "Student Satisfaction and Quality of Service in Italian University". *Journal Managing Service Quality*. Vol. 16, No.4.

Noel-Levitz. 2016. *Student Satisfaction Inventory.* Summit Pacific College. Retrieved on 2 March 2017 from https://www.ruffalonl.com/about-ruffalo-noel-levitz.

Parasuraman A., Zeithaml, and Berry L., 1988."Servqual: A Multiple-Item Scale for Measuring Consumer Perceptions of Service Quality". *Journal of Retailing.* Vol. 64, pg. 12-40.

RENSTRA Politeknik Negeri Bali Tahun 2015-2019.

Riduwan. 2002. *Skala Pengukuran Variabel-Variabel Penelitian.* Bandung: Alfabeta.

_____ 2006. *Cara Menggunakan dan Memakai Analisis Jalur (Path Analysis).* Bandung: Alfabeta.

Roszkowski, Michael J. 2003. "The Nature of The Importance-Satisfaction Relationship in Rating: Evidene from The Normative Data of The Novel-Levitz Student Satisfaction Inventory". *Journal of Consumer Satisfaction, Dissatisfaction and Complaining Behavior,* 2003, 16, pg 211.

Unit Penjaminan Mutu Akademik Politeknik Negeri Bali, *Laporan Survey Tingkat Kepuasan Mahasiswa Politeknik Negeri Bali Tahun 2016.*

Sugiyono. 2012. *Metode Penelitian Bisnis*. Bandung: CV Alfabeta.

Tjiptono, Fandy, 2005, *Pemasaran Jasa.* Malang: Bayumedia.

Tjiptono, Fandy; Chandra, Gregorius. 2005. *Service, Quality & Satisfaction.* Yogyakarta: ANDI.

Zeithaml V. A. & Bitner,M.J. 2000. *Service Marketing: Integrating Customer Focus across the firm", 2nd* Ed. Boston: McGraw-Hill.

ISBN : 978-602-99806-3-9

Influence of variation fluid flow towards the performance of cooling tower type induced draft counterflow cooling tower

Sudirman [1], I Putu Darmawa[1]
[1] Jurusan Teknik Mesin – Politeknik negeri Bali, Badung, Bali, Indonesia

dirmansdr@pnb.ac.id

Abstract. This research aims to improve the competence of students in the field of Cooling Tower. With product research is a simulation of Cooling Tower. The type cooling tower is Induced Draft Counter flow Cooling Tower. The need of simulation cooling tower for Refrigeration and Air Conditioning Program Study student will be met.Simulation of the Cooling Tower to be created, the load of cooling tower from 2 x 4 kW heater to heat the water that will be circulated to the cooling tower . The pump will circulation water heated by the heater into the cooling Tower. Discharge of water circulated will be varied, then the hot water circulated or which will be cooled in a cooling tower, also will be varied, to see a performance of a cooling tower that was made. The performance of the cooling tower is sought is the value of the temperature range, the temperature value approach, the effectiveness of the average cooling towers, the rate of evaporation of water into the air, cooling capacity (cooling load).

1. Introduction

One of the main components in central air conditioning other than chiller, AHU, and ducting is cooling tower. Its main function is as a means to cool hot water from condenser by direct contact with air by force convection using fan.

Processes that occur in chillers or cooling units for central air conditioning systems with vapor compression systems comprise the process of compression, condensation, expansion and evaporation. This process occurs in a closed cycle that uses a working fluid in the form of a refrigerant that flows in a piping system connected from one component to another. The condenser in the chiller is usually a water-cooled condenser that uses water for the refrigerant cooling processAnother section of your paper In general the shape of the construction of shell & tube where water flows into the shell / tube and superheat refrigerant vapor flows in the tube inside the tube so that the heat exchange process occurs. The superheated refrigerant vapor turns the phase into a liquid that has a high pressure flowing into the expansion device, while the water coming out has a higher temperature.

Because this water will be used again for condenser cooling process then of course the temperature must be lowered back or cooled on cooling tower. The first step is to pump the hot water into the cooling tower through the piping system which at the end has many nozzles for the spraying stage or bursts. The hot water coming out of the nozzle directly makes contact with the surrounding air which forcibly moves due to the influence of the fan / blower installed on the cooling tower.

Two factors that determine the rate of heat transfer from hot water to coolant air are contact time and surface area between phases (water and air). By giving the fill (filler) on the tower, then the two factors above enlarged (Qian et.al., 2012).

Susanto (2010) examined the characteristics of cooling towers using several types of arrangement of pipes as a liquid distributor. Mulyono and Baskoro (2000) examined the characteristics of cooling towers

ISBN : 978-602-99806-3-9

with corrugated plastic stuffing materials. Jamilah (1999) examines the performance of cooling tower with aluminum plate as a flow distributor. Ramli (1998) examined the characteristics of cooling tower with plate as a liquid distributor.
Refrigeration and Air Conditoning Program Study, Department of Mechanical Engineering State Polytechnic of Bali, practicing for students in accordance with real conditions that occur in the field, and always trying to develop tools or machines used for student practice. One of the practice tools that do not yet exist in the laboratory of Air Conditioning is the Cooling Tower.

This research activity aims to develop the tools of practice that exist in the Lab. Tata Air PS TPTU, especially the Cooling Tower Simulation tool, as well as practical teaching materials for this cooling tower. With the simulation of cooling tower later, the competence of students will increase, they will be able to audit the cooling tower in the field, as well as can improve the cooling tower performance, if there is a decrease in cooling tower performance studied in the field.

2. Methodology

The location of the research is in Lab Mekanik and Lab. Tata Air Department of Mechanical Engineering PNB.Lab. Mechanical will be used as a place of fabrication and assembling of tools to be made, while the Lab. Tata Air is the location where the process of taking the necessary data.The type of this research is research experimental research (true experimental research), which is doing direct observation to know the cause and effect relationship, after done a change (there is a special treatment) to the variables studied.

The research to test the performance of Induced Draft Cooling Tower is done by varying the water temperature at the water reservoir, varying the water debit to and varying the data retrieval time in every 30 minutes to 1 hour, so it will know the maximum range of cooling tower works optimally.

Measuring tools that are needed and exist in Refrigeration and Air Conditioning Laboratory of Engineering Program of Cooling and Air System of Mechanical Engineering Department are: Thermostat Digital, Thermocouple sensor, Thermocouple Display, Stop Watch, Anemometer, Thermocontrol

The data obtained from the research will be processed according to the formulas below, so get the quantities that show the performance of the cooling tower, that is:

2.1Temperature range.

Range is the difference between the inlet and outlet temperature of the cooling tower. High range means that cooling tower has been able to decrease water temperature effectively and its performance is good. The formula is as follows.

$$\text{Range } (^\circ\text{ C}) = \text{inlet temperature } (^\circ\text{ C}) - \text{outlet temperature } (^\circ\text{ C}) \qquad \_(2.1)$$

The range is not determined by the cooling tower, but by the process it serves. The range of a heat exchanger is determined entirely by the heat load and the rate of water circulation through the heat exchanger and into the cooling water. The cooling tower is specifically designed to cool a certain flow rate from one temperature to another at a certain wet bulb temperature

2.2Temperature approach (A)

Approach is the difference between cold water temperature out cooling tower and ambient wet bulb temperature. The lower the approach the better the cooling tower performance. Although the range and approach should be monitored, however, the approach is a better indicator of cooling tower performance.

$$A(^\circ\text{C}) = \text{water temp.out } (^\circ\text{C}) - \text{wet bulb temp. } (^\circ\text{C}) \qquad (2.2)$$

2.3 Effectiveness of cooling (Ec).

Cooling effectiveness is the ratio between temperature approach,and range. The higher this ratio, the higher the cooling effectiveness of a cooling tower.

ISBN : 978-602-99806-3-9

$$\boldsymbol{E_c}(\%) = \mathbf{100\%} \times \frac{water\ in\ temp. - wet\ bulb\ temp.}{water\ in\ temp. - water\ out\ temp.} \quad (2.3)$$

2.4Cooling Capacity (cooling load)

The cooling capacity of a cooling tower is equivalent to the cooling tower's ability to discharge heat into the environment. The coolingh capacity can be calculated by the following formula.

While the specific cooling capacity of the uniform cross-sectional area of the cooling tower can be calculatedby the following formula.

$$q = \dot{m}\ x\ C_p\ x\ \Delta T\ \left(\frac{kJ}{s}\right) \quad (2.4)$$

Where ,

Q = cooling capacity (kW)
$\dot{m}$ = water discharge (kg/s)
Cp = heat specific of water (KJ/kg°C)
ΔT = difference of inlet and outlet water temp. (°C)
A_{tower} = wide cross section of the cooling tower (m^2)

Product of this research is a cooling tower. Figure 1. under is the product of Cooling Tower Type Induced Draft Counterflow Cooling Tower.

Figure 1. Induced Draft Counterflow Cooling Tower.

This cooling tower is tested by varying the motor rotation of the pump so that the flow of flowing water will vary as well. Motor rotation variation is obtained by changing the frequency input of the inverter. The flowing water discharge is varied at 1.8 to 3.9 m3 / h. The water temperature to be cooled is made about 34 - 35 oC by using Thermocontrol.

ISBN : 978-602-99806-3-9

3. Result

The test results data are processed by the formulas presented front, then presented in graphical form below.

3.1 *The relationship between variation flow of water with temperature range*

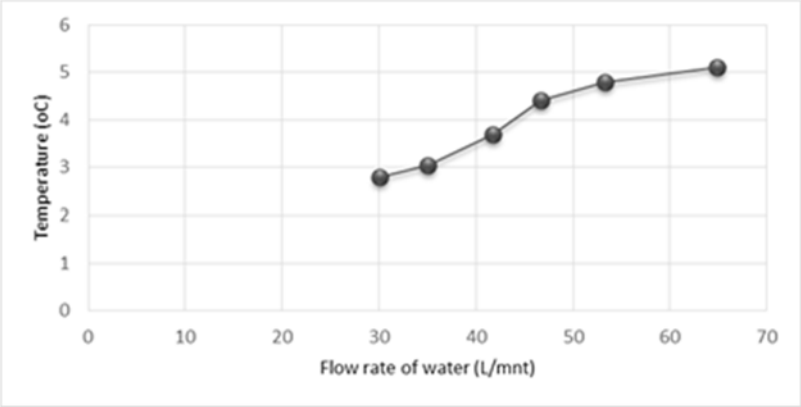


Figure 2 Flow rate of water to temperature Range

Changes in the flow of water into the cooling tower, the greater the water discharge is applied then the temperature range will be greater. This means that the water temperature that comes out will be cooler if the amount of water discharge into the cooling tower the higher.

3.*2 The relationship between variation flow of water and temperature approach.*

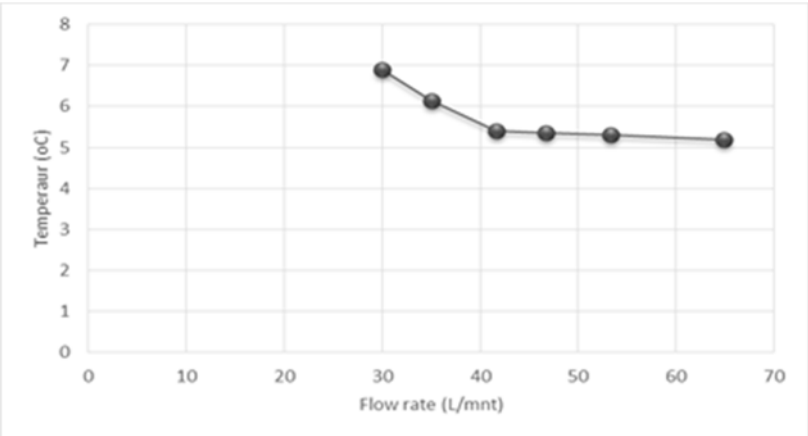


Figure 3. Flow rate of water to temperature approach

Changes in the flow of water into the cooling tower, the greater the water discharge is applied then the temperature approach will decrease. This means that the temperature of the water coming out cooling tower will approach the wet air temperature of the environment.

ISBN : 978-602-99806-3-9

3.3 *The relationship between variation flow of water and effectiveness cooling.*

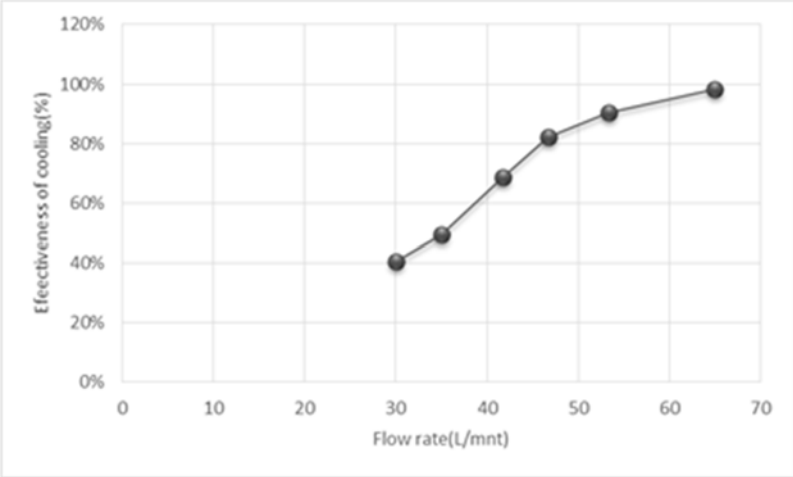


Figure 4 Flow rate of water to effectiveness cooling

Changes in the flow of water into the cooling tower, the greater the water discharge applied then the cooling effectiveness will be greater. This means that the cooling tower will be more effective with the greater the flow of water into the cooling tower the higher

3.4 *The relationship between variation flow of water and cooling capacity.*

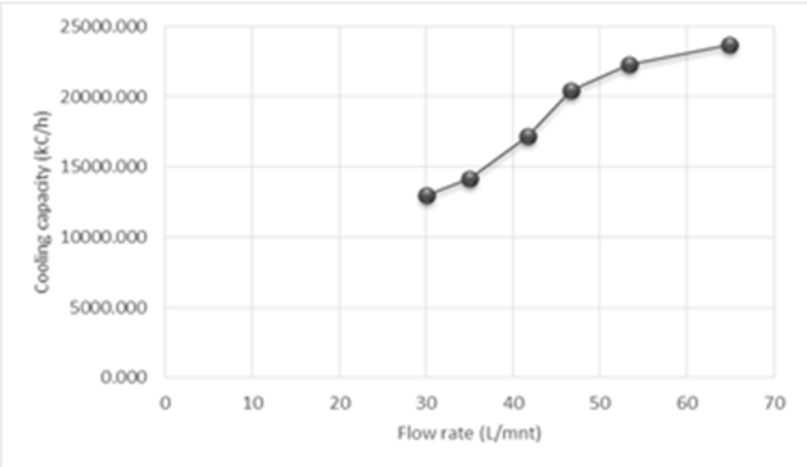


Figure 5 Flow rate of water vs cooling capacity

Changes in the flow of water into the cooling tower, the greater the water discharge is applied then the cooling capacity will be greater.

4. Conclusion

With variations of flow discharge applied 30, 35, 41, 46.7,53.3, 64.9 (lt / min) yielded

1. Temperature range is increasing, ie 2.8 / 3.05 / 3.7 / 4.4 / 4.8 / 5.1 (ºC)
2. The approach temperature is lower, ie 6.9 / 6.15 / 5.4 / 5.35 / 5.3 / 5.2 (oC)
3. Higher effectiveness of 41% / 50% / 69% / 82% / 91% / 98%
4. Cooling capacity is higher: 13,022,335 / 14,185,040 / 17,208,085 / 20,463,670 / 22,324,010 / 23,719,250 (kC / h)

ISBN : 978-602-99806-3-9

Referensi

[1] Jianfeng Qian, Lina Li, Yankun Tan And Dayu Zheng, (2012) "Research And Application Of Closed Cooling Tower", 2nd International Conference On Electronic & Mechanical Engineering And Information Technology ,1-3.

[2] Ramarao R.A (2004) Towers and Equipment Ltd. and Shivaraman Tower Tech Ltd, Selection and Design of Cooling Towers , Design Values of Different Type of Fill, Bureu Efficiency Energy : India

[3]. M. Lemouari a, M. Boumaza b,*, I.M. Mujtaba, (2007), Thermal performances investigation of a wet cooling tower", Applied Thermal Engineering 27 (2007) 902–909

[4]. Jamilah, S., 1999, Unjuk Kerja Cooling towerdengan Plat Aluminium sebagai Pendistribusi Aliran, Laporan Penelitian Laboratorium Teknologi Kimia Umum, Fakultas Teknik, UGM, Yogyakarta.

[5]. Kakaç, Sadik and Hongtan Liu, (2002). "Heat Exchangers Selection, Rating and Thermal Design Second Edition," CRC Press, Boca Raton, Florida 33431".

[6]. Mulyono dan Baskoro, 2000, Karakteristik Pendingin dengan Bahan Isian Plastik Bergelombang, Media Teknik, No. 1 Tahun XXII, Edisi Februari

[7]. Suryabrata, J.A. 2011, Pendekatan Konsep Hemat Energi pada Proses Pelaksanaan Desain Gedung Baru, EECCHI Conference: Sustainable Design Practices and Energi Conservation, JW Marriot Hotel, Jakarta.

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

The perception of tourists toward the Festival of Kuta Majelangu Market as a community-based tourism attraction

Made Ruki[1], Ni Gst Nym Suci Murni[1], Ida Ayu Elistyawati[1]
[1]Tourism Dept. Politeknik Negeri Bali, Badung, Bali, Indonesia

rukimade@gmail.com

Abstract. The aim of this research was to identify foreign tourist perception toward service of Kuta Majelangu Market as an Attraction of community-based tourism. Foreign tourist's perception was analyzed by Likert scale. This research used various approaches such as: social and culture, community based tourism, sustainable tourism, and perception theory. Respondent were taken from foreign tourist come from many other countries such as Japan, Australia, China, America, Germany, Austria, Holland, and British, while the informants were taken from districts officers, around Kuta Village: such as the head of villagers known as bendesa, kelihan banjar, kelihan dinas banjar, Kuta community leaders. Data were taken from observation, Interview, questionnaire, and some document of literatures. The results of this study revealed that perception of tourists toward the festival Market Majelangu Kuta as community-based tourist attraction for a variety of requirements had been fulfillment where starting from the land use, planning, management, preservation, benefit economically performed independently by local community. While the perception of tourists toward the activities and services of the Market Majelangu Kuta were well perceived by 79% percent of tourists.

1. Introduction

Law of the Republic of Indonesia No. 10 Year 2009 about tourism requires that one of the purposes of tourism activity is in an effort to empower community or local community, preserving natural resources, maintaining the sustainability of nature and the environment, and ensuring alignment between sectors, between regions, between the center and regions which is one unit system in order to be an autonomous region as well as the alignment between stakeholders.

One of the concepts that describes the role of the community in the development of tourism is community based tourism. Basic principles of community-based tourism is putting the community as the main perpetrators through community empowerment in tourism activities so that the benefit of tourism as big as destined for the community. Murphy (1985) stated community based tourism emphasizing empowerment the local community to a better understanding of treating the values and assets that they have, such as culture, customs, cuisine, culinary, lifestyle (as cited in Okazaki (2008). According to McCool & Martin (1994) in the context of community attachment and attitude toward tourism development, the community shall independently conduct mobilization of assets and the value being the main attraction for tourists visiting experience (as cited in Williams, *et al*., 1995).

McCloskey (2011) stated the concept of the development of community-based tourism requires the presence of access, participation, control and benefits for the community in the aspects of economic, social, cultural, political and environmental issues. The community as the main perpetrator in the development of community-based tourism plays a role in all lines well as planners, investors, managers, implementers, monitors or evaluators (as cited in Rasoolimanesh, 2016). While Tosun, (2006) stated the

ISBN : 978-602-99806-3-9

community in the development plays a role in all lines as planners, investors, managers, implementers, evaluators. The highest level of participation is spontaneous participation, in which local residents have the nature power to make decisions and control the process of development still the involvement of government and private sector is indispensable (as cited in Prabhakaran, *et al*., 2014).

Kuta Majelangu Market, which is held once a year on *ngembak geni*, in Kuta Beach, Bali, is intended not only as a customary activities but also as a concept rather than the implementation of community-based tourism. The market that is part of the tradition that has already lasted for decades it held a one-day on the day *ngembak geni* i.e. one day after Nyepi holiday. The market is managed by the village of Kuta by involving indigenous traders from Kuta. Products sold on the market, in addition to food, as well as various kinds of souvenirs, as well as presenting performance art.

Based on the background above, the authors are interested in conducting research on the existence of a Majelangu. Beside, this sort of research has never been conducted yet. It hopes to have vital information and detail, both on the market activities also meant as community-based tourist attraction, the role of indigenous village, a community of traders, the type and quality of service, and the perception of the existence of tourist and service they experience.

2. Research Methods

Research using qualitative quantitative method supported. Data were collected through a literature review, observation, in-depth interviews to managers and the spreading of a detailed questionnaire to 105 tourists' visitors Majelangu Markets of Kuta. Data analysis is done in qualitative analysis – the interpretive and quantitative analysis using the Likert scale by applying some theories are eclectic, i.e. the theory of community based tourism, the theory of perception, and the theory of service.

To know the perception of tourists to the existence of a market, we collect opinions from travelers as the respondent. They are local tourist as well as foreign tourists. The collection of this opinion is done through direct interviews and disseminate a list of question or questionnaire. Determination of the respondents using the method of accidental sampling, random visitors or tourists found on site. The calculation results using Likert scale which gradable positive start from 5 strongly agree, 4 agree, 3 undecided, 2 less agree, 1 do not agree. The number of respondents are 105 of 61 local people, consisting of 30 male, female 31, and foreigners of 44 people, consists of 20 male, female 24. The age of respondents on average 30 years old – 60 years. The background of the respondents, both concerning the background of the country, region, age, and gender is expected to represent the diversity of the opinions of travelers to the existence of the Market Majelangu of Kuta.

3. Results And Discussion

3.1. Kuta Majelangu Market As A Community-Based Tourist Attraction

Kuta Majalangu market that was held one day after Nyepi holiday was meant as tourist attractions that can be visited both by locals as well as tourists. The villagers made Majalangu Market as a community-based tourist attraction. The involvement of Kuta communities in managing the holding of Market Majalangu, based on consideration as follows:

3.1.1. The location.

Kuta Majalangu held in Kuta beach, starting from the front of Segara temple up in front of the task force office of Kuta beach, 250 meters long and 30 meters wide. At this location the tents and stalls fitted to the merchants roll out merchandise, and the stage to perform a wide range of entertainment. This location is chosen because it is indeed a land under the management of village customs through the Unit Manager of the indigenous village of Kuta Beach. "This is indeed a coastal area including Indigenous Village or Kuta and therefore we can make use of them in accordance with the programed, in particular in terms of supporting the well-being of our people," said the leadership of the villagers, Wayan Swarsa (interview, Thursday, 8/5/2017). With this activity, which is one of its objectives to drive potential local village, then elections site of beach venues of this market in accordance with the concept of community-based tourism, where the community does not depend on investors but exploit potentials that they have independently without the intervention of others outside the community.

ISBN : 978-602-99806-3-9

3.1.2. *Cooperation with Indigenous Village Community.*
In managing the market this indigenous village party help the process of holding the market with forming a committee to be in-charge in handling technical of the market. Traders and prospective committee next convenes to equate the perception and define everything according to the concept of a market that they want. They determine the lay out with the appropriate number of market traders, the type of merchandise, the capacity of the land or the location, and the approximate number of visitors. It is calculated to maintain comfort and conservation of the environment based on the area capacity. Type of tents for rent adjusted to their financial abilities, as well as other technical things. All options were discussed openly and democratically so that people feel involved, responsible, and able to understand all aspects of the implementation of the market. The steps undertaken by the indigenous village of Kuta and the community was a form the development of the community by the community and for the community, in accordance with the terms of community-based tourism concept.

3.1.3. *Food and handicraft products.*
On the market sold culinary products and displayed handicraft for sale such as apparel and gift products featuring traditional Balinese characteristics, such as pork, vegetables of lawar, suckling pig, gerang asem chicken, typical Balinese hot spicy grill fish, also various kinds of traditional snacks. Halal food products is also provided, as well as international food is like chinese food, fizza, and so on. This meant that the tourists have the option to taste, culture and beliefs of each. Thus, practiced in this Kuta Majelangu in accordance with the principles of community-based tourism, which according to UNEP and WTO (2005) between them to develop pride in community, maintain the uniqueness of the local culture and character, helps the development of learning about cultural exchanges on communities, appreciate cultural differences and human dignity, with regard to retaining cultural tolerance through tourism activities.

3.1.4. *Investment.*
All aspects of the organization of people's markets is handled by the community, including in terms of investment, provision of supporting facilities and infrastructure as well as setting up the sale respectively. The village of custom help to facilitate and to ensure participation and guarantee the rights of the community in the management of existing resources. The investment is carried out by taking into account efficiency, effectiveness, propriety, so as to give economic benefits to the community. In the activity of the market of this locals act as protagonists, both as planners, investors, managers, as well as executor. This is in accordance with the principles of community-based tourism that puts the community as the main perpetrators through empowerment of local activities in tourism.

3.1.5. *Traditional Performances.*
Cultural scene in front of Segara temple is a Kuta Majelangu support facilities. At this stage various traditional Balinese arts are performed, such as musicians of Bali, Balinese dances, as well as art music with songs, performed by groups of children and youth organizations of indigenous village of Kuta. Whereas in the south of market location, exhibited a dozen of ogoh-ogoh or giant sculptures. Ogoh-ogoh had previously been carried round the village as part of the ritual of the day of *pangerupukan*, the day before Nyepi holiday. Ogoh-ogoh is a work of art or creativity in the trade of young men and girls of the village customs is very attracting tourists. The concept of community-based tourism, in the form of stage entertainment and exhibition of ogoh-ogoh is part of the effort to appreciate the local culture, heritage and tradition in tourism activities, as it is essentially community-based tourism should be able to strengthen and preserve local culture.

3.2. *The Perception of tourists toward Kuta Market Majelangu As a Community-Based Tourist Attraction.*

ISBN : 978-602-99806-3-9

To know the perception of tourists to the existence of a Majelangu Market of Kuta we gain the opinion of respondents on a number of matters concerning Market Majelangu Kuta, among others:

3.2.1. The location of the market.
As many as 95% of the respondents said people's market location is excellent. Respondents perceived that this location is very strategic because it is at the Kuta beach which is an area of tourism indeed a well-known and visited hundreds of tourists every day. Access to this location is very easy. Thus the market is easily accessible. Tourists who visit that day to experience the beauty of Kuta beach at the same time can also enjoy the market. Whereas 5% of respondents who consider this location is less adequate as people's market presence that this harms the atmosphere as well as the convenience of the tourists who were enjoying the beauty of Kuta beach.

3.2.2. *Atmosphere*.
The majority is that 70% of tourists said the atmosphere in the market perceived good. They're impressed because this bustling market atmosphere is in an encouraging atmosphere. The tents are decorated in traditional Balinese ornaments, as well as the majority of traders wear Balinese clothes the typical atmosphere of the building is distinctive impression for the tourists. Travelers rate the festive market atmosphere, friendly, and nuanced of Bali, is something different to that in their country.

3.2.3. *Set-up.*
As much as 70% of respondents say this market is properly set up with the same thematic arrangements. The committee set up in accordance with the merchants and sellers location theme merchandise. For example, a seller of clothes are grouped in one area, as well as merchant craft or gift shop, and food. With a set up like this, the visitor traffic would distribute well into the booths hence that it is not concentrated in one point only. But as much as 30% of the respondents consider structuring tends less appropriate because of it is too tightly one to another. It makes visitors feel crowded and uncomfortable.

3.2.4. *Culinary Diversity.*
Culinary diversity in the Kuta Majelangu rated very good by 83% of tourists. Tourists said they did not find any difficulties when they were about to choose foods because of its availability relatively complete. Travelers can find many kinds of food, both international and local foods, typical Balinese cuisine, as well as halal food. Tourists consider that the availability of diverse culinary is strengthening the existence of Kuta Majelangu market.

3.2.5. *Hospitality of Service.*
Kuta Majelangu market in delivering services are perceived good by 75% of respondents. Respondents assess the officers or guards stand sufficiently responsive to the needs of visitors and able to provide adequate information with the ability to communicate in foreign languages, especially English, which is pretty good and communicative.

3.2.6. *Hygiene.*
As much as 75% of travelers consider that cleanliness of this market is quite good. Bathroom amenities are also representative, sufficient clean water and equipped with soap and toilet paper. So are the environmental conditions surrounding the market is pretty clean. While 25% of the respondents considered the number of inadequate restrooms which it makes the visitors must stand in queue to get into the toilet

4. **Conclusion**

4.1. Conclusion
Kuta Majelangu market can be said as a community-based tourist attraction due to a number of requirements has been fulfillment where starting from ranging space of land use, planning, management,

ISBN : 978-602-99806-3-9

preservation, benefit economically performed independently by the local community. Through market activities this market resource is potential, good society, economy, environment, as well as the potential uniqueness of local traditions and culture can be powered independently and participatory so that local people benefit welfare. While perception of tourists toward the activities and services of the Kuta Majelangu market are well perceived by tourists. It is visible from 79% percent of tourists. Various aspect of this market, which is either *tangible* or *intangible*, such as location, atmosphere, setup, type of food, service, to clean aspect are well perceived by tourists.

4.2. Suggestion.

To maximize service, a distance of booths on the Kuta Majelangu need to be more space, so that visitors are more convenient in doing their transaction. Similarly road access for visitors need to be wider and vehicles parking lot should be well provided, so that visitors will be more convenient and they do not jostle around in when they are in the market.

Acknowledgement

The authors would like to thank the editor and the anonymous reviewers for their constructive comments, the P3M of Politeknik Negeri Bali for their guidance and support, and to the indigenous of community for their permission and information as well as tourists as the respondents of our research.

References

[1] Anonymous, *Law of the Republic of Indonesia No. 10 Year 2009. Tourism.*

[2] López-Guzmán O, Sánchez-Cañizares S and Víctor P 2011 *Community - Based Tourism In Developing Countries: A Case Study. Tourismos*: An International Multidisciplinary Journal of Tourism. Vol **6** N 1.

[3] Okazaki E 2008 *A Community-Based Tourism Model: Its Conception and Use*. Journal of Sustainable Tourism, Kobe University, Japan.

[4] Prabhakaran S, Vikneswaran N and Sridar R 2014 *Community Participation in Rural Tourism: Towards a Conceptual Framework.*

[5] Rasoolimanesh S. M, Mastura J and Rabeeh B 2016 *Effects of Motivation, Knowledge and Perceived Power on Residents' Perceptions: Application of Weber's Theory in World Heritage Site Destinations.* International of Journal Tourism Research.

[6] Rasoolimanesh S M and Mastura J 2016 *Community Participation toward Tourism Development and Conservation Program in Rural World Heritage Sites.*

[7] _____, _____. 2016. *Sustainable tourism development and residents' perceptions in World Heritage Site destinations.* Asia Pacific Journal of Tourism Research.

[8] Williams D R, Cary D M, Carla M and Riden M U 1995 *Community Attachment, Regional Identity And Resident Attitudes Toward Tourism.*

ISBN : 978-602-99806-3-9

A Web-based Automatic Meter Reading for Electric Power Monitoring

I G A Made Sunaya[1], I N K Wardana[2], I N Sukarma[2]

Electrical Enginering Dept., Politeknik Negeri Bali, Bukit Jimbaran, Kuta Selatan, Badung, Bali-Indonesia

a_sunaya@pnb.ac.id, kusumawardana@pnb.ac.id, sukarma@pnb.ac.id

Abstract. Power monitoring of electrical appliances can be an effort for energy efficiency. Automatic Meter Reading (AMR) is a technology that commonly used to automatically read the electrical parameters (current, voltage, phase, etc.), diagnostic and status from the power metering. The on-site monitoring process needs the user to visit the place where the power meter is installed thus making the process less efficient. A web-based monitoring system is proposed in this paper. By TCP/IP communication protocol, the power meter can transmit the data through internet connection making the monitoring and control process is remotely possible. To support wide range of web-enabled devices, a responsive web interface design is implemented.

1. Introduction

Power monitoring of electrical appliances can be an effort for energy efficiency. An effective and efficient measurement system is strictly needed [1]. Automatic Meter Reading (AMR) is a technology that commonly used to automatically read the electrical parameters, diagnostic and status from the power metering. AMR is a key point in smart grid systems including electricity [2]. In smart grid architecture, accurate measurement of electrical parameter (voltage, current, frequency, power factor, etc.) is a basic requirement to be fulfilled [3][4]. The use of AMR can reduce the expanses due to monitoring process, extend the device life-time, avoid the excessive components by integrated device, and improve the measurement reliability [5]. AMR can be also saves a lot of labor cost [6]

For power and energy monitoring, the use of AMR will be significantly required. However, the common AMRs show the parameters being measured through a dedicated built-in display (in-situ monitoring) [3]. This condition becomes more challenging especially for remote measurement. The users should actively visit the place where the power monitors are installed. Alternatively, the drawback of in-situ monitoring can be solved by remote monitoring [7]. To achieve this goal, the communication method for remote monitoring system is mandatory required.

The Ethernet protocol is commonly used for remote monitoring systems. Beside this, the RS-485 communication protocol is more commonly used than Ethernet protocol. However, the Ethernet protocol offers more flexibility. However, the power meters with Ethernet protocol are much more costly than common power meters. Some of them are provided by a built-in web server for web interface purpose. With internet application, many monitoring devices can be developed [8-13].

A web-based monitoring system is proposed in this paper. By TCP/IP communication protocol, the power meter can transmit the data through internet connection making the monitoring and control process is remotely possible. To support wide range of web-enabled devices, a responsive web interface design is implemented.

ISBN : 978-602-99806-3-9

2. Methodology

The research schematic is shown on Figure 1. The schematic is based on monitoring and controlling systems installed at the Electrical Power Laboratory, Dept. of Electrical Engineering, Politeknik Negeri Bali (Bali State Polytechnic).

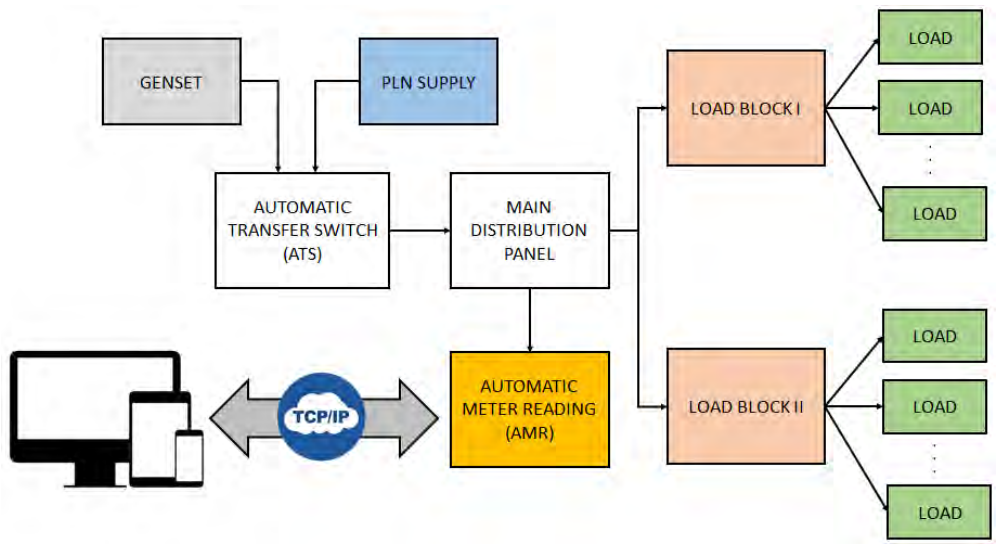


Figure 1. Research schematic.

The main supply is provided by two sources, that is an installed diesel generator (genset) or state electricity company (PLN). The PLN supply is the main source whereas the genset is used as a back-up. An Automatic Transfer Switch (ATS) will turn the loads to the genset when the PLN is switched-off. In this case, the genset will be automatically switched-on. For maintenance reason, the genset sometimes replace the PLN sources intentionally. But for daily purposes, the PLN supply is always prioritized as the main source.

Through the Main Distribution Panel (MDP), the loads are divided by two main groups, called Load Block I (LB I) and Load Block II (LB II). The LB I consists of miscellaneous devices for student's experimental purposes like grinding tools, drilling tools, CNC machines, etc. whereas the LB II is dedicated for lab's daily operational loads (like computers, ACs, TVs, etc.).

The AMR is installed on MDP's box. Therefore, both genset and PLN supply are continuously monitored. The AMR will measure many parameters such as current, voltage, power, energy, etc. These parameters are our objects to be transferred. The main purpose of this research is how to deliver these parameters through the communication lines. By doing this, the operators of the Electrical Power Laboratory can regularly monitor the use of the electricity.

Based on many considerations, the use of TCP/IP protocol offers some advantages. By unshielded twisted-pair (UTP) cables, the communications between AMR and computer (or gateway) can be built. The data can be transferred either by Local Area Network (LAN) plan or internet plan. With no internet connections provided, the LAN plan can be applied only for internal purposes. It means that the data to be transferred from AMR to the computers and then to be shown on the monitor is accessed only for authorized lab operators. If an internet connection is available, the data can be accessed anytime and anywhere. The operators or other authorized persons can monitor the electric power data by their own devices (desktops, laptops, mobile phones, etc.). By this monitoring schema, the remote monitoring advantages can be achieved.

ISBN : 978-602-99806-3-9

3. Results and Discussions

3.1. Selecting the AMR

There are many types of AMR devices in the market. All of them are classified by their specifications, starting from the simple equipped features to the complex one. Selecting the appropriate AMR is the key to achieve the research purpose. Since our main purpose is transferring the data through the TCP/IP communication protocols, the AMR that support this kind of protocol is needed. Based on the financial support and market availability, the Schneider PowerLogic PM5560 is chosen. This AMR device is featured by Ethernet protocol with RJ-45 port.

3.2. Installed System

The AMR device is installed on Main Distribution Panel (MDP) which is located just after the Automatic Transfer Switch (ATS) panel. The installation consider the user convenience of the users.

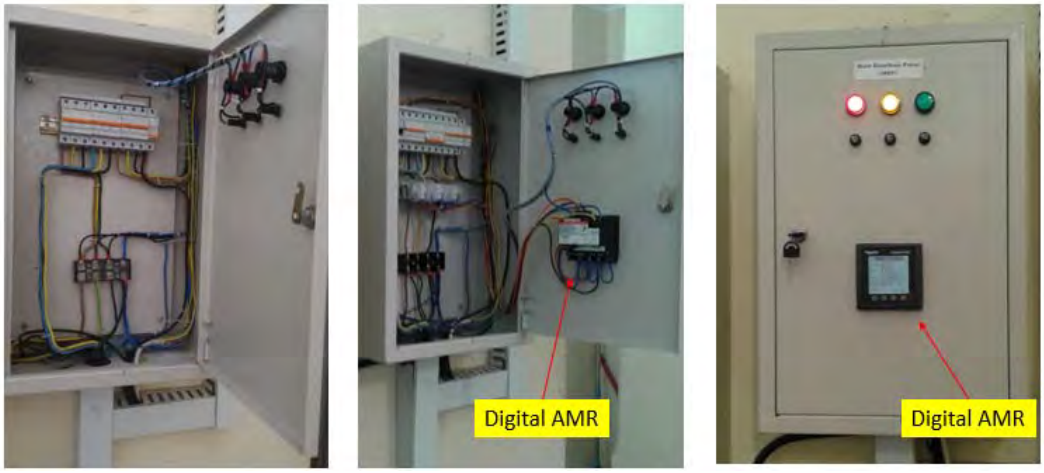


Figure 3. AMR is installed on the MDP Panel. Without AMR installation, the original MDP appearance is shown on the leftmost figure. The inside and outside parts of the MDP after AMR installation are shown in middle and right figure respectively.

3.3. Web-based interface

A web-based interface for the users is developed. By using a web-based technology and broadband connection, it is possible to display various sophisticated contents to desktops, laptops, or mobile devices anywhere in the world. This in an advantages for the operators or authorized persons as the electric parameters of the laboratory's usage can be received and monitored wherever and whenever it is convenient for them.

The developed web-based interface during this research is shown in Figure 3. The interface is the improvement of the built-in web provided by the manufacturer. To support wide range of web-enabled devices, a responsive web interface design is implemented. Therefore, the web will automatically adjust the wide-size of the user's display. Some parameter such as Load Current, Power, Line-to-Line Voltages, Line-to-Neutral Voltages, Power Factor, Power Quality, etc. can be monitored in real time.

Another advantage of remote monitoring system is its easiness of device configuration. The device setting can be set remotely. By providing a protection password, the authorized operators can set the device parameters remotely without visiting the place where the device is installed. For many devices to be set, this advantage will improve the efficiency.

ISBN : 978-602-99806-3-9

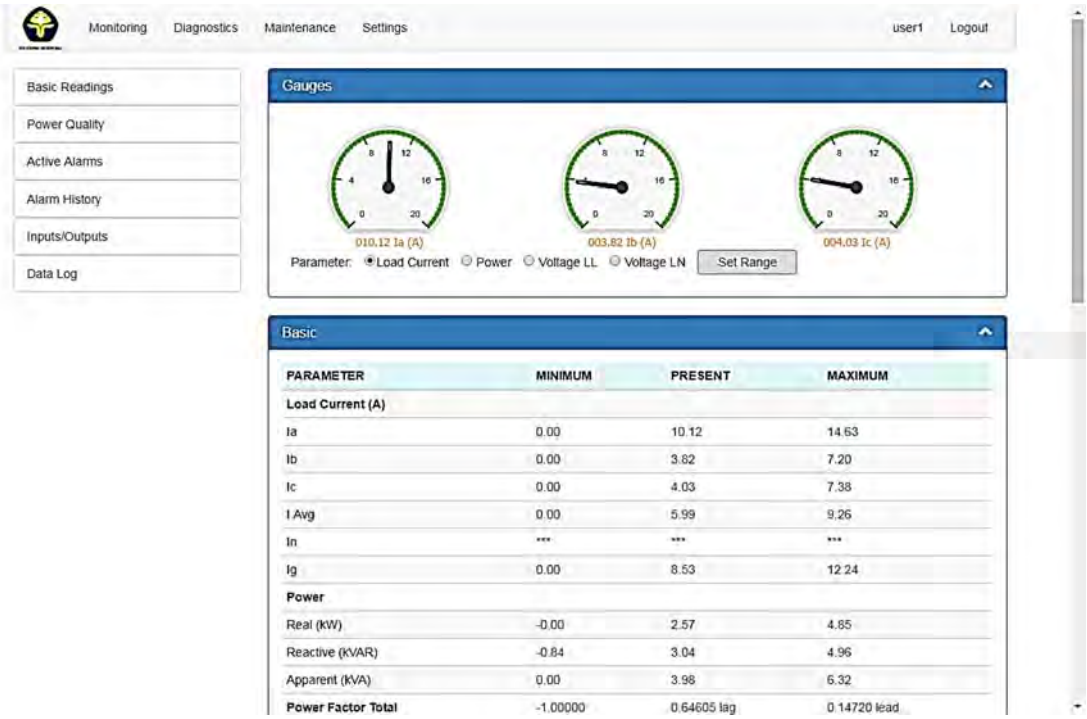


Figure 3. A web-based interface for the AMR

3.4. System Evaluations

The AMR featured by class-0.2 measurement device which means that the device has 0.2% of accuracy. It is very high accuracy for measurement systems. This accuracy can be achieved only by using a digital AMR, not an analog one.

The AMR inputs consists of three-phase voltage and current lines. For measuring the current, a Current Transformer (CT) must be used before connecting the load and AMR channels. In this research, three 100/5A of CTs is utilized. Based on the operator experiences, the device is well installed on the MDP and well accessible for monitoring purposes.

A responsive web interface design is implemented by various types of displays. The web-based interface works accordingly, depends on the display's size. It covers all necessary parameter to be displayed.

4. Conclusion

In this research, a web-based automatic meter reading was developed. The system works accordingly. The user-friendly web interface can be used to monitor the electrical parameters. By using a web-based technology and broadband connection, it is possible to display various sophisticated contents to desktops, laptops, or mobile devices anywhere in the world. Another advantage of remote monitoring system is its easiness of device configuration. The device setting can be set remotely.

Acknowledgment

We sincerely thank to the Ministry of Research, Technology and Higher Education Republic of Indonesia for research funding through the agreement with Politeknik Negeri Bali. This research is funded by DIPA Politeknik Negeri Bali Number SP Dipa-042.01.2.401006/2017 dated on December 7, 2016.

ISBN : 978-602-99806-3-9

References

[1] Wallin, F., Bartusch, C., Thorin, E., Dahlquist, E., 2007, *Important Parameters for Prediction of Power Loads - A Bottom-Up Approach Utilizing Measurements from an Automatic Meter Reading System*, IEEE Power Engineering Society Conference and Exposition in Africa.

[2] Guanghua, W., Hong, C., Yanyi, M., Xitian, L., Kun, Y., Xueping, J., Yuxuan L., Design and Implement of Baseband Circuits for a Wireless Automatic Meter Reading Application, *IEEE International Conference on Electron Devices and Solid-State Circuits* (EDSSC), The University of Hong Kong

[3] Jain, A., Verma, M.K., 2016, Implementation of automatic meter reading technique using SYNC 2000 & SYNC 5000 in Indian power system, *IEEE International Conference on Computing for Sustainable Global Development (INDIACom)*

[4] Alok, J., Verma, M.K., 2016, Implementation of automatic meter reading technique using SYNC 2000 & SYNC 5000 in Indian power system, *International Conference on Computing for Sustainable Global Development (INDIACom)*

[5] Schneider Technical Team, *Technical Datasheet: Power Meter Series 800*, Schneider Electric, 2016.

[6] Liu, N., Wang, Y., Liu, S., 2016 Centralized Automatic Meter Reading System Based on GPRS Technology, *International Conference on Instrumentation & Measurement, Computer, Communication and Control (IMCCC)*

[7] Petrisor, D., Fosalau, C., Zet, C., 2015, Remote measurement and surveillance grid for landslide risk assessment and mitigation, *IEEE International Conference on Telecommunications and Signal Processing (TSP).*

[8] Nagata, T 2006 An electric power energy monitoring system in campus using an Internet, *Proceeding of IEEE Power Engineering Society General Meeting*

[9] Eddy L.M., Edson G.C., George R. S. L., Alex C. R. A., Caio V. A. D., 2016, A low cost power quality meter over the internet, *International Conference on Harmonics and Quality of Power (ICHQP)*

[10] Delsing, J., Hyyppa, K., Isaksson, T., 2000, The IP-meter, design concept and example implementation of an Internet enabled power line quality meter, *Proceedings of the 17th IEEE Instrumentation and Measurement Technology Conference*

[11] Wen-Shyong, Y., Yi-Jie F., 2016, Data analysis of the smart meters and its applications in Tatung University, *International Conference on Fuzzy Theory and Its Applications (iFuzzy)*

[12] Lin, C.M., Chen, M.T., 2017, Design and implementation of a smart home energy saving system with active loading feature identification and power management, *Proceeding of IEEE 3rd International, Future Energy Electronics Conference and ECCE Asia*

[13] Sanket, T., Akshay, S., Vikas T., Prakash, Y., Keerthi, U., 2016, Implementation of an energy monitoring and control device based on IoT, *Proceeding of IEEE Annual India Conference (INDICON)*

ISBN : 978-602-99806-3-9

Procurement Clean Water by Using Groundwater (Case Studi in Bukit Asah Bugbug Village Karangasem Bali)

Ni Ketut Masih[1] and I Nengah Simpen[2]
[1]Accounting Department, Bali State Polytechnic
Jl. Raya Kampus UNUD, Bukit Jimbaran, Kuta Selatan, Badung-Bali-803611
[2]Physics Department, Mathematics and Science Fakulty Udayana University
Jl. Raya Kampus UNUD, Bukit Jimbaran, Kuta Selatan, Badung-Bali-803611

ketutmasih@yahoo.com

Abstract. Bukit Asah is a residential complex located in the village of Bugbug Karangasem, position of about 8.498162 LS, 115.602957 BT, the height between 120 - 150 m, the population of about 800 people, the location of the house spread. Bukit Asah has no water source. Taking into account such circumstances, residents in Bukit Asah took the initiative to raise water using pumps with the ability and knowledge of sober. The water discharge can flow about 0.5 m^3/hr. Households can be serviced by about 50 households with a total volume of 6 - 9 m^3 per month. With such a large discharge, there are still many unserved households, pumps work all day, resulting in frequent burning of pumps. The use of dug well water leads to the quality of the water in doubt. The low technology used to raise the water resulted in the expensive water that is Rp. 9,000, - /m^3. An underground water survey has been conducted using Geolistrik Method, the result has been found aquifer. In the place has also been done drilling. Water sources are found at a depth of 18.5 m. After analyzing the quality of water, pursuant to Governor Regulation No. Bali. 8/2007 on Environmental Quality Standards and Raw Environmental Damage and Guidelines for Drinking Water Quality, WHO, Geneva, 1982, water quality is feasible for drinking water sources. The result of the analysis using Quality Water Index Calculator test showed that the well water of drill has 89 quality index with good category. Optimum discharge of well 65 m3 / hour. If this water is transmitted to Bukit Asah, electricity costs Rp. 1.288 /m^3

1. Introduction

Water is a vital good that is needed by humans, animals and plants. Water is very limited. Water in an area can come from rain, wells, and springs. The location of the water source to the neighborhood of residents from a few meters to thousands of meters. The position of the water source may be higher or lower to the home environment of the population. If the position of the water source is higher than the environmental position of the people's house, water can be drained gravity to the people's homes. If the position of the water source is lower than the environmental position of the resident's house, water should be discharged with the help of the machine.

Bukit Asah is a residential complex located in the village of Bugbug Karangasem, position of about 8.498162 LS, 115.602957 BT, the height between 120 - 150 m, the population of about 800 people, the location of the house spread. Bukit Asah has no water source. The water source is below, on the shore of a dug well and a water company drinking water village. Many locals use rain water for washing, bathing and drinking water. The rain water is accommodated by the shelters in the houses. The reservoirs are made with volumes between 10 - 50 m^3. There are also residents who come down to take water for drinking water with a distance of about 1- 2 km. Taking into account such circumstances, residents in Bukit Asah took the initiative to raise water using pumps with the ability and knowledge of sober. The

ISBN : 978-602-99806-3-9

water discharge can flow about 0.5 m^3/hr. Households can be serviced by about 50 households with a total volume of 6 - 9 m3 per month. With such a large discharge, there are still many unserved households, pumps work all day, resulting in frequent burning of pumps. The use of dug well water leads to the quality of the water in doubt. The low technology used to raise the water resulted in the expensive water that is Rp. 9,000, - /m^3

Taking into account the existence of water problems in Bukit Asah, it is necessary to find a quality water procurement solution and meet the quantity. Water resources research (Aquifer) using Geolistrik Method has been done many, some of them at Nyitdah International Hospital Project Tabanan Bali, in Project Villa Puri Persada Denpasar, and at Project Joglo Bedugul (Simpen, 2016 a, 2016 b, 2016 c). Several studies have been conducted in order to estimate the aquifers by Geoelectric Method, namely, Indriatmoko and Herlambang (2005), Purnama and Sulaswono, (2006), Anomohanran (2011), Rolia (2011), Irjan (2012), Karunia et al. (2012) Wulandari (2014), VenkataRao et al., 2014), Alile et al. (2011: Olawuyi and Abolain (2013) and Anomohanram (2013) and the results are very suitable.Seeing the success of the Geoelectric Method in interpreting the aquifer's position, this method is worthy of consideration for suuse.

Physically, the aquifer has the resistivity contrast to its environment (Keller and Frischknecht in Sajeena et al., 2014). Geoelectric Method is one of the geophysical methods to estimate the presence of sub-surface coatings based on their resistivity differences. Geolistrik Method works by injecting electric current (I) into the earth (soil) and then measuring the potential difference generated (V). The strong magnitudes of current (I) and the magnitude of the resulting potential difference (V) reflect the magnitude of the rock resistivity at the point of measurement. Geoelectric Method can map rock resistivity in the vertical and horizontal direction. The presence of water content in rocks results in decreased rock resistivity. There are several factors that determine the magnitude of the resistivity value of rocks, ie material types, water content, rock porosity, and chemical properties of fluid fillers (Sen et al., 1988; Araffa, 2013; Simpen et al., 2016). Thus the Geoelectric Method is expected to help obtain a good aquifer so that it can be explored and if it is raised to serve the population in Bukit Asah how much it will cost.

2. Research Methods

2.1 Time and location of study

The study was conducted in May - June 2015 in around of Bukit Asah Village of Bugbug Karangasem Bali. Geographically located at position 8.5735280 LS and 115.120702 BT, at an altitude of 25 - 150 m (Figure 1).

Source: https://www.google.co.id/maps/@-8.4972515,115.5970595,337m/data=!3m1!1e3

Figure 1 Location of Study

2.2 Research tool

ISBN : 978-602-99806-3-9

Equipment used in this research are: Set resistivimeter gauge, Laptop, Res2Divn Software.(Figure 2).

Figure 2 Research tool

2.3 Method of data retrieval

The data needed in this research are location height data, geoelectric data and cost data of raising water to reach Bukit Asah. Location altitude data is measured by General Position System (GPS) tool. Geoelectric data is measured by a multichannel SkillPro resistivimeter tool set by the Wenner configuration. The cost data of raising water up to Bukit Asah is calculated based on electricity consumption.

2.4 Method of data analysis

Data obtained from geoelectric measurements in the form of strong current injected data (I) and magnitude of the resulting potential difference data (V). Further I data and data data processed by Res2Divn program so that obtained contour cross section sideways resistivity. The analyzes were conducted on the color and shape of the contour cross-sectional resistivity image. From the analysis of the resistivity contour of the cross section can be known aquifer and also obtained the position of drilling point to get ground water with good quality and quantity.

3. Data Analysis Research Results

Geoelectric data is initially a strong quantity of injected current (I) and potential difference quantity (ΔV) due to current injection. However, in the Geolistrik Skill Pro tool set can be directly obtained the apparent resistivity scale at the measurement points. The apparent resistivity value is then analyzed by Res2divn program so that the real resistivity value of each point in the cross section of the trajectory and the cross sectional resistivity contour is obtained. Figure 3 is the result of geoelectric measurement after being processed using Res2divn program.

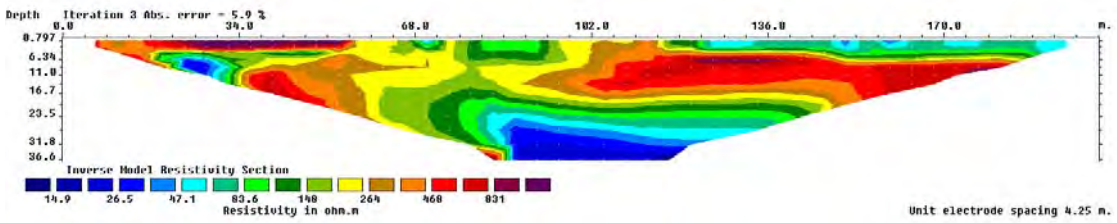


Figure 3. Contour Cross Section of Geoelectric Measurement

From the picture it appears that the contras resistivity of small resistivity from 14.9 - 26.5 ohm.m with the position of around the point 102 and the depth of 18.5 m which indicates the area of the aquifer.

ISBN : 978-602-99806-3-9

The aquifer in the research area is suspected of a distressed aquifer. The aquifer is thought to have come from a trench buried by the eruptive material of Mount Agung. This situation can be seen in positions 24 - 28, that the presence of aquifer at a depth of 6 m. According to locals, around this place before Mount Agung erupted in 1963, there was a trench as a boundary of land. Now revived again the trench, but its position shifted 10 m (in position 34-38). Similarly, the acquired aquifer, suspected of a ditch buried by the eruption of Mount Agung in 1905. The results of this study in accordance with Simpen (2015a) which states that the aquifer can be formed from the accumulation of trenches by volcanic eruption material. Such aquifers are usually shaped grooves according to the previous ditch groove.

Based on the drilling at 87.75 position obtained aquifer at a depth of 18.5 m, then drilling continued to a depth of 27.74 m. After meeting the aquifer, the water level up until 17.22 m. This means the acquired aquifer is a distressed aquifer, its infiltration upstream. Well water obtained need to be tested quantity and quality. The quantity test is done using step drown test method. The results of the pumping test can be seen in Table 1.

Table 1. Pump Well Test Results

Step	Q (m^3/s)	Sw (m)
1	0,00078	0,088
2	0,00125	0,187
3	0,00181	0,320
4	0,00233	0,428
5	0,00278	0,533

Description: Q discharge pumping and Sw decreasing the water level at the well due to pumping

Qualitative analysis of the result of well pumping test with step drown test method based on Table 1 shows that optimum discharge of well 65 m3/hour.

Drilling well water is chemically, physics, and biology analyzed. To get more accurate results, two tests were performed. The test results are presented in Table 2. These results suggest that the values of biological parameters such as ALT, Coliform, E. Coli, Staphilococcus aereus, Salmonella/Shigella and BAL are all zero, so it can be interpreted that a wellbore aquifer has a water infiltration site upstream. From the results of qualitative analysis with reference to the Bali Governor Regulation no. 8/2007 on Environmental Quality Standards and Environmental Damage Standards and Guidelines for Drinking Water Quality, WHO, Geneva, 1982, and analyzed using the Quality Water Index Calculator (http://www.water-research.net/index. Php / water-treatment / water-monitoring / monitoring-the-quality-of-surfacewaters) showed that wellbore water has a good quality index of 89 (Table 3), interpreted that the water obtained from the borehole is suitable for use drinking water.

The economic calculation is done to get water up to Bukit Asah. Existing data include 375 m water transmission data, height 130 m, population 800 people, water requirement 60 l/person/day (Dirjen Cipta Karya, Public Works Department, 2007). Based on the data, the daily water requirement is 48000 l. The installed pump is a pump capable of transmitting water between 2000-2500 l / hr. One of the pump brands that can be used for this purpose is Groundforce pump SQ 3-105 power 2.3 KWh (Groundforce, 2012). Installation of this pump in theory the pump will work 20 - 24 hours / day. Price of electricity per KWh Rp. 1400, then the water price becomes Rp. 1288 /m^3. This price only covers the price of electric power required, not including the depreciation of investment and maintenance. Installation of such pumps above will not cause the well water to recede because the optimum well discharge of 65 m3 / hr, is still well below the optimum well discharge. The well has also been tested for taking water with a discharge of 10 m^3/h (Table 1), for 24 hours, well water does not recede, just down 53 cm.

Table 2. Water Quality Test Result of Drilled Well

ISBN : 978-602-99806-3-9

No.	Parameter	Unit	Test 1	Test 2	Threshold
1	pH		7,12	7,42	6-9 [1)]
2	BOD5	mg/l	1,83	1,28	2 [1)]
3	COD	mg/l	4,28	3,20	10 [1)]
4	Nitrite (NO2)	mg/l	0,001	0,004	0,06 [1)]
5	Nitrate (NO3)	mg/l	7,242	6,421	10 [1)]
6	Sulfate (SO4)	mg/l	15,926	14,829	400 [1)]
7	Darkness	mg $CaCO_3$/l	241,297	157,642	500 [2)]
8	Chloride (Cl)	mg/l	21,3	51,79	600 [1)]
9	Amonia (NH3)	mg/l	0,002	Ttd	0,5 [1)]
10	Turbidity	mg/l	18,75	16,5	1000 [1)]
11	Colour	UnitPtCo	0,001	0,001	50 [2)]
12	Odor		odorless	odorless	odorless [2)]
13	Taste		Does not taste	Does not taste	Does not taste [2)]
14	Calcium	mg/l	7,363	7,476	200 [2)]
15	Magnecium	mg/l	1,135	1,244	150 [2)]
16	Sodium	mg/l	-	-	0 [2)]
17	Iron	mg/l	Not detected	Not detected	1,0 [2)]
18	*ALT*	CFU/ml	0	0	0 [2)]
19	*Coliform*	MPN/100ml	0	0	0 [2)]
20	*E.Coli*	MPN/100ml	0	0	0 [2)]
21	*Staphilococcus aureus*	CFU/ml	0	0	0 [2)]
22	*Salmonella/Shigella*	CFU/ml	0	0	0 [2)]
23	*BAL*	CFU/ml	0	0	0 [2)]

[1)] *Bali Governor's Regulation no. 8 of 2007 on Environmental Quality Standards and Raw Environmental Damage*
[2)] *Guidelines for Dringking Water Quality, WHO, Geneva, 1982*

Table 3. Water Quality Index Test Results

Factor	Weight	Meaured	Quality Index
Dissolved Oxygen	0.17	-	100
Fecal Coliform	0.16	-	100
pH	0.16	7.27	92
BOD	0.11	1.55	89
Temperature Change	0.11	1	89
Total Phosphate	0.10	-	100
Nitrates	0.10	6.82	58
Turbidity	0.08	17.625	84
Total Solids	0.07	17.625	84

Factors Entered:	9
Final Index:	89

Water Quality Index Legend

Range	Quality
90-100	Excellent
70-90	Good
50-70	Medium
25-50	Bad
0-25	Very Bad

4. Conclusions

Provision of clean water in high areas such as Bukit Asah with an altitude of 120 - 150 m above sea level can be done by first surveyed water source, drilling then transmitted to the desired location.

ISBN : 978-602-99806-3-9

Survey water sources one of them using Geolistrik Method. The water obtained is suitable as a source of drinking water. In theory until the price of water in Bukit Asah Rp. 1288 /m^3.

Acknowledgments
We would like to thank the Head of Soil Mechanics Laboratory of Civil Engineering Department, Engineering Faculty of Udayana University for the lending of Geolistrik equipment provided for data collection. We also thank the Geoelectric Survey Team Civil Engineering Student and Physics Student of Udayana University.

Refrence

Anomohanran, O. 2011. Determination of Groundwater Potentian in Asaba, Nigeria Using Surface Geoelectrical Sounding. *International Journal of Physical Scienc.* 6(33): 7651-7656.

Anomohanram, O. 2013. Investigation of Groundwater Potential in Some Selected Towns in Delt 5a North District of Nigeria. *International Journal of Applied Science and Technology*. 3(6): 61-66.

Alile, O.M., O. Ujuanbi, I. A. Evbuomwan. 2011. Geoelektric Investigation of Groundwater in Oberatin – Iyanomon Locality, Edo State, Nigeria. *Journal of Geology and Mining Research.* 3(1): 13-20.

Araffa, S.A.S. 2013. Delination of Grounwater Aquifer and Subsurface Structure on North Cairo, Egypt, Using Integrateg Interpretation of Magnetic, Gravity, Geoelectrical and Geochemical Data. *Geophysical Journal International.* 192.: 94-112.

Indriatmoko, R., Haryoto dan A.Herlambang. 2005. Pendugaan Potensi Air Tanah dengan Metode Resistivitas Dua Dimensi di Wilayah Pesisir untuk Perencanaan Pembangunan Air Bersih di Kabupaten Pasir, Kalimantan Timur. *JAI.* 1(3): 332-339.

Irjan. 2012. Pemetaan Potensi Air Tanah (Aquifer) Berdasarkan Interpretasi Data Resistivitas Wenner Sounding. *Jurnal Neutrino.* 4(2): 201-212.

Karunia, D.K., Darsono, Darmanto. 2012. Identifikasi Pola Aliran Sungai Bawah Tanah di Mudah, Pracimantoro dengan Metode Geolistrik. *Indonesian Journal of Applied Physics.* 2(2): 91-101.

Olawuyi, A.K. and S.B. Abolarin. 2013. Evaluation of Vertical Electrical Sounding Method for Groundwater Development in Basement Complex Terrain of West-Central Nigeria. *Nigerian Journal of Technological Development.* 10(2): 22-28.

Purnama, Ig., Setyawan. dan B. Sulaswono. 2006. Pemanfaatan Teknik Geolistrik untuk Menditeksi Persebaran Airtanah Asin pada Akuifer Bebas di Kota Surabaya. *Majalah Geografi Indonesia,* 20 (1): 52-66.

Rolia, E. 2011. Penggunaan Metode Geolistrik Untuk Menditeksi Keberadaan Air Tanah. *Tapak.* 1(1): 1-11.

Sajeena, S., A. V. M. Hakkim, and E.K. Kurien. 2014. Identification of Groundwater Prospective Zone Using Geoelectrical and Electromagnetic Surveys. *International Journal of Engineering Inventions.* 3(6): 17-21.

Sen, P.N.P.A, Goode, and A. Sabbit. 1988. Electrical Conduction in Clay Bearing Sandstones at Low an High Salinities. *Journal of Applied Physics.* 63(10): 4832-4840.

Simpen, I N. 2016. *Pendugaan Posisi Akuifer dengan Metode Geolistrik dalam Rangka Membuat Sumur Bor di Proyek Rumah Sakit Internasional Nyitdah Tabanan.* Laboratorium Mekanika Tanah Jurusan Teknik Sipil Fakultas Teknik Universitas Udayana. Denpasar.

Simpen, I N. 2016. *Pendugaan Posisi Akuifer dengan Metode Geolistrik dalam Rangka Membuat Sumur Bor di Villa Jogla Bedugul*. Laboratorium Mekanika Tanah Jurusan Teknik Sipil Fakultas Teknik Universitas Udayana. Denpasar.

Simpen, I N. 2016. *Pendugaan Posisi Akuifer dengan Metode Geolistrik dalam Rangka Membuat Sumur Bor di Villa Puri Persada Denpasar*. Laboratorium Mekanika Tanah Jurusan Teknik Sipil Fakultas Teknik Universitas Udayana. Denpasar.

Simpen, I N., I N.S. Sutama, I W. Redana, S. Zulaikah. 2016. Aquifer Porosity Prediction Based on Resistivity Data and Water Conductivity. *International Research Journal of Engineering, IT & Scientific Research*. 2(5): 8-21.

VenkataRao, G., P. Kalpana, R. Srinivasa. 2014. Groundwater Investigation Using Geophysical Methods – A Case Studi of Pydibhimavaram Industrial Area, *ICPECDM*.03(Spc.06): 13-17.

ISBN : 978-602-99806-3-9

Wulandari, N., Novi, Sujito, D.A. Suaidi. 2014. Aplikasi Metode Geolistrik Resistivitas 2 Dimensi Untuk Menentukan Persebaran Air Tanah di Desa Gunungjati Kecamatan Jabung Kabupaten Malang. *Jurnal Online UM.*

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

Implementation of supply chain management through collaboration strategy to improve logistic capability and performance

Cokorda Gede Putra Yudistira[1], I Wayan Edi Arsawan[1], Ni Wayan Sumetri[1], I Wayan Wirga[1]
Departement of Business Administration, Bali State Polytechnic, Indonesia
Jalan Kampus Bukit Jimbaran, Kuta Selatan Badung Bali, Indonesia

deyudistira@yahoo.co.id

Abstract. This study examines the relationship of collaboration in improving the capability of the company which ultimately leads to improvement of the company's logistics performance. This research uses quantitative design through the spreading of questionnaires with Likert 5 approach. The population in this research is ALFI company in Badung regency, Bali Province, Indonesia which amounts to 22 units. From the population then determined the distribution of questionnaires to 44 managers and assistant managers as the unit of analysis. The research model was built using structural equation model and analyzed with smartPLS-3 software. The research findings reveal that collaboration has a significant effect on logistics capability, logistics capability has a significant effect on logistics performance. The results provide an overview of the importance of collaborative strategies in enhancing capability and logistics performance.

Keywords: Supply Chain, Logistic Capability, Logistic Performance, Collaboration

1. Introduction

Logistics conditions in Indonesia from year to year can be said to improve. This is evident from the logistics performance index periodically issued by the World Bank about the logistics index of 166 countries in the world known as logistics performance index (LPI). In 2014 Indonesia ranked 53rd, up sixth place from the year 2012 which is ranked 59th. The World Bank (2014) establishes six parameters in ranking the average logistics of a state that is (a) the efficiency of the clearance process (I;e speed, simplicity and predictability of formalities) by the competent authorities, including customs; (B) The quality of trade and transport related infrastructure (eg ports, railways, roads, information technology); (c) ease of delivery at competitive prices; (d) Competence and quality of logistics services (eg, transport operators, customs processes); (e) the ease of tracking the shipment; (f) On time delivery in accordance with the expected time Indonesia's logistics performance index is improving, but according to the Logistics and Forwarding Indonesia Association (ALFI) there are still some things that become logistical weaknesses in Indonesia such as the high cost of logistics and the delay in delivery of goods. The high cost of transportation and storage (storage) resulted in increased production costs, coupled with internal problems such as low company performance of human resources and leadership. For almost 30 years the company has been increasingly concerned with logistics activities (Tibben *et al.,* 2010). This means that logistics is an important part of supply chain network systems that should be a major concern in the evaluation of operational costs. Service and manufacturing industries are required

ISBN : 978-602-99806-3-9

to have competitive value, create value added, work more efficiently by applying integrated management concept so as to create sustainable competitive advantage.

The shipping business has grown so rapidly and is closely linked to the logistics and transport costs that contribute between 25 and 50 percent (Parego et al., 2010). This is because the process of transporting cargo and documents using ships and aircraft is very complicated and requires a relatively expensive cost. Logistics conditions nationally are closely related to the logistics performance of each company, especially companies engaged in logistics and supply chain. Logistics performance reflects the organization's performance in relation to the ability to deliver goods and services in the proper quantity and time as per customer demand.

Logistics distribution as a component of the dominant business activity in the field of logistics services requires efforts to improve its competitiveness. Increased competitiveness in the field of logistics services has been done by many business organizations through collaborative strategy, on the grounds that collaboration can increase market share, improve customer service, share and lower product development costs, reduce risk, improve product quality, improve skills and knowledge, , and others (Bititci, 2004). According to Vereecke and Muylle (2006), collaboration can result in improved performance in the supply chain. The company builds collaborative relationships with its supply chain partners to achieve sustainable efficiency, flexibility and competitive advantage (Nyaga et al., 2010) that ultimately lead to improved corporate performance. Collaboration aims to strengthen the partnership network by integrating their resources, strengthening the business network, and improving the competitiveness in delivering services. Nevertheless, contradictory values occur in realizing a partnership pattern that is a high risk of failure. Some of the obstacles in realizing the success of the partnership (collaboration) are, among others, caused by factors such as inter-firm rivalry, governance problems, inter-firm organizational differences, coordination costs, differences in knowledge spillover, differences in target services desired by each company, and organization rigidity (Park and Ungson, 2001).

From the description is necessary research to test the relationship of collaboration in improving corporate capabilities that ultimately leads to increased logistics performance in logistics companies. This research will be conducted on companies incorporated in ALFI (Logistics and Forwarding Association of Indonesia) of Badung Regency, especially in facing the competition of logistic business which is still a lot of complained about by customers, especially the high cost of logistics and the delay of cargo delivery. In addition, Indonesia is already incorporated in the MEA (ASEAN Economic Community) which allows more and more foreign logistics companies to enter Indonesia so that competition in the logistics business / supply chain is increasing. Therefore, in anticipation of such a large expansion, collaboration among logistic companies that is currently required to improve logistics capabilities, which leads to improved logistics performance.

2. Literatur Review

Collaboration

According Wood and Gray (1991) describe collaboration as a process in which the parties involved view the different aspects of a problem and find solutions to the differences and limit their view of what can be done. One of the key words in supply chain management is the establishment of robust collaboration between parties in a supply chain. Collaboration improves the capabilities of the entire members. Collaboration is able to multiply the power of each other to produce results that can not be achieved by one party if they work alone. In collaboration there must be enough freedom to reach the goal, with some outside boundaries (Rowland, 2008). Collaboration is a partnership to achieve something more than one person or organization can do by yourself. Collaboration does the best in the group and helps each other to achieve a higher position.

From previous studies, there are some researchers who interpret the definition of collaboration. According to Huxham (1996), collaboration has been discussed as a way that organizations can do in situations where self-employment is not possible to achieve the organization's ultimate goals. It further said that collaboration implies a form of positive cooperation in relation to various parties. Collaboration can also be interpreted as a difference in organizational mode, a positive benefit for the purpose of relationships among organizations that maintain self-reliance, integrity, and identity differences and

ISBN : 978-602-99806-3-9

potentially for the benefit of cooperative relations (Huxham, 1996). According to Jordan and Michel (2000), collaboration is a number of companies linked to creating and supporting a service or product for life services, including final disposal. Collaboration focuses on collaboration in planning, coordination, and integration processes between suppliers, customers, and others in a supply chain involving collaborative decision-making strategies on partnership and network design. Simatupang et al. (2004) stated that collaboration is a cooperative strategy of partners in the supply chain with the goal of serving customers through integrated solutions to lower costs and increase revenue. Collaboration describes cooperation among independent firms, but related companies share resources and capabilities to meet the most unusual or dynamic changing needs of customers. Collaboration is also said to be the ability to work across organizational boundaries to build and manage unique value adding processes to meet customer needs. While Cao and Zhang (2011) define collaboration as a partnership process whereby two or more autonomous companies work together to plan and execute supply chain operations for mutual and mutual benefit purposes. Collaboration is done by gathering different parties with different interests to generate a shared vision, building agreement on an issue or issue, creating solutions to the problem, and putting forward shared values to produce decisions that benefit all parties (Simatupang & Sridharan, 2008). Supply chain collaboration connects two or more supply chain members in building commitment and maintaining a strategic relationship relationship process, whereby they use their core capabilities to address appropriate changes and challenges (Bowersox et al., 2003).

Some researchers connect internal or functional collaboration with external, implicate relationship development, process integration, and information sharing with suppliers and customers. Previous literature also demonstrates the benefits of collaboration. In a preliminary study, Lewis (1990) found that the company derives benefits from collaboration, especially in product quality improvement, economies of scale in business, and so on. And ultimately collaboration increases the company's market share. Collaboration will result in a faster product development process, reduced product development costs, improved technology, and / or improved product quality in dynamic market conditions (Walter, 2003). Another advantage of collaboration is the division and reduction of product development costs (McCarthy and Golicic, 2002). Collaboration also results in improved performance in supply chains (Vereecke and Muylle, 2006).

Matthew and Cheung (2008) point out some of the benefits of supply chain collaboration: first, collaboration improves profit sharing. Second, the ever-increasing collaboration can lower the company's expenses. Third, long-term partnership collaboration is the best solution to develop business processes, including lower cost and value addition for partners. Companies build collaborative relationships with their supply chain partners to achieve sustainable efficiency, flexibility and competitive advantage (Nyaga et al., 2010). Dyer and Singh (1998) argue that collaborating firms can generate relational rents through relation-specific assets, knowledge-sharing routines, complementary resource endowments, and effective governance.

Logistics capability

Capability is an important part of strategic planning to identify and predict the ability to maintain and enhance an organization's competitive position. Companies should seek solutions to competitive problems through core capabilities in providing an unlimited source of future customer value. Core capabilities are often used to gain access to a wide range of markets. The core capabilities must be closely linked to the benefits provided by the customer's value products or services. The core capabilities can provide an organization's competitive advantage. Another characteristic of the core capability is that such capabilities must be difficult to imitate. Continuous competitive advantage can not be achieved if provided by an imitable core capability. Logistics capability has internal and external aspects. Internally, logistics must work closely with other functions to plan, coordinate, and integrate cross-functional activities (Bowersox et al., 1999). From a strategic perspective, logistics has the ability to coordinate and integrate interdependent activities across key functional areas. Externally, through logistics development that includes customers and suppliers, logistics can generate profits, such as asset productivity, operational effectiveness, and customer value achievement. Logistics must have a unique capability to coordinate internal and external corporate resources, create and develop enterprise supply

ISBN : 978-602-99806-3-9

chain capabilities by connecting system and operational interfaces to reduce redundancy along with maintenance of operational synchronization (Mentzer et al., 2004).

In his research, Morash et al. (1996) suggests that logistics capabilities use two disciplinary values (proximity to customers and operational excellence) to identify logistical capabilities. The value of discipline first emphasizes external customers, external customer relations, and external goals. The value of this discipline is demand-oriented or customer-oriented. Demand-oriented logistics capabilities are related to customer service and time-advantage, and responsiveness to the target market. The second value of discipline relates to supply-oriented operational capabilities and emphasizes product availability, total integrity and low total cost.

Logistics Performance

Performance can be defined as the ability of an object to produce results, either in a certain dimension in relation to the target to be achieved (Laitinen, 2002). Performance is measured to benchmark and evaluate the effectiveness and efficiency of each organization. Kaplan and Norton (1996) argue that organizations must have an effective performance measurement system capable of covering all aspects to achieve success and growth. Tummala et al. (2006) states that the performance measurement criteria made by the organization must be specific, measurable and can be evaluated periodically. Company performance shows how far the company can achieve its market-oriented goals along with the achievement of its financial goals (Yamin et al., 1999). The short-run goal of supply chain management is to increase productivity and reduce inventory and cycle time, while its long-term goal is to increase market share and profit for all members in the supply chain (Tan et al., 1998).

Mentzer and Konrad (1991) define logistics performance as the effectiveness and efficiency in carrying out logistical activities. Langley and Holcomb (1992) developed the definition by adding logistical differentiation as a key element of logistics performance because acceptance of customer value from logistics activities is also treated as an indicator of logistics performance. They assume that logistics can create value through efficiency, effectiveness, and differentiation. For example, values can be created through customer service elements such as product availability, timeliness and consistency of delivery, and ease of ordering. If logistics can create value through logistical activities that can not be replicated, a company may be able to differentiate from its competitors. Excellence in logistics performance requires superiority when compared to competitors (differentiation). Then Smith (2000) developed the opinion of Langley and Holcomb (1992) to define logistics performance as a second order construct consisting of efficiency, effectiveness, and logistic differentiation. Logistics performance is multi-dimensional and is defined as the level of efficiency, effectiveness, and differentiation associated with the completion of logistical activities (Bobbit, 2004).

According to Keebler and Plank (2009), there are at least three reasons why a company wants to measure its logistics performance. Companies can lower operating costs, use logistic performance measures to drive revenue growth, and further increase shareholder value. When operating costs are measured, firms can identify how, when, and where to make operational changes to control burdens, and, of course, the most important is to improve asset management. Companies can attract and retain valuable customers through increasing the value of the offered product price with reduced costs and service improvements. Finally, returns for shareholder investment and firm market value can be significantly influenced by improved logistics performance through a process that leads to stock prices and dividend policy.

Traditional logistics measurements measure "hard times" like services (order cycle times and fill rate), cost, return on assets, or return on investment (Morash et al., 1996), "soft measures" such as managers' perceptions of loyalty and customer satisfaction (Holmberg, 2000). Currently, measures of logistics performance are related to corporate strategy (Zacharia and Mentzer, 2004) and more explicitly incorporate customer perspectives (Brewer and Spech, 2000).
There are a number of empirical studies that test the measurement of logistics performance. Starting from Kearney (1978, 1984) that examines how logistics performance is tested and highlights the success of case studies. Byrne and Markham (1991) describe the activity of quality improvement and productivity within the company. Bowersox et al. (1989), and the Global Logistics Research Team at

ISBN : 978-602-99806-3-9

Michigan State (1995) documented extensive cross-business measurement practices and found that many measures of asset management and other investments are not available within the firm.

More specifically, they identified 17 key cost sizes and only five were available and used in 99 percent of the companies surveyed. In a similar study, Novack et al. (1995) found that when these measures were used, logistic executives were generally unable to calculate the value of the logistics function for the firm. Caplice and Sheffi (1995) provide a foundation for selecting and maintaining a logistics performance measure of a system. Fawcett and Clinton (1996) what the impact of logistics performance in the company and found seven factors that have a provable impact on manufacturing companies. Keebler (2000) states that leading companies do not use the specific measures of logistics performance that are important to their customers. Rafele (2004) provides a framework for measuring logistics services in more than one supply chain perspective, rather than an individual company.

The construct of logistics performance reflects the performance of the organization in relation to the ability to deliver goods and services in the proper quantity and time as per customer demand. Andersson et al. (1989) states that in measuring logistical performance, a comprehensive strategy measurement is needed for successful planning, realization, and oversight of different activities comprising logistics business functions. Logistics performance is usually associated with delivery service, logistics cost, and tied up capital. The delivery service can be shared and measured as lead time and on-time delivery. The cost of logistics, for example, is transportation and supplies carried, while tied-up capital appears in many in the flow of materials as in raw materials and finished goods inventory (Stock and Lambert, 2001). Meanwhile Bowersox et al. (2000) provides performance metrics such as customer satisfaction, delivery speed, delivery dependability, and delivery flexibility.

A. Research Methodology and Hypotheses

Population and sample

The population of this study are all companies incorporated in ALFI (Association of Logistics and Forwarding Indonesia) Badung regency, which amounted to 22 companies. The sampling technique used in this study is non probability sampling, where the elements of the population do not have the same opportunity to be selected into the sample (Indriantoro and Supomo, 2002). While the sample unit of this research is 19 cargo companies which are also as forwarder and expedition. Sampling method in this research is purposive sampling, that is sampling method with certain consideration which is considered relevant or can represent the object under study (Effendi and Tukiran, 2012). Sample criteria selected are companies that have the following qualifications:

1) cargo which is also well as a forwarder and expedition (multipurpose organization)
2) long operation over 15 years,have agency abroad,
3) has service contract with several supporting companies such as shipping company, tracking, transportation, warehousing, and fellow forwarder, and
4) has a certificate of PPJK (Customs Service Implementing Company)

After the number of research sample is known then do the calculation of respondent research that manager and assistant manager. Respondents who are represented by managers and assistant managers are representatives of policy making in the organization mainly related to research variables such as collaboration and logistics performance. So the number of respondents is 38 respondents.

3. Results and Discussion

The accuracy of testing a hypothesis about the relationship of research variables depends on the quality of the data used in the test. The research data will not be useful if the measuring tool used to collect the data does not have high validity and reliability. According to Johnson et al. (2008), the validity indicates the extent to which a measuring instrument measures what is measured. Validity test is used to measure feasible or not a research instrument (questionnaire). A questionnaire is said to be valid if the statement on the questionnaire is capable of capturing something that will be measured by the questionnaire (Latan and Gozhali, 2012). Validity of instrument in this research is done by using correlation method between scores of item statement with tota score (indicator) in 95% significance level or alpha equal to 0,05. The statement item is valid if it has positive correlation and greater than 0.30 or correlation coefficient value (r)> 0.30.

ISBN : 978-602-99806-3-9

Outer model

Outer model or also called measurement model is a specification of the relationship between latent variables with indicators or variables manifestnya, or in other words measure how far the indicator can explain the latent variables. Therefore, validity and reliability must be tested. The validity test shows the extent to which the measuring instrument is able to measure what it wants to measure (Danim, 1997). The validity of the data is determined by the circumstances in which the respondent was interviewed (Umar, 2002). The validity test ensures that the measurements include a set of sufficient and representative items that reveal a concept (now, 2006). While the reliability test is a term used to indicate the extent to which a measurement result is relatively consistent if the measurement is repeated twice or more (Umar, 2002). If a measuring instrument (questionnaire) is used twice to measure the same symptoms and the measurement results are relatively consistent, then the measuring device is said to be reliable. Covergent validity of the measurement model with reflexive indica¬tor is assessed by correlation between item score / component score with construct score calculated by PLS. Individual reflexive sizes are said to be high if they correlate more than 0.70 with the constructs you want to measure. However, for the initial stage of development of measurement scale the loading values of 0.5 to 0.60 are considered sufficient (Chin, 1998).

Discriminant validity of the measurement model with reflexive indicators is assessed based on cross loading measurements with constructs. If the construct correlation with the measurement item is greater than the size of the other construct, then it indicates that the latent construct predicts the size on their block is better than the size of the other block. Another method of assessing discriminant validity is to compare the square root of average variance extracted (AVE) value of each construct with the correlation between the construct and the other constructs in the model. If the AVE square root value of each construct is greater than the correlation value between the construct and the other constructs in the model, it is said to have a good discriminant validity value (Fornell and Larcker, 1981). Fornnel and Larcker (1981) suggest that these measurements can be used to measure the reliability of latent variable component scores and the results are more conservative than composite reliability (pc). Recommended AVE value should be greater 0.50. Composite reliability indicator blocks that measure a construct can be evaluated with two sizes, namely internal consistency developed by Werts, Linn and Joreskog (1974) and Cronbach's Alpha. Compared with Cronbach Alpha, this measure does not assume equivalence between measurements assuming all indicators are weighted equally. So Cronbach alpha tends to lower bound estimate reliability, whereas PC is closer aPproximation assuming parameter estimation is accurate. PC as internal consistency measure can only be used for construct with reflexive indicator.

Reliability shows the accuracy and precision of the meter. A gauge is said to be reliable if the measurement results are accurate and consistent. Measurements are said to be consistent if multiple measurements on the same subject are obtained with no different results. The variable is considered reliable when the Alpha Cronbach coefficient> 0.6.

ISBN : 978-602-99806-3-9

Tabel 1 Outer Loadings Model

Outer Loadings

Matrix

	Collaboration	Logistic Perf.	Logistic cap.
x1.1	0.825		
x1.10	0.819		
x1.2	0.884		
x1.3	0.902		
x1.4	0.873		
x1.5	0.814		
x1.6	0.846		
x1.7	0.874		
x1.8	0.855		
x1.9	0.788		
y1.1			0.777
y1.2			0.869
y1.3			0.838
y1.4			0.732
y1.5			0.736
y1.6			0.667
y1.7			0.793
y2.1		0.921	
y2.2		0.835	
y2.3		0.908	
y2.4		0.915	
y2.5		0.895	

Individual reflexive sizes are said to be high if they correlate more than 0.70 with the constructs you want to measure. However, for the initial stage of development of measurement scale the loading values of 0.5 to 0.60 are considered sufficient (Chin, 1998). In table 5.9 above it can be said that the outer loading value is said to be high.

Tabel 2 Average Variance Extracted (EVA)

Average Variance Extracted (AVE) | Matrix

	Average Varian...
Collaboration	0.720
Logistic Perf.	0.801
Logistic cap.	0.602

Fornnel and Larcker (1981) suggest that these measurements can be used to measure the reliability of latent variable component scores and the results are more conservative than composite reliability (pc). Recommended AVE value should be greater 0.50. Table 5.10 shows that the AVE value of all variables is more than 0.50. After conducting an outer test the next step model is to evaluate the inner model by looking at the magnitude of its structural path coefficient, as well as its statistical t test value obtained

ISBN : 978-602-99806-3-9

by the bootstrapping method. In addition, also note R2 for the latent variable dependent. The value of R2 about 0.67 is said to be good, 0.33 is said to be moderate, while 0.19 is said to be weak. Changes R2 can be used to assess the effect of a particular latent variable on the latent independent variable whether it has substantive influence. This can be done by calculating f2. The value of f2 is equal to 0.02, 0.15 and 0.35 can be said that predictors of latent variables have a small, medium, and large influence on the structural model. The structural model is evaluated by using R-square for dependent constructs, Stone-Geisser Q-square test for predictive relevance and t-test as well as the significance of the structural path parameter coefficients. In assessing the model with PLS we start by looking at R-square for a dependent latent variable. The interpretation is the same as the interpretation of the regression. Changes in R-square values can be used to assess the effect of certain latent independent variables on latent dependent variables whether they have substantive effects. The effect of magnitude f^2 can be calculated by the following formula (Cohen, 1988),

$$f^2 = \frac{R^2_{included} - R^2_{excluded}}{1 - R^2_{included}}$$

Where R^2included and R^2excluded are R-squares of dependent latent variables when predictors of latent variables are used or excluded in structural equations. The f2 value equals 0.02, 0.15 and 0.35 can be interpreted that the predictors of latent variables have small, medium, and large effects on the structural level (Cohen, 1988). Besides looking at the R-square values, the PLS model is also evaluated by looking at Q-square predictive relevance for the construct model. Q-square measures how well the observation value is generated by the model and also its parameter estimation. The larger Q-square value 0 (zero) indicates that the model has a predictive relevance value, whereas a Q-square value less than 0 (zero) indicates that the model lacks predictive relevance. Godness of fit (GoF) is used to validate the model as a whole. GoF values range from 0 (zero) to 1 (one). The formula used to determine the value of Goodness of Fit (GoF). GoF value is getting closer to 0 (zero) shows the model the less good, and vice versa move away from 0 (zero) and the closer one (1) then the model the better.

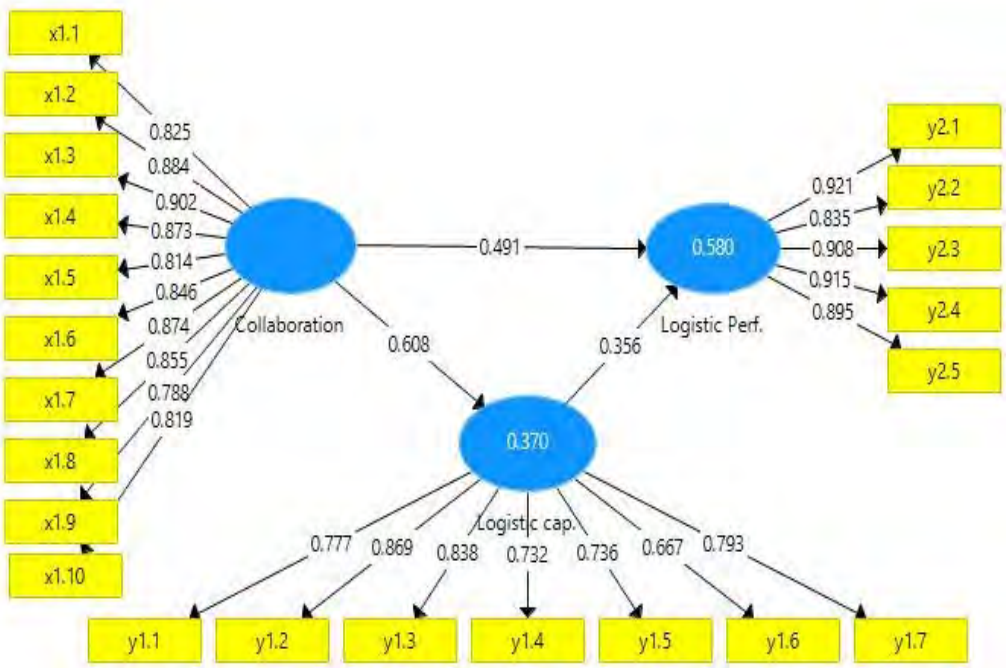


Figure 1. Output Analysis

ISBN : 978-602-99806-3-9

In Figure 5.1 above shows the results of the analysis test with the help of SmartPLS 3.0 and the relationship between variables.

Table 3 Path Coefficient

Matrix | Path Coefficients

	Collaboration	Logistic Perf.	Logistic cap.
Collaboration		0.491	0.608
Logistic Perf.			
Logistic cap.		0.356	

In the table above described the coefficient value of the relationship path between each research variable. The value of the coefficient of the path of collaboration strategy with logistics capability is 0.608> 1.96 which means significant (hypothesis 1 accepted). The logistics capability coefficient and logistics performance are 0.356> 1.96, which means significant (hypothesis 2 is accepted). While the relationship of collaboration strategy and logistics performance of path coefficient is 0,491> 1,96 meaning significant (hypothesis 3 accepted).

Table 4 Direct and Indirect Effect

Indirect Effects

Matrix

	Collaboration	Logistic Perf.	Logistic cap.
Collaboration	1.000	0.216	
Logistic Perf.		1.000	
Logistic cap.			1.000

Total Effects

Matrix

	Collaboration	Logistic Perf.	Logistic cap.
Collaboration	1.000	0.707	0.608
Logistic Perf.		1.000	
Logistic cap.		0.356	1.000

ISBN : 978-602-99806-3-9

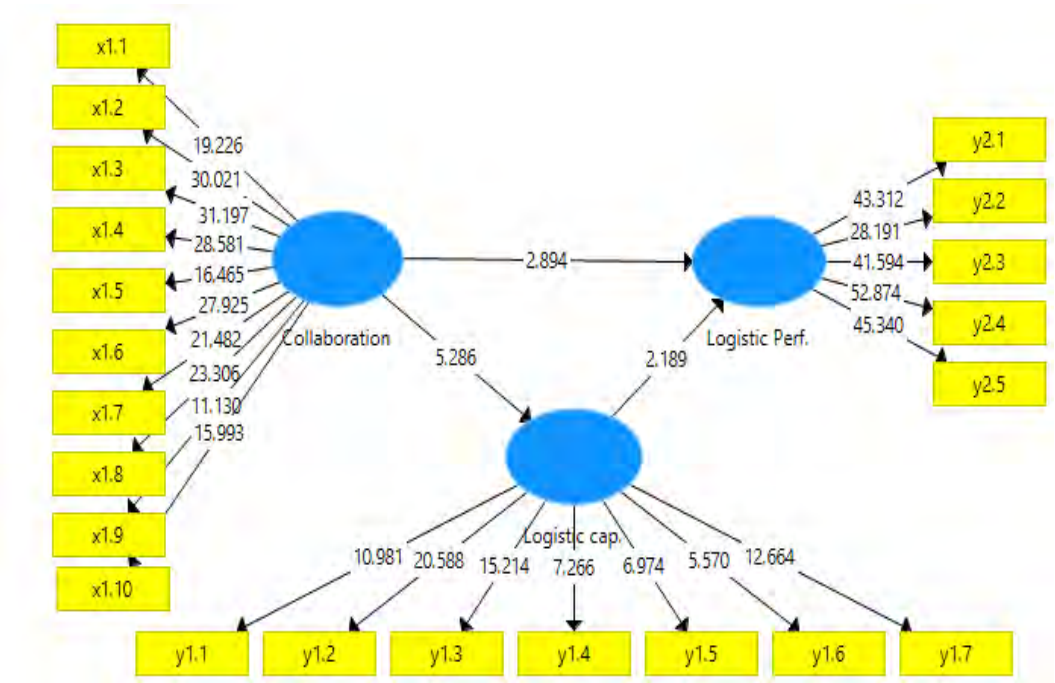


Figure 2 Bootstropping Model Analysis

Tabel 5 Path Coefficients

Path Coefficients

Mean, STDEV, T-Values,... | Confidence Intervals | Confidence Intervals B... | Samples | Export to clipboard: Co

	Original Sampl...	Sample Mean (...	Standard Devia...	T Statistics (|O...	P Values
Collaboration -> Logistic Perf.	0.491	0.474	0.170	2.894	0.004
Collaboration -> Logistic cap.	0.608	0.626	0.115	5.286	0.000
Logistic cap. -> Logistic Perf.	0.356	0.375	0.163	2.189	0.029

In table 5.13 above can be explained the relationship of each variable. The coefficient of direct link lane of collaboration strategy and logistic capability is 5,286> 1.96 meaning significant and hypothesis 1 accepted, while the coefficient of logistic capability relationship and logistics performance is 2,189> 1.96 meaning significant and hypothesis 2 accepted. The relationship of collaboration strategy with the logistics performance shown by the large coefficient is 2,894> 1.96 which means significant and hypothesis 3 accepted.

Tabel 6 Indirect Coefficients

ISBN : 978-602-99806-3-9

Indirect Effects

Mean, STDEV, T-Values,... | Confidence Intervals | Confidence Intervals B... | Samples | Export to clipboard:

	Original Sampl...	Sample Mean (...	Standard Devia...	T Statistics (|O...	P Values
Collaboration -> Logistic Perf.	0.216	0.235	0.119	1.816	0.070
Collaboration -> Logistic cap.					
Logistic cap. -> Logistic Perf.					

For the role of mediation variable logistics capability mediate the relationship of collaboration strategy and logistics performance obtained by T statistics 1.816> 1.96 which means that not significant and become important finding in this research.

The direct path coefficient of collaboration strategy and logistics capability is 5,286> 1.96 which means significant and hypothesis 1 is accepted. This study is in line with research conducted by (Rowland, 2008) who found that collaboration enhances the capabilities of the entire member. This study also supports research conducted Nyaga et al. (2010) and Simatupang and Sridharan (2002). Collaboration also results in improved performance in supply chains (Vereecke and Muylle, 2006). The coefficient of logistical capability relationship and logistics performance is 2,189> 1.96 which means significant and hypothesis 2 is accepted. This study is in line with research conducted by Morash et al. (1996) who found that the company's logistics performance was influenced by logistical capabilities. This is also in accordance with the findings about the resouce based view theory proposed by Barney (1991). The relationship of collaboration strategy with logistics performance is shown by the large coefficient is 2,894> 1.96 which means significant and hypothesis 3 accepted. This study is in line with research conducted by Kocoglu et al., 2011; Wu et al., 2014; Vereecke and Muylle, 2006) that logistics performance is influenced by collaboration either directly or indirectly.

Discussion

Collaborative strategies are vulnerable to risks so companies are expected to apply risk sharing patterns through well-regulated agreements that benefit both parties. To improve the logistics capability one way is to map and possibly consider opening a potential branch to reduce difficulties especially transportation and supplyer and improve lead time service.

Referencies

[1] Ballou, R.H. (2004) Business Logistics/Supply Chain Management: Planning, Organizing and Controlling the Supply chain. 5th Edition, Pearson/Prentice Hall Inc., New Jersey

[2] Barratt, M. (2004). Understanding the meaning of collaboration in the supply chain. *Supply Chain Management: An International Journal*, *9*(1), 30-42

[3] Bititci, *B* (2004). Understanding the meaning of collaboration in the supply chain. *Supply Chain Management: An International Journal*, *9*(1), 30-42

[4] Cao, M. & Zhang, Q. (2011). Supply Chain Collaboration: Impact on Collaborative Advantage and Firm Performance. *Journal of Operations Management*, 29 (3), 163–180.

[4] Chandra, K., & Kumar, S. (2000). Supply chain management in theory and practice: A passing fad or a fundamental change? *Industrial Management & Data System*, 100(3), 100-113

[5] Chopra, S., & Meindl, P. (2010). *Supply chain management: Strategy, planning, and operation* (4th ed.). Upper Saddle River, New Jersey: Pearson Education, Inc.

[6] Eisenhardt, K. M., & Schoonhoven, C. B. (1990). Organizational growth: Linking founding team, strategy, environment and growth among US semiconductor ventures. *Administrative Science Quarterly*, 35, 504-529

ISBN : 978-602-99806-3-9

[7] Halley, A., & Beaulieu, M. (2009). Mastery of operational competencies in the context of supply chain management. *Supply Chain Management: An International Journal*, 14(1), 49-63.

[8] Locke, R., & Romis, M. (2007). Improving work conditions in a global supply chain. *MIT Sloan Management Review*, 48(2), 53-62.

[9] Nyaga, G. N., Whipple, J. M. & Lynch, D. F. (2010). Examining Supply Chain Relationships: Do Buyer And Supplier Perspectives on Collaborative Relationships Differ? *Journal of Operations Management*, 28 (2), 101–114

[10] Parego, M., Oliva,R.,&Watson,N.(2010). Cross-functional alignment in supply chain planning: A case study of sales and operations planning. *Journal of Operations Management*, 29, 434-448.

[11] Pfohl, H. C. & Buse, H. P. (2000). Interorganizational Logistics Systems in Flexible Production Networks: An Organizational Capabilities Perspective. *International Journal of Physical Distribution and Logistics Management,* 30 (5), 388–406.

[12] Reichhart, A., & Holweg, M. (2007). Creating the customer-responsive supply chain: A reconciliation of concepts. *International Journal of Operations & Production Management*, 27(11), 1144-1172.

[13] Simatupang, T. M., & Sridharan, R. (2005). The collaboration index: a measure for supply chain collaboration. *International Journal of Physical Distribution & Logistics Management*, *35*(1), 44-62

[14] Vereecke, I. P dan Muylle V. & M. (2006). Supply Chain Collaboration Between Retailers and Manufacturers: Do They Trust Each Other? *Supply Chain Forum: An International Journal*, 7 (1), 70–80.

[15] Wu, S.J., Melnyk, S.A., & Flynn,B .B.(2010). Operational capabilities: The secret ingredient. *Decision Sciences*, 41(4), 721-754

Proceeding International Joint Conference on Science and Technology (IJCST) 2017
ISBN : 978-602-99806-3-9

The integrated practice learning model to improve the competency of waiter/s occupation on hospitality study program of Bali State Polytechnic (BSP)

I Ketut Sadia[1], I Made Darma Oka[1], I Wayan Pugra[1]
Program Studi Perhotelan Politeknik Negeri Bali
Jalan Kampus Bukit Jimbaran, Badung, Bali.

ketutsadia@pnb.ac.id

Abstract. Bali State Polytechnic (BSP) Hospitality Study Program hadn't implemented integrated learning practice optimally. The aim of this research was improving the learning process method as an integrated practice learning model involving three courses (Food Production, FB Service, and English for Restaurant) in the same topic. This study was conducted on the forth semester of Hotel Study Program as the sample used in this research. After the random sampling was selected two classes as research samples, those were IVA class as an experiment group and IVB class as a control. Thus the samples could be determined according to the number of students in each class as many as 26 people. Based on the results, it could be concluded that the application of integrated practice learning had an effect on the achievement of student competency in waiter/s occupation at Hotel Studies Program. The result of statistical test showed that there was a significant difference of competency achievement between integrated learning practices with partial practice learning students groups. It's suggested to the management Hospitality Study Program to encourage and to facilitate the lecturers especially of core subjects to apply integrated learning practices in order to achieve the competency.

1. Introduction

Integrated learning as a concept was a learning approach involving several courses to provide a meaningful learning experience for students. The aim was to make it easier for students to understand the lecture material taught by the lecturers. Resmini (1996) stated that integrated learning was believed to be a practice-oriented approach to learning that meets the needs of students. Effective integrated learning could help to create broad opportunities for students to see and build on interrelated concepts. With this integrated learning the students were expected to have the ability to identify, to collect, to assess and to use the existing information in the vicinity meaningfully. It could be gained not only through the provision of new knowledge to the students but also through the opportunity to consolidate and to apply them in new and increasingly diverse situations in the hospitality industry.

Learning could be able to prepare professional waiter candidate. The achievement of the students in the restaurant service lecture (FB Service) should be at a very satisfactory level. Thus the graduates of the Diploma Program of Hospitality PNB had high competency so as to compete competitively in the hotel industry. The standard of competency that became the reference in FB Service subject course was ASEAN Common Competencies Standard for Tourism Professional (ACCSTP) in restaurant. All of these standards had been through common conventions and declared legitimately as a standard in their respective fields.

In the last five years, the achievement of the highly satisfied BSP Hospitality Study Program students was still below 30%, while the FB Service course was the core course that determined the competency

ISBN : 978-602-99806-3-9

of the student concerned (Hospitality Study Program, 2016). Oka, et al. (2011) stated that the level of student satisfaction on the model of teaching courses Food and Beverage Service applied to the Hospitality Studies Program was average of 71.91%. Some important components that needed to get serious attention were the accuracy in choosing learning media, learning methods, and appropriate learning strategies to be applied in learning. Therefore, it was necessary to apply more effective learning method to the students in order to obtain optimal learning result. Arsyad (2005) suggested, in the process of teaching and learning, there were two very important elements of teaching methods and learning media. These two aspects were interrelated. The Implementation of appropriate learning methods could generate new desires and interests, to generate motivation and stimulation of learning activities, and even to bring psychological influences on students.

To design integrated learning, lecturers should have broad insight into the linkage of combined concepts, high creativity, good teaching methodology skills, high self-esteem, and encourage to package and to develop materials. Integrated learning if it was well designed could provide effective learning and provide more meaningful learning experience, because students could learn according to the context of real work through work simulation. The formulation of the problems focused in this article was whether there was a significant difference in the achievement of competencies between groups of students who were treated with integrated learning practice with group of students who applied partial practice learning

2. Methodology

This research uses experimental research approach, where there were two groups of samples were given different treatment. Experiment Group (E) is a group of students who were experimented with the application of integrated practice learning. Control Group (K) is a group of students with the application of learning practices separately / partially. Population in this research were students of forth semesters of BSP Hospitality Study Program year 2016/2017. Samples were randomly selected from four classes of students of Hospitality Study Programs namely classes IVA, IVB, IVC, and IVD. After the random drawing was selected two classes as research samples those were class IVA and class IVB. Thus the number of samples could be determined according to the number of students in each class.

In the determination of the research sample, the group determination was made as experimental group and control group. One group was given an integrated practice of learning practice and another group was treated with partial practice learning, through random sampling technique. The draw was found that the selected group as the experimental group was the IVA class, and was selected as the control group was the class IVB. To equate the condition of the experimental group and the control group, the students as the subjects of the study in each group were classified based on three categories according to the scores obtained in the pretest namely: good, medium, and less. Good category of students who scored ≥81, moderate category with score 66-80 while the less category with score ≤ 65.

Based on initial test scores obtained in the second semester as an experimental group consisting of good category students 9 people, while 11 people, and less 6 people. The total number of IVA students were 26 people. Semester IVB as a control group consists of students good category 10 people, while 12 people and less 6 people. The total number of IVB students were 28 people. In order to obtain two groups of samples with the same condition, the students were made good, medium and low, the compositions were the same for both groups, so there were no more good and medium category students in the control group than in the experimental group.

Thus the sample of this study was a good category of 9 students in the experimental group, 9 people in the control group. Medium category students were 11 people in each group. Category less students 6 people in each group. So that the sample in this study was 52 people from 54 people population. To clarify the above description can be seen in Table 1.

ISBN : 978-602-99806-3-9

Table 1. The Composition of Populations and Samples

Category	Populations		Samples	
	Experiment Group	Control Group	Experiment Group	Control Group
Good	9	10	9	9
Fair	11	12	11	11
Less	6	6	6	6
Amount	26	28	26	26

Source: Student's Data of Hospitality Study Program, 2017

In this study, it was used inferential statistical analysis techniques. Inferential statistical analysis techniques used were test differences in this case that was used t test. This test was used to prove whether there was a significant difference between students with integrated practice learning with control group students who did not apply integrated practice learning to the Hotel Studies Program of BSP. After that, it was proved then the mean value which gave better result between the experimental group and the control group selected as the research sample.

3. Discussion

Hotel Study Program BSP is an educational institution that provides education with more emphasis on vocational education. Practical activities become more dominant in the learning process in order to be able to meet the demands of learning achievement that has been determined. The purpose of vocational education is to prepare workers who are able to apply the skills in the field of work in the tourism industry. Thus the applied learning is directed to produce graduates who master the ability in a particular field of work so that it can be absorbed directly in accordance with the needs in the tourism industry.

The results of observations by researchers so far showed that the process of learning practices in the BSP Hospitality Study Program was still done partially and more emphasis on achieving their respective competencies. Therefore, this study examined the impact of integrated learning practice by combining three interrelated courses of Food Production, Food and Beverage Service, and English Professional for Restaurant. It was hoped that with the application of integrated practice learning, students more easily simulated and related the relationship of learning materials to one competency with other competency according to the hotel industry situation.

Data obtained in this study were in the form of scores of student learning outcome which was the result of the measurement of student competency to support the work as a waiter of three courses of learning practices combined in the topic of handling guests enjoying food and beverages in the restaurant. The data were taken from two groups of students of the Hospitality Study Program of the Department of Tourism of the Bali State Polytechnic, who were sitting in the fourth semester of academic year 2016/2017. The number of samples in this study were 52 students divided into 2 groups, the groups that were given the integrated learning practice (experiment group) were 26 students and the unadjusted control group 26 students (Table 2).

ISBN : 978-602-99806-3-9

Table 2. Student Competencies Score on Waiter's Occupancy

No	Experiment group score	Control group score
1	84.00	72.00
2	88.00	80.00
3	92.00	84.00
4	96.00	80.00
5	84.00	80.00
6	92.00	72.00
7	88.00	80.00
8	92.00	80.00
9	96.00	84.00
10	80.00	72.00
11	80.00	68.00
12	80.00	68.00
13	80.00	79.00
14	92.00	78.00
15	76.00	66.00
16	76.00	72.00
17	80.00	72.00
18	88.00	80.00
19	92.00	80.00
20	84.00	80.00
21	80.00	68.00
22	80.00	66.00
23	76.00	72.00
24	72.00	72.00
25	76.00	66.00
26	80.00	66.00

Source: Research data, 2017

Data score of student learning outcome in this study were processed by using SPSS with t-test analysis techniques of two paired samples. A two-t test was used to assess whether the two groups' averages differed statistically from one to another. The result of data processing was integrated learning practice had an effect on improving student competency to do food and beverage service in restaurant. This was evidenced by the significant difference between the achievement of experimental group competency and the control group in which the experimental group achievement was better than the achievement of the students of the BSP Hospitality Study Program control group.

Based on the results of data processing presented above, the findings in this study was that the application of integrated practice learning had a significant effect on increasing the achievement of student competency for the BSP Hospitality Study Program. This was evidenced by the results of the analysis and that there was a significant difference in the achievement of competency between the groups of students who were treated with integrated learning practices with groups of students who practiced partial learning.

This finding was in line with the results of the research of Arjana, et al. (2012) which stated that integrated practice learning was effective to improve student competency achievement to make flight ticket reservation, because the concept was learned through direct and real experience so that students were able to comprehend the concept as a whole. The immediate experience intended in this study was an integrated learning practice designed to approach the real atmosphere of the industry by creating themes based on the fields of work in the tourism industry especially food and beverage services in international restaurants. Ardika (2012) mentioned that educators needed to apply pragmatics in speaking skills because students generally felt happy if the learning process that occurs in the classroom was actively implemented.

ISBN : 978-602-99806-3-9

The application of integrated learning aimed to improve students' creativity and motivation. This would appear at the time of the course. Students were more enthusiastic in learning, the students felt more intimate, felt more courageous in issuing opinions in answering questions, dare to ask because lecturers always involve students in preparing teaching media, so that learning was active, creative, effective and fun. The same thing was stated by Coll, et al (2002) in the learning could be done by the process of active mastery in the workplace so as to improve student self-confidence through the assignment of duties, motivation of lecturers, and self-evaluation so that finally facilitated in achieving competency.

With active learning from learners would retain attention, improve performance, and establish new knowledge. Media could serve as an intermediary or messenger from sender to message recipient. If the media carries messages or instructional information or contains instructional purposes, then the media was called learning media. Sanjaya (2008) mentioned that the selection of media in teaching and learning process was very necessary to consider several principles, namely (1) according to the objectives to be achieved, (2) based on clear concept, (3) characteristics of students, (4) learning styles of students and teachers And (5) should be appropriate to the environmental conditions, facilities and time available for the learning needs.

Permana (2008) mentioned the principles of integrated learning: it meant that children were not only focused on certain subjects, it was possible that the developed learning contained meaningful messages for the children; The need for consideration of which priority scale should take precedence in the selection of subject / learning topics, study time, and evaluation of children's learning progress; The learning environment in the classroom gave children the freedom to think and creativity; The surrounding community opened and provided insights for the development of learning in schools; And children gained attitudes and norms from the community environment, including home, school, both verbal and non-verbal.

In an integrated learning the role of an educator changed from the information giver to facilitator, mentor, challenger, resource person and organizer. Thus the students got a wider opportunity to explore, investigate issues and problems issues with more open activities. Student involvement was to enhance in all stages of learning, from planning and tasks, activities to reflection and self-evaluation. Thus, students had the opportunity to be more enthusiastic, self-evaluate, so that the acquisition of knowledge was more effective.

4. Conclusions

Based on the results of the above analysis it could be concluded that the application of integrated practice learning had a significant effect on increasing the achievement of student competency in occupation waiter/s field at the Hospitality Study Program of the Bali State Polytechnic. This was evidenced by the results of statistical tests indicated that there were significant differences in achievement of competencies between groups of students who were given the treatment of integrated practice learning with the group of students with partial practice learning. It was suggested to the management of BSP Hospitality Study Program should encourage and facilitate for the lecturers especially the core subjects matter (core) to apply integrated learning practice in order to facilitate the achievement of competency to the material taught to the students. The lecturers were also expected to implement integrated learning practices so that students quickly understood the competencies as per ACCSTP requirement so that the BSP Hospitality Study Program could compete in ASEAN level.

Acknowledgments

I am thankful to all informant for providing us information and kind support throughout the research work. I am also thankful to the God.

ISBN : 978-602-99806-3-9

Reference

Ardika, I W. Dana. 2012. Penerapan Pragmatik dalam Pembelajaran Bahasa Inggris. *Jurnal Soshum*, Vol. 2 (1), hal. 72-81

Arjana, I W. Basi, N. Mastiani Nadra, N. M. Ernawati. 2012. Pembelajaran Praktek Terpadu Untuk Meningkatkan Kompetensi Penerbangan bagi Mahasiswa Program Studi Usaha Perjalanan Wisata Politeknik Negeri Bali. *Jurnal Soshum*, Vol. 2 (1), hal. 13-27

Arsyard. 2005. *Media Pembelajaran*. Jakarta: PT Raja Grafindo Persada

Coll, R.K., Lay, M., & Zegwaard, K. E. 2002. Enhancing acces to experiental learning in a science and technology degree program. *Journal of Vacational Education Training*, 54 (2) 197-217.

Oka, I M. Darma, I N. Winia, dan I. A. K. Sumawidari. 2011. Eksistensi Multimedia dalam Pembelajaran Materi Tata Hidangan pada Program Studi Perhotelan PNB. *Analisis Pariwisata*. Vol 11 (1), 49-55

Permana, J. 2008. *Pembelajaran Terpadu.* Bandung: Universitas Pendidikan Indonesia.

Resmini, N. dkk. 1996. *Penentuan Unit Tema dalam Pembelajaran Terpadu.* Malang: IKIP Malang.

Sanjaya, W., 2008, *Perencanaan dan Desain Sistem Pembelajaran*. Jakarta; Prenada Media Group.

……, 2016. Program Studi Perhotelan Jurusan Pariwisata Politeknik Negeri Bali. Badung: Administrasi Akademik

Proceeding International Joint Conference on Science and Technology (IJCST) 2017
ISBN : 978-602-99806-3-9

A Management Model for Sustainable Tourism for Tegenungan Waterfall Tourism Object in Gianyar

Ni Made Sudarmini[1], Cokorda Istri Sri Widhari[2], Ni Wayan Sukartini[3]
[1,2]Tourism Department, [3]Business Administration Department, Politeknik Negeri Bali, Jl. Kampus Bukit Jimbaran, Kuta Selatan, Badung, Bali, Indonesia 80364

sudarmini33@yahoo.com[1], widhari@yahoo.co.id[2], geksukartini@yahoo.com[3]

Abstract. In general, the aim of this research was to design a model for the management of Tegenungan waterfall attraction located in Gianyar regency. The data were gathered through interviews, observation, questionnaire, and documentation. Data analysis was conducted using descriptive statistics, adopting a descriptive qualitative method. The findings of the study are expected to be useful for the management, local society, government, and Politeknik Negeri Bali. The results of the data analysis showed that the management model suitable to be applied to operate the Tegenungan Waterfall attraction pointed to the establisment of the Tegenungan Waterfall Attraction Management Board which should involve four stakeholders, namely community, businessmen, government, and universities.
Suggestions to improve the management of Tegenungan waterfall attraction are as follows: (1) Tegenungan Village should improve their management system through establishing Tegenungan Waterfall Tourism Object Management Board by appointing an operational manager capable of running the attraction professionally; improving supporting facilities; conducting promotion; establising cooperation with other parties. (2) The government should issue a regulation which governs sand digging around Petanu river which is the source of the Tegenungan waterfall (3) in accordance with its third principle, that is community service, university should train the villagers, through management workshop, how to effectively run the waterfall attraction.

Keywords: Tourism, Waterfall, Tegenungan, Model

1. Background

Bali as a world tourist destination is not only famous for its unique arts and culture, but also has a beautiful panorama. Tourism developed in Bali is a cultural tourism that is inspired by the teaching of Hinduism and the philosophy of Tri Hita Karana as the main potential whereby tourism can serve as a vehicle for its actualization, resulting in a dynamic interrelationship between tourism and culture that makes them develop synergistically, harmoniously and sustainably so as to provide prosperity to society, cultural and environmental sustainability [9]. The combination of art, culture, customs and beautiful natural panorama has attraced many tourists to visit Bali. Compared with other sectors, tourism is the most rapid sector in terms its development; this is because Bali has many tourist attractions, such as nature tourism, historical tours and cultural tourism.

Tourism, as an activity that directly touches various aspects of life and involves the community, has an impact on society. Such impact, be it socio-cultural, socio-economic or environmental, as well as the increase of the Balinese population, due to the urbanization of the population from outside Bali, of the livelihoods of the people of Bali and beyond Bali, have led to the fact that local tradition has tended to change, that the religious rituals become more lively due to the increase of income [23]. To maintain the

ISBN : 978-602-99806-3-9

existence of Bali tourism in the future, tourism development should always prioritize sustainable tourism development. Suistainable tourism provides positive benefits for people's lives and environmental sustainability [2,3]. Sustainable tourism development can cancel out the negative impacts to improve the quality of life of people and tourist destinations [15]. Sustainable tourism is tourism that can meet the needs of the present and the future, does not damage the environment and local cuture to be inherited to future generations. In principle, sustainable tourism is tourism whose activities still pay attention to the balance of nature, environment, culture [22] and economy so that tourism can continue. In other words, the management should be able to provide economic benefits for all stakeholders, be it government, private sector, and local communities. In sustainable tourism, tourists who come not only have fun, but also get more experience in order to gain insight and development of knowledge for themselves. The attitudes to be displayed by tourists when visiting a region to support sustainable tourism include: responsible, in the sense that it does not cause natural and cultural damage to the area they visit; respectful, in the sense that they respect the customs and culture of the inhabitants of the destination [4].

Gianyar Regency has Tegenungan waterfall as a tourism object, located in Banjar Tegenungan, Kemenuh Village, Sukawati District, Gianyar Regency, Bali. In 2011 Desa Kemenuh was proclaimed as a cultural tourism village expected to maintain cleanliness and environmental sustainability. The location of Tegenungan waterfall is very strategic, which is close to Sukawati Art Market, Trekking Kalker Train Kaler Village Kemenuh, and on the same route to other tourism objects in Gianyar supported by good transportation system. This tourism object has good potential and deserves to be developed as ecotourism in Gianyar, because it brings about positive contribution to society, i.e. increasing income and employment [10]. Management of this attraction is currently run by the local community, and the average number of tourist visits to this object is 500 people per day.

This potential still needs to be developed because it has not been managed properly, which can be seen from the supporting facilities that have not been adequate. The absence of a life guard responsible for the safety of tourists who use waterfalls to bathe have led to the death of tourists. In addition, the excavation of rocks in the upstream river around the object has caused the water to be murky leading to the damage of the environment. The management has no authority in regulating or prohibiting the existence of this excavation and the involvement of Gianyar Regency Government is undoubtedly required in arranging it.

The future challenge in managing this attraction is to realize sustainable tourism, which is able to utilize natural resources optimally so as not to cause environmental damage, and tourists respect the social culture of local communities so that sustainable economic benefits can be distributed fairly to all stakeholders around the tourism object. A management model is needed [7], which can answer the sustainability of the waterfall tourism object. From the background of the problems described above, in general the purpose of this research is to formulate the Tourism Management Model of Tegenungan Waterfall Tourism in Gianyar Regency to realize sustainable tourism. To arrive at the model, the following were be analyzed: (1) the perception of tourists to Tegenungan waterfall tourism object in Gianyar regency; (2) community participation in managing Tegenungan waterfall tourism object in Gianyar regency; (3) the management of the waterfall tourism object; (4) the constraints faced in managing Tegenungan waterfall tourism object in Gianyar regency.

2. Conceptual Framework

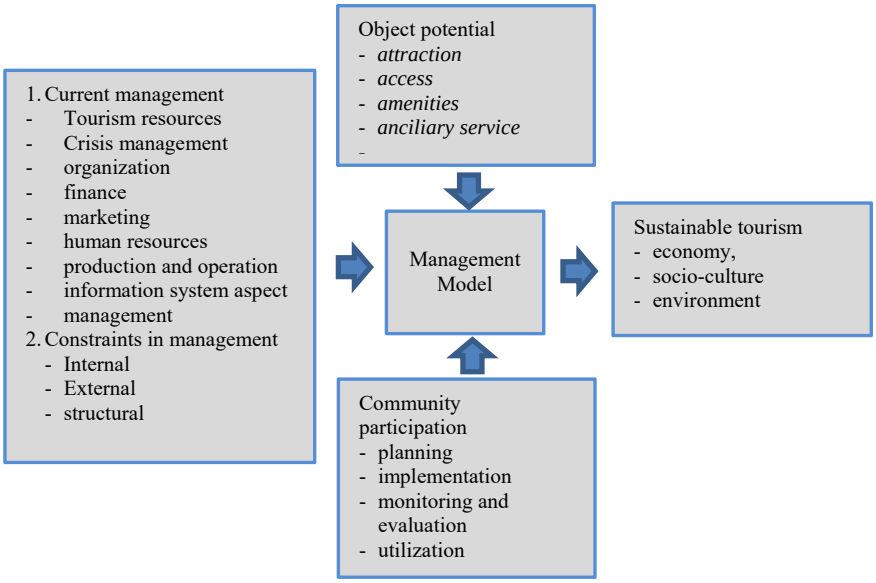
Tourism management is fundamentally an activity to arrive at sustainable tourism. The three pillars of sustainability are sustainability in economiy, socio-culture and environment [1,8].

Management means controlling, organizing, running or managing. Management includes aspects of tourism resource management, organizational crisis management, finance, marketing, human resources, production and operations, as well as management information systems. These aspects are interconnected and addressed by each different division to achieve a goal [5,7,8]. Management and policy were the most important two dimensions influencing the sustainable tourism development [21]

Community participation in developing sustainable tourism is very important, which can start from planning, implementation, monitoring and evaluating programs, and utilization [16,24]. Local communities' participation in decision making, empowerment, and community knowledge about tourism do affect the sustainability of rural tourism development [20].

ISBN : 978-602-99806-3-9

The elements that determine the success of a tourist destination are (a) attractions including natural and artificial attractions; (b) accessibility to location (access,) such as the availability of local transportation, whether land, sea or air, as well as supporting facilities and infrastructures; (c) Amenities such as accommodation quality, restaurant, financial services and security; (d) Support services provided by the government and the private sector (anciliary service) including regulations and legislation on tourism [25].



3. Method

This research was conducted at Tegenungan Waterfall Tourism Object in Gianyar regency. The number of respondents who participated was 100 tourists, and 30 local people. The informants were managers / public figures who know the management of Tegenungan Waterfall Tourism Object. Reqruitment of the respondents was conducted using accidental methods, while the determination of informants was conducted using purposive sampling method.

The data were collected by interview, observation, questionnaire, and documentation, subsequently analyzed using (1) descriptive statistic technique [5], and (2) qualitative descriptive analysis, i.e. describing phenomenon or relationship between phenomena studied systematically, factually, and accurately [6].

4. Findings and Discussion

4.1. Tourists' perception

Tourist attraction is everything that has uniqueness, such as natural beauty, social and cultural life which become the target or purpose of tourist visit. Broadly speaking, the factors that cause tourists to visit a tourist attraction can be grouped into four, namely (1) tourist attraction (attraction), (2) accessibility to access (access), comfort (amenities), and support services provided (anciliary service).

The average number of tourist visits per day was 500 people, and could even reach 800 people during holiday season. The majority of them were foreign tourists. The result showed that tourists' perception on Tegenungan Waterfall Tourism Attraction located in Gianyar Regency could be categorized as "Good", the average score being 2.63, as shown by Table 1 below.

Table 1. Tourists' Perception on Tegenungan Waterfall Tourism Object in Gianyar Regency

ISBN : 978-602-99806-3-9

No.	Tourists' Perception	Average	Remark
1.	*Attraction*	2,80	Good
2.	*Accessibility*	2,77	Good
3.	*Amenities*	2,48	Fair
4.	*Ancillary Service*	2,49	Fair
Average		2, 64	Fair

Source : 2017 Research

Tourists can enjoy the beauty of natural panorama (waterfall) and can also do other activities such as bathing or trekking. A total 100 tourists stated that this tourist attraction has a beautiful panorama, and can be caterized as "Interesting to visit", with the score being 2.80.

The result of analysis showed that accessibility to reach the location was in the "Good" category, with the score being of 2.78. Access to this location is very easy, can be reached by either two-wheeled vehicles or four-wheeled vehicles, or even tour buses because the road to the location is good. In addition, the location of this tourism object is in a very strategic route; from Denpasar to Gianyar we can take Ida Bagus Mantra highway, and is close to Sukawati art market and on the same route to other sights like Goa Gajah, Ubud, Kintamani. The only things not yet available are (1) public transportation passing through these attractions. Public transportation is very important for individual tourists, since most of them organize their own journeys without the help of travel agents, relying heavily on public facilities; and (2) a location sign board that makes it easy for visitors to locate the tourist attraction.

The results of the study indicated that the facilities required by the tourists are not yet optimally available, for example there was no ATM machine, money changer, tour guide, certified life guard, WIFI, health facility for first aid to tourist (P3K). The amenities of this attraction were perceived by the participants as "Poor", with the average score being 2.48.

According to the tourists (participants of the study), the ancillary service available in Tegenungan Waterfall Tourism Object was "Poor", with an average score being 2.49. In the vicinity of the waterfall there are no other support services, such as travel agents, tourist information. Tourists feel that the manager has not provided optimal supporting services. For example, tourists who need information about hotel felt that no one served them.

4.1. *Community Participation*

Community participation in developing sustainable tourism is very important, whereby the goal is to provide welfare for themselves while maintaining the quality of the environment, and protecting their social and cultural life, so that its implementation can support the achievement of the three pillars of sustainability, namely economic, socio-cultural and environmental sustainability. Community involvement can start from planning, implementation, monitoring and evaluating the program.

The analysis of the level of public involvement can be used to describe the extent to which the people of Tegenungan village participate in its management which can be illustrated by examining their authority and responsibility. Because the village acted as the manager, therefore all the people got involved fully from the planner, implementation, monitoring & evaluation of the program, and utilization of program results. Decisions were made through meetings among the village people, where everything was discussed and decision was made through deliberation. In every decision made, there must be pros and cons, which affected the social life of the village. For example, in planning to provide a CCTV for the security of visitors, managers had to conduct meetings and the decision could only be implemented after an approval from the village was obtained. It was also true of the participation in utilizing management results: groups such as Family Welfare Education, Youth Social Organization, and traditional musical ensemble all got funding for every activity they conducted resulting in good socio-cultural life.

4.2. Management

ISBN : 978-602-99806-3-9

Tegenungan waterfall is located in Kemenuh village, Sukawati District, Gianyar Regency. Tegenungan village has of 1 (one) banjar, namely Tegenungan banjar, so that Tegenungan banjar is at the same time Tegenungan village. The result of interview with an informant, Mr. I Gusti Made Raka, the current manager, and some people from the village, showed that the existence of the waterfall as a tourism object was realized by the community in 1988 when Udayana University students carried out their community service in Kemenuh, Sukawati District, Gianyar Regency. At that time the students realized that the waterfall in Tegenungan had a very beautiful scenery and had the potential to become a tourist attraction. In 2002 in accordance with the results of a village meeting, the community is allowed to issue admission ticket for people who want to visit the waterfall. And the revenue was deposited to banjar to become cash for banjar. With the increase in tourist visit to the tourism object, from 2004 until 2014 in accordance with to the decision made in a village meeting, the waterfall management was agreed to be run by one of the village members. This was because village people felt that they did not have the ability to manage the attraction, and they only wanted to receive the net result for the village cash. This tourism object grew and became popular both nationally and internationally since then, where more and more tourists had been visiting the tourism object leading to increased fund coming into the village. Because it was considered to be growing, then from 2015 until now its management was taken over by the village, where village leaders acted as the head of the management.

On the basis of the results of observations and interviews with the manager, it can be concluded that this object has not been managed properly. This can be seen from the implementation of management by the management. All management is done by the managing chairman, but is does not yet have an organizational structure that governs the tasks and responsibilities in the management.

4.3.1 Management of Tourism Resources

Basically, the management of tourism resources is an activity to achieve the objectives of sustainable tourism, whether in terms of economy, socio-culture, and environment. Managers are required to carry out effective resource management to ensure protection of ecosystems and degradation of environmental quality. The management has done some improvemen, for example making a better stairs to facilitate the tourists who want to visit the location. In addition, for the security of tourists, railling has been placed on the stairs. Although the surrounding environment was still beautiful, the problem was the parking lot that was still not well organized. This was because the parking lot at this time was still owned by individual village members.

4.3.2 Marketing management

Marketing planning reflects the relationship between tourism products and its market. Tourism marketing strategy includes three elements: 1) market diversification; 2) quality improvement; and 3) season extension (tourist arrivals). Destination marketing is an effort to empower all the elements of the tourist attraction available and to design an event that can attract tourists on a regular and repetitive basis year after year. The results of interviews with the head of management of the waterfall showed that the manager does not have a specific strategy to market the waterfall. The manager had no cooperation with other parties (travel agents) to market the attraction; instead, they relied on mouth-to- mouth promotion by the visitors. This finding was consistent with the results of observation: the researchers have not found any brochure as one of the promotional tools in the research site.

4.3.2 Human Resources

Human resource management in the tourism industry is a series of activities undertaken to open new opportunities for people who want to join the world of tourism. Management of tourism resources in question concerns how organizational leaders develop their members to become a skilled manpower of tourism. The number of workforce was 49 people, all of whom were the residents of Tegenungan village, recruited with no consideration of education level, competency or age. So every member of the village who wanted to participate in the management will be accepted regardless of the competence they had. For example, the life guards who were very important to ensure the security of tourists were recruited from the village security force (pecalang) having no competence to become life guards. The employees

ISBN : 978-602-99806-3-9

could be groupped into 4 (four) groups, namely parking attendants, ticketing staff, cleaning staff, and security officers. The management has not conducted any training to improve the employees' ability.

4.3.3. Financial Management
Financial management is a very important issue to raise the trust of the village members to the management. Up to this time, the only thing that the management has done was directly depositing the money received every day to the Village Credit Institution (LPD). The amount was determined from the number of tickets sold. The admission ticket to enter the attraction is 15 thousand rupiah for foreign tourists, 10 thousand rupiah for domestic tourists, and 5 thousand rupiah for local tourists (Balinese). Financial reporting from the manager was done every month during a meeting.

4.3.4. Organizational Management
Since the attraction was run by the village, any decision made should come out of a formal village meeting. Therefore, the management of the attraction was basically the same as the management of *banjar* in Bali.

4.3.5 Crisis Management
Crisis management in tourism industry is a very essential component, used not only to identify kriris but also to limit its impact on the organization, tourist destination, and related industries. In relation to the management of the waterfall attraction, the problems that might have an impact on the sustainability of the attraction included the of pros and cons among the community members against the head banjar as the manager, the excavation in the upstream of Petanu river that made the water murky, the arrangement of buildings around the waterfall, and the competition between the village of Tegenungan and Blangsinga village to claim over the waterfall. The current management did not have any clear concept as a solution to solve the problems.

4.3. *Management Constraints*
The results of interviews with managers indicated that there were various constraints evident in the operational activities of the waterfall. All of the constraints were grouped into 2 (two), namely internal and external issues. Internal problems were all problems that existed in the village that brought about some impact on the management of the waterfall, such as human resource capabilities, pro and contra attitude within the community, the arrangement of parking lots. While external problems were problems that came from outside that had an impact on the management of the waterfall, such as the excavation, arrangement of the environment. The constraints can be explained as follows:

4.3.1. *Human Resource Capability*
The community involved in the management did not have competence as required. In accordance with the results of the village meeting, all village members were welcome to participate in the management with no consideration of competence.

4.3.2. *Pros and Cons Attitude*
This attitude was triggered by the distrust of some village members against the manager. Those in the contra position showed indifference to the existence of the waterfall. This distrust concerned liability of the money received from the sale of admission tickets. According to the manager, such pros and cons attitude had a negative impact on social life of the society.

4.4.3. Arrangement of Parking Lot
Since currently the parking lots belonged to individual village members, consequently they were not well organized.

4.4.4. Arrangement of the Environment
In the upstream of the Petanu river there was an excavation that could destroy the environment and the river water became murky, so the view of the waterfall became unattractive to visitors. In addition, the

ISBN : 978-602-99806-3-9

existence of buildings which belonged to individual village members might cause damage to the natural scenery around the waterfall. The management did not have the authority to regulate it, because it was the authority of the government to regulate it. If the solution to problems caused by the external factors were not sought, then it could bring about a negative impact on the sustainability of the waterfall as a tourist attraction.

4.4.5. Conflict Potential

There was a conflict potential with the neighboring village, Blangsinga village, concerning the naming of the tourist attraction, because the original name of the waterfall was Srogsrogan waterfall located between the Tegenungan village and Blangsinga village. Naming it Tegenungan waterfall is likely to indicate that this waterfall belongs to the Tegenungan village. This has the potential to create conflicts between the two villages in the future, because Blangsinga village wants the name of the waterfall to be returned to Srogsrogan waterfall. This problem has not been solved so as to ensure sustainable tourism at the waterfall tourist attraction.

4.5. Model Pengelolaan

The constraints encountered in managing the Tegenungan waterfall tourist attraction will have an adverse impact on its sustainability as a tourist destination. To overcome the problems faced by Kemenuh Village in managing Tegenungan Waterfall, then the appropriate management model is by forming a Tegenungan Waterfall Management Board (TWMB) whereby a manager is appointed to run its operational activities. Preferably, the appointed manager should be recruited from Tegenungan village or from outside of the village provided that they have the credibility and competence required in performing their duties. The selected manager should be given the authority to run the management in a professional manner while the village keep monitoring and evaluating its operational activities. Employees recruited by the management should come from Tegenungan village with their competence being given due consideration. TWMB should form planning department, marketing department, HR, Finance with their respective job desscription, and TWMB also should establish cooperation with private sector and the government. The Tegenungan Waterfall Management Model located in Gianyar regency can be seen in Figure 5.1 below.

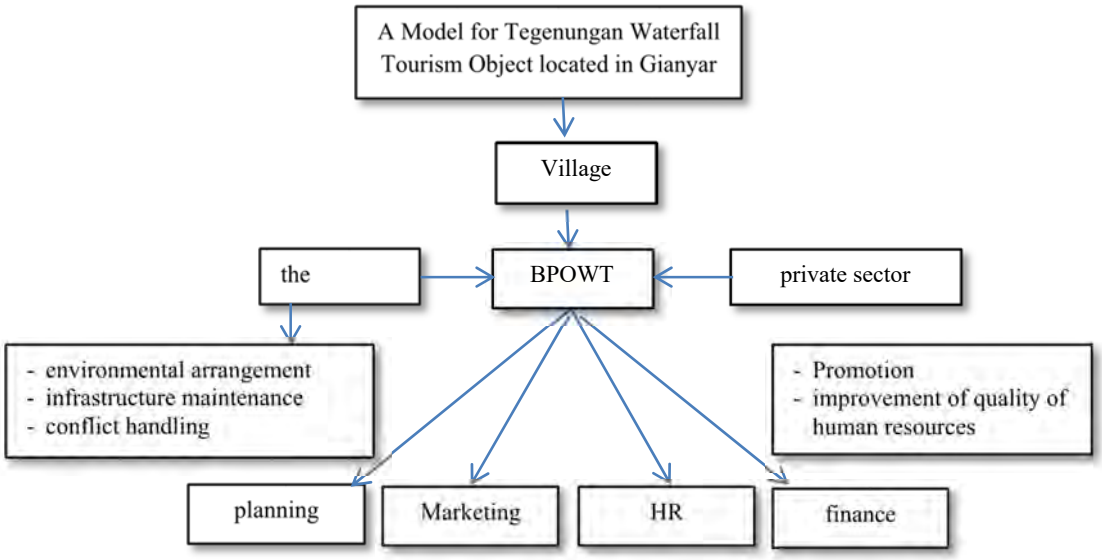


Figure 1. A Model for Tegenungan Waterfall Tourism Object located in Gianyar

5. Conclusion

From the results of analysis and discussion above, the following conclusion can be drawn:

ISBN : 978-602-99806-3-9

1. Tourists' perception of Tegenungan Waterfall Tourism Object can be categorized into the category "Good", the average score being 2.62.
2. The level of community participation in managing Tegenungan Waterfall Tourism Object is very high, from planning, implementation, monitoring and evaluation, as well as utilizing management activities.
3. Tegenungan Waterfall Tourism Object has not been managed properly due to the absence of implementation of standard management.
4. The problems encountered in running the waterfall tourism object are of internal and external. Internal problems include low capability of the human resources, and the existence of pros and cons within the village. While the external problems concern environmental arrangement and conflict potential with the neighboring village.
5. The appropriate management model to run Tegenungan Waterfall Tourisn Object is by forming Tegenungan Waterfall Management Board (TWMB) involving four pillars (stakeholders), namely local community, businessmen, government, and universities.

The following suggestions could be given to improve the management of Tegenungan waterfall tourism object:

For Tegenungan Village (management):

Improving operational management by forming Tegenungan Waterfall Management Board (TWMB) appointing an operational manager capable of managing the waterfall tourism object professionally.

a. The new management should improve relevant supporting facilities required by visitors, such as money changer, ATM machine, better parking lots.
b. Intensive promotion should be done to face the competition.
c. Cooperation with other parties should be established: travel agent (increasing tourist visits)); also to be done is coordination with the government in regarding to the excavation in the tourisn object and arrangement of buildings in the vicinity.
d. Dialogue with the neighboring village should immediately be done to solve the current conflict.

1. Government
   The government should issue a policy in regard to the excavation surrounding Petanu river being the water source of Tegenungan waterfall.
2. Universities
   In accordance with the third principle of the Three Principles of Higher Education, universities should conduct community service to provide the villagers with management training.

References

[1] Asker S, Boronyak L, Carrard N and Paddon M 2010 *Effective Community Based Tourism, A Best Practice Manua*l. Singapore: Sustainable Tourism Cooperative Research.

[2] Butarbutar, Regina R, Soemarno 2012. *Community Empowerment Efforts In Sustainable Ecotourism Management In North Sulawesi, Indonesia.* J-PAL **3(1)** ISSN: 2087-3522, E-ISSN: 2338-1671

[3] Damanik, Janianton dan Weber H 2006 *Perencanaan Ekowisata Dari Teori ke Aplikasi*.Yogyakarta: PUSPAR UGM dan Andi

[4] Hasan A 2014 *Green Tourism* Jurnal Media Wisata 12(1)

[5] Husein, Umar. 2005. *Strategic Management in Action*.Jakarta: PTGramedia Pustaka Utama

[6] Kusmayadi dan Endar Sugiarto. 2000. *Metodelogi Penelitian dalam Bidang Kepariwisataan*. Jakarta: Gramedia Pustaka utama

[7 Mowforth dan Munt. 2000.*Managing Sustainable Tourism Developmen*t ESCAP Tourism Review **22** New York, NY: UN.

[8] Pitana I G dan Diarta I K S 2009. *Pengantar Ilmu Pariwisata*. Yogyakarta:Andhi

[9] Perda Provinsi Bali Nomor 2 Tahun 2012

[10] Setiawan J, Sutarj, Citra, Ananda, I Putu. 2014. *Analisis Potensi Wisata Air Terjun Tegenungan Sebagai Pengembangan Ekowisata Di Desa Kemenuh, Kabupaten Gianyar*. **5(1)** http://ejournal.undiksha.ac.id/index.php/JJPG/article/view/3735

ISBN : 978-602-99806-3-9

[11] Sugiyono. 2009. *Metode Penelitian Pendidikan (Pendekatan Kuantitatif, Kualitatif, dan R&D).* Cet. IX. Bandung: Alfabeta.
[12] Swarbrooke J 1998 *Sustainable Tourism Management* London : CABI Publishing
[13] Tao 2005 *Sustainable Tourism Development* Ohauo University
[14] Weaver D. 2006 *Sustainable Tourism: Theory and Practice*. Great Britain: Elsevier Butterworth Heinemann.
[15] Yazdi, Khoshnevis S 2012. *Sustainable Tourism* American International Journal of Social Science **1(1)**
[16] Yang J, Ryan C and Zhang L 2014 *Sustaining culture and seeking a Just Destination: governments, power and tension - a life-cycle approach to analysing tourism development in an ethnic-inhabited scenic area in Xinjiang, China* ournal of Sustainable Tourism **22(8)** 1151-1174
[17] Pitana, I G. 2009. *Pengantar Ilmu Pariwisata*. Yogyakarta: ANDI
[18] Angelica M. Zambrano Almeyda, Broadbent EN and Durham WH 2010 *Social and environmental effects of ecotourism in the Osa Peninsula of Costa Rica: the Lapa Rios case* Journal of Ecotourism **9(1)** 62–83
[19] David L 2011 *Tourism Ecology: Towards The Responsible, Sustainable Tourism Future* Emerald **3(3)** 210-216
[20] Fong SF and Lo MC 2015 *Community involvement and sustainable rural tourism development: perspectives from the local communities* Euroupean Journal of Touism Research **11** 125-146
[21] Wang S H, Lee M T, Chateau P A and Yang C C 2016 *Sustainability Performance Indicator Framework for Evaluation of Sustainable Tourism in the Taiwan Coastal Zone* Sustainability **8(685) 1-13**
[22] Ene S G, Baraitaru M 2010 *Sustainable Development Strategies in Domestic and International Tourism* European Journal of Interdisciplinary Studies **2(2)** 87-95
[23] Wijaya P 2015 *Masa Depan Pariwisata Bali (Perspektif Permasalahan Dan solusinya).* Journal Of Research In Economics And Management **15(1)** 118-135
[24] Budiasa IW And Ambarawati IGA 2014 *Community Based Agro-Tourism As An Innovative Integrated Farming System Development Model Towards Sustainable Agriculture And Tourism In Bali*. J. ISSAAS **20(1)** 29-40 (2014)
[25] Yoeti O A 2008 *Perencanaan dan Pengembangan Pariwisata* PT. Pradnya Paramita

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

Analysis of the effect of temperature on tire's durability on *engkel* truck vehicle

I Wayan Suastawa[1], Ida Bagus Putu Sukadana[2]

Department of Mechanical Engineering Politeknik Negeri Bali[1,2]
Bukit Jimbaran, P.O. Box 1064 Tuban-Badung, Bali
Phone: +62-361-701981, Fax. +61-361-701128

asta782002@yahoo.com[1], grantangs@ymail.com [2]

Abstract: Tires are a very important component of a vehicle, a variety of charges are imposed on the tires when the vehicle is stationary or moving. The various loading styles directly rest on the air trapped in the tire, and cause the rise of pressure to flow in accordance with the magnitude of the various forces it receives. The rise in tire pressure mainly occurs when the vehicle is in motion, where the tire gets a compressive force from the constant load of the vehicle and the shock load due to the road contour. High pressure and rising and falling causes heat on the tire which then heat is moved to the rubber tire layer. Besides also because of the heat when the surface of the tire tread rub against the road during acceleration and braking. Assuming that heat is the main cause of tire damage then this study will try to analyze the influence of tire rubber temperature on the ability of work to withstand the air pressure in the tire. The loading received by the tire rubber coating is assumed to be the same as the tensile test that will be applied to the tire when used. This tensile test will be carried out on the rubber tire layer by heat treatment before it is tested. Temperature treatment starts from a temperature of 30 until 110 with a range of 20 degrees, with the expected stress value and the best strain obtained at that temperature range. The tire samples used in this study are two of the most used tire brands on Engkel truck trucks which are the most widely used truck types. With tensile test the tire performance is generally very good at low temperature up to 70 degree temperature, above 70 degree temperature tire performance began to decrease due to the increased strain on the tire material so that the ability to resist high pressure by the pneumatic force of the wind inside the tire decreased relative Against the increase in tire temperature.

1. Introduction

Tires are a component that needs attention in a vehicle. A variety of loading styles are worn on the tires, both when the vehicle is in motion or still. The three forces acting on the tire are normal or vertical forces caused by the weight of the vehicle, the longitudinal force due to the acceleration or braking force and the lateral or lateral forces caused by the vehicle's centrifugal force. [2] The force causes damage along with the duration of use and when it gets excessive force and shock force it will cause the rupture of the tire. Various kinds of excessive force that may occur in the tire caused by various things such as vehicle load is too high, road damage, collision with uneven road surface, and foreign objects that can stick on the tires that cause tire pressure leak.

In the vehicle of goods or material dimension of vehicle and tire become limiting ability of vehicle transport so often at stake its ability to economical value of vehicle transport become feasible. For example a medium-sized truck carrying 2-axis 2-axis of sand that should carry 5 tonnes of sand today with an economical calculation is used to carry sand weighing approximately 12 tons. This is what causes the rapid destruction of vehicle components, especially tires or the occurrence of tire breaks in

ISBN : 978-602-99806-3-9

transit. Based on experience passed on from generation to generation, truck drivers try to overcome and anticipate the breaking of tires and the rapid wear of tires by way of stopping the roadside to lower the temperature of the tire known as "Ngeban". If it is felt the tire temperature is cold enough then the truckers continue the journey. In a roadside survey conducted on Jalan Mahendradatta there are many trucks loaded with sand stopping around Lembeng Beach with a duration of half to 1 hour. From the interview it is known that they are cooling the tires (ngeban) as mentioned above, from the interview also found that if ngeban not done then the tires become too hot and can cause tire breaks and fast tire wear. From interviews also obtained the long use of tires and brands of tires are often used.

Theoretically the breakdown or breakup of the tire is due to the amount of air pressure inside the tire due to the various forces that rest on the air captured in the tire. Pressure and force that rests on the air trapped in the tire increases the tire pressure in all directions equally. Pressure or excessive force does not necessarily cause a tire break even though it is pressurized above the tire specification capability. However, due to the presence of lateral and longitudinal forces when moving or rotating, the pressure on the tire changes and causes a change in temperature. The pressure change accumulates and is proportional to the length of rotation or movement of the tire without stopping, the accumulation causing heat or temperature changes in the air in the tire, which then moves on the tire rubber layer. This heat damages the tire, causing wear and tear [3]. Increased tire temperature in addition to the ups and downs of air pressure in the tire is actually also caused by the friction of the tread of the tread with the road during acceleration and braking. The only way to cool the tire back is to stop the roadside or silence until the temperature of the tire back cold. Based on the background above this study takes the theme of analyzing the effect of temperature on tire resistance. In this study a study of the effect of temperature on durability and tire elasticity. From this study will get the value of a certain temperature where the tire has the best performance capabilities. The object of this study is the most widely used tire on the truck Engkle which is the most used middle-class commercial truck in the area of Bali.

Based on the above background, then taken the formulation of the problem as follows:

1. How does temperature influence truck tire performance with tensile test?
2. What is the best working temperature of each tire brand that is widely used in Engkel trucks?

2 Research Methods

The method used is to test the object directly studied in this case is in the form of an armor truck tire. The tires are sampled in the form of Engkel truck tires with the size of alloy wheels 60 ring 16 with the size of bias 750 tires brand Bridgestone and Gajah Tunggal brand. As shown in Figure 1, each tire will be split / cut off the left and right blanket into 5 specimens. The total specimens were 10 specimens.

On a predetermined day the data will be taken in the form of stress and strain of each specimen by first providing heat treatment by inserting it into the microwave and setting the microwave heat degree in accordance with the specimen's planned heat. The first specimen is heated to a temperature of 30 or more to be obtained after the specimen is tested at that temperature. Furthermore, after checking the specimen heat is then mounted on a tensile test choke and measured tension and strain. And so on until all the specimens get heated and tested from a temperature of 30 to 110 degrees Celsius with an increase of 20 degrees.

After all data obtained then input and tabulation of data in microsof excel to obtain the graph and compare one graph with other graph. From the graph it can be seen the tendency of the graph line to further narrated in the analysis results.

ISBN : 978-602-99806-3-9

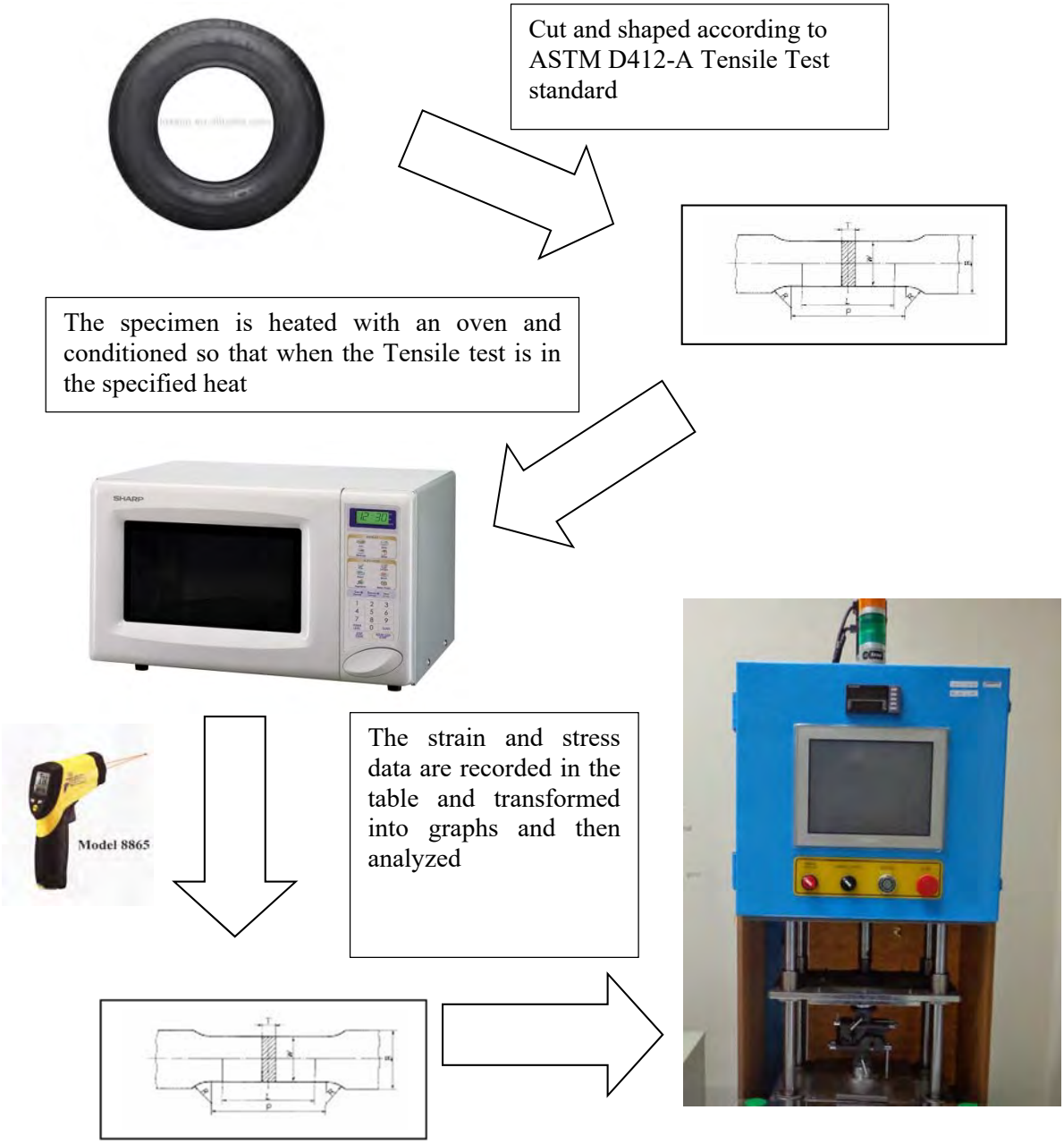


Figure 1. Test Flow

ISBN : 978-602-99806-3-9

3 Results and Discussion

From 5 specimens on each tire brand, 10 data were recapitulated as shown below:

Table1. Recapitulation of Tension and Strain

No	Temperature (°C)	Tension (Kgf/mm^2)		Strain mm/mm	
		Tension No A	Tension No B	Strain No A	Strain No B
1	30	0.6	0.5	1.9189	1.831
2	50	0.3	0.3	1.9159	1.8059
3	70	0.3	0.3	1.9395	1.8177
4	90	0.3	0.3	1.9895	1.8959
5	110	0.2	0.2	2.1294	1.9294

From the table above then transformed into a graph as shown in Figure 2

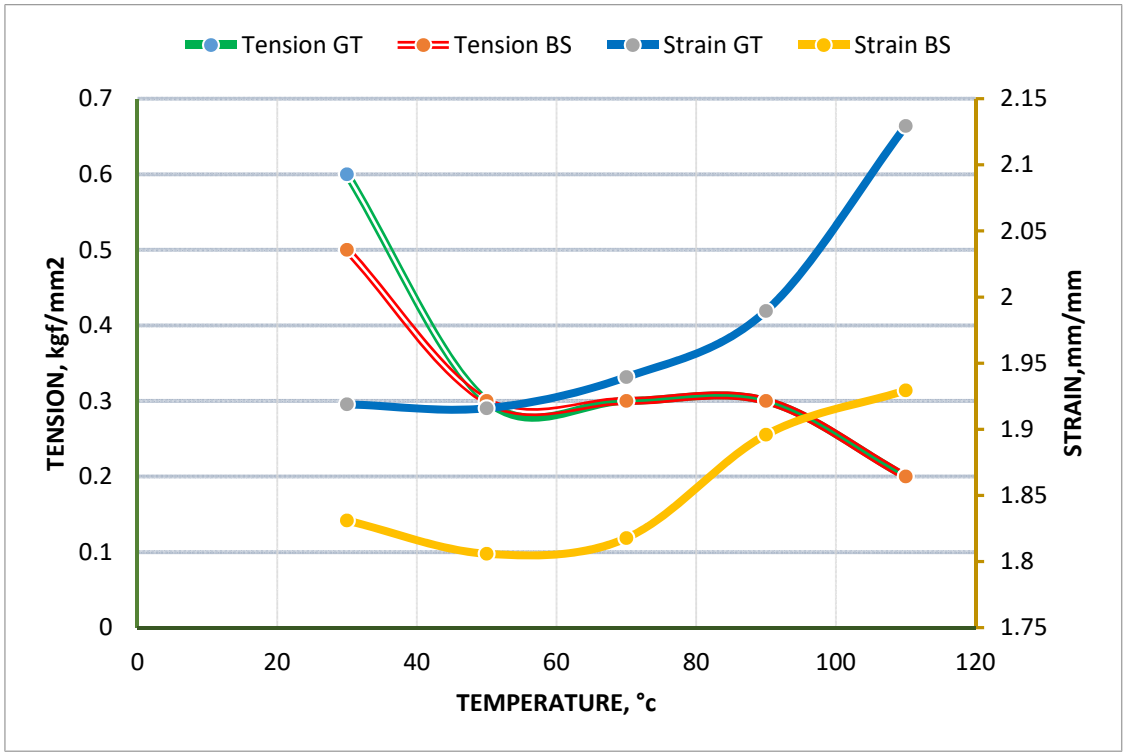


Figure 2. Graphics Effect of temperature on tension stress and strain

From the graph, the tire strain B (BS) is relatively lower than the A (GT) tires at all temperatures. While in the second tire voltage has almost the same value only tire voltage A (GT) at a temperature of 30 ° C has a higher voltage but at other temperatures the same value with tire B (BS). From the graph above it can also be seen from the strain perfomance both tires are relatively good at low temperatures but decreased at temperatures above 90 ° C seen from the stress while viewed from the strain, the performance of both tires decreased at a temperature of 50 to 60 ° C.

ISBN : 978-602-99806-3-9

4 Conclusion

The conclusions that can be drawn from the results of this study are as follows:

1. With tensile test the tire performance is generally very good at low temperatures up to 70 degrees, above 70 degrees the performance of tires began to decline due to the increased strain on the tire material so that the ability to resist high pressure by the pneumatic force of the wind inside the tire decreased relative to the increase Tire temperature.
2. For the best performance A (GT) tires at low temperatures up to 70 degrees, as well as B (BS) tires, although generally at low temperature the performance of B (BS) tires is relatively better than A.

Reference

[1] Prasetya Hari Akademi Teknologi Kulit.Yogyakarta. Arang Aktif Serbuk Gergaji Bahan Pengisi Untuk Pembuatan Kompon Ban Luar Kendaraan Bermotor. Jurnal Riset Industri, Vol. VI. Palembang. 2012.

[2] Ian Hardianto Siahaan, Ninuk Djonoadji, Amelia Sugondo. Analisa Gaya Pada Roda Kendaraan Pada Berbagai Kecepatan. Product Innovation and Development Centre Petra Christian University. Jurusan Teknik Mesin, Fakultas Teknologi Industri-Universitas Kristen Petra. Laboratorium Pengaturan dan Uji Konstruksi, Universitas Kristen Petra Surabaya .2006

[3] Rahmaniar, marlina.. Pengaruh Ukuran Partikel Nano Sulfur Terhadap Sifat Fisis Karet

[4] Jurnal of Industrial Reasearch, Komponen Kendaraan Bermotor., Vol. IV. Jakarta.

[5] Wikipedia, 2012, Ban, diakses dari http://id.wikipedia.org/wiki/Ban

[6] Wikibooks.org. wiki. Moda. Transportasi/Moda. Transportasi Jalan diakses dari http://id.wikipedia.org/wiki/Ban

ISBN : 978-602-99806-3-9

The Development of Teaching Material for Automotive Electrical and Electronics Laboratorium Based on Automotive-SKKNI to Improve the Achievement of Standar Competencies of Polytechnic Students

I Komang Rusmariadi[1], I Putu Darmawa[2]
1,2 Bali State Polytechnic /Mechanical Engineering Department, Bukit Jimbaran P.O Box: 1064 Tuban Badung Bali,Phone : (0361) 701981, Fax (0361) 701128.

rusmariadi@yahoo.com

Abstract. The development research aims to produce draft teaching materials of otomotive electrical and elektronic practice in the form of an integrated jobsheet that can improve the achievement of competency standars in mechanical engineering majors. Development held for two years. The first year perform a requirement of analysis of the competency standards contained in the SKKNI otomotive field based Kep.116 /Men/ VII/2004 , KKNI and SNPT based curriculum in mechanical engineering majors in 2017[4]. Automotive electrical and electronic practice grouped into 2 (two) types of jobsheet that is conventional ignition system and the elctronic ignition jobsheet system , where both types of jobsheet are arranged in one standard of competence. The model refers to the material development of the model of Dick and Carey (2004). The results of the questionnaire responses of experts, students, and faculty were analyzed descriptively, the result is the average age of students is 20-22 years. Outstanding characteristics are more students tend to like work that is experimental. (Sunarto, 2004). Means of laboratory learning approaches and strategies of training is one of the most appropriate learning system applied in practice otomotive electrical and electronic in mechanical engineering majors.Characteristics of students majoring in mechanical engineering force in 2016/2017 to practice learning otomotive electrical and electronic views of: 1) the attitude of the average student score of 114 (positive), 2) the interest of students the average score of 75 (high), 3) student motivation average score of 75 (high), and 4) the level of students' understanding of the concept of otomotive electrical and electronic practices an average score of 3.6 (medium), and 5) most of the suggestions students 79,41% suggest the practice of teaching materials need to be developed , enhanced with more series of system drawings and short explanations to make it more easily understood and to understand.

1. Introduction

Polytechnic is a professional institute of higher education oriented to the needs of industry and ready-made resilience of learners become members of the community who have professional skills in their respective fields. In order to produce the workforce and professional, it is necessary to process the preparation of infrastructure and learning activities in Polytechnic not only focused on the activity of developing cognitive ability only, also student's own competence. However, the facilities and infrastructure associated with the development of these factors are ignored. This can be seen from textbooks or other teaching materials on special practice lessons for learning at the Polytechnic. The learning practices that are the main ingredients to equip student hard work also require more intensive practice learning. The course subjects that practice teaching materials are still not classified as the practice of Electricity and Electronics.

Based on the preliminary survey of the research team, it concludes that there are two main issues in practical learning: l) the absence of innovative practice learning modules, practical lecture materials as

ISBN : 978-602-99806-3-9

outlined in the lesson plan (RPP) and Jobsheet less relevant to the Indonesian National Work Competency Standards (SKKNI) automotive field [6] and 2) practice teaching method with lecture (conventional) still become habit of teaching team. Based on the background explanation above, the main problem of this development research is how is the draft form of teaching materials in the form of an integrated jobsheet based on SKKNI in automotive field for electrical engineering and automotive electronics courses that can improve the achievement of competence in students majoring in mechanical engineering of Polytechnic.

2. Research Methods

2.1 Types and Research Design

This research material development study using the model of Dick & Carey (2004) and designed to take place in two years. A summary of key activities, subjects and products to be achieved within two years can be briefly described in the following Table 1.

Table 1. Expected Summary of Activity and Product Within Two Years

Step	Main Activities	Subject	Product
I -2017	Jobheet development 1. Setting course and course materials 2. Conduct a needs analysis (need assessment) 3. Establish SK, KD and learning outcome indicators 4.Designing the developer of teaching materials and instructions for their use 5. Drafting (prototype) jobsheet and instructions for its use	1. College student 2. Lecturer/ instructor	Draft teaching materials or an integrated jobsheet has not been validated
II-2018	Jobheet testing 1. Conduct expert test 2. Analyzes and revisions I 3. Conduct individual testing 4. Analysis and revisions II 5. Conduct group test small 6. Analysis and revision III 7. Conduct a class test 8. Analysis and revision IV 9. Dissemination	1. Field experts Studies 2. Technologist Learning 3. Assessment expert 4. College student 5. Lecturer/ Instructor	Practical teaching materials In the form of an integrated jobsheet that has been Validated

2.2 Population and Sample

The population of the study were students and lecturers of mechanical engineering, where the students were 140 people and 63 lecturers at the State Polytechnic of Bali. Samples were taken as many as 71 students distributed in three classes, namely engineering courses of classes IVA, IVB and IVC IV Semester IV classes in 2017, and 7 lecturers special lecturer at Lab.Otomotif. In detail the state of the population is presented in the following Table 2.

ISBN : 978-602-99806-3-9

Table 2. Sample Population of Research Preparing the Practice of Practice Materials in the Form of Integrated Jobheet at Bali State Polytechnic

No	Study Program	Number of Classes	Number of people
1.	Student majoring mechanical engineering (Smt IV)	3	71
2.	Lecturer/Instructor of Mechanical Engineering at Lab.Otomotif	-	7
	Amount	3	78

2.3 Data Analysis

Data collected from questionnaires from expert responses, students, and lecturers were analyzed descriptively. The feasibility and criteria for product revision are as follows.

Feasibility Level and Product Revision Criteria

Scorecoards (%)	Eligibility
82,3 – 95,0	Very worth it
69,7 – 82,3	Well worth it
44,3 – 69,7	Quite decent
31,7 – 44,3	Less feasible, needs to be revised
19,0 – 31,7	Very unfeasible, it needs to be revised

(Depdiknas BNSP,2008)

3. Results and Discussion

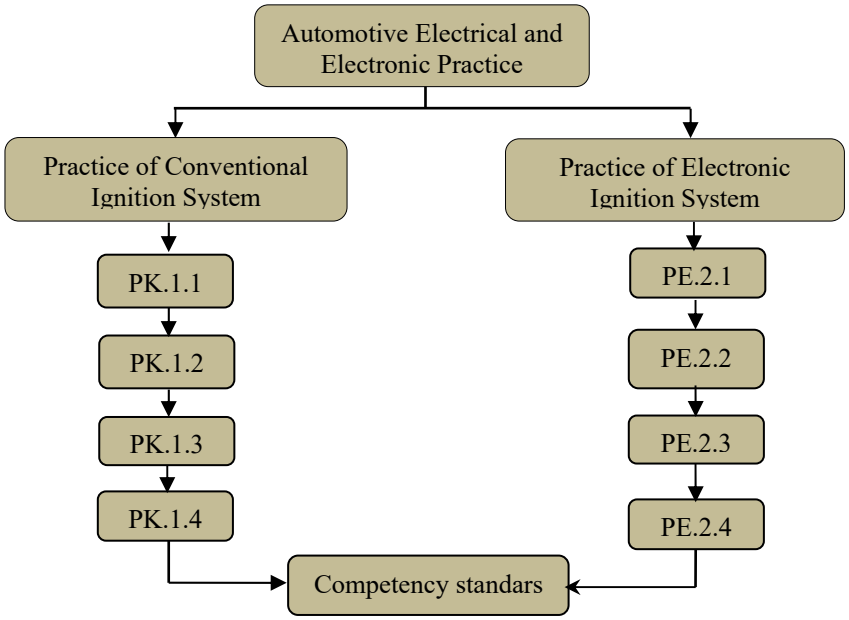
The teaching material development model refers to the development model of Dick & Carey (2004) through 3 (three) steps of development, namely: 1) the determination of the course and the material includes needs analysis, 2) drafting the worksheet, and 3) review and trial. The first and second steps are run in the 1st year, while the third step will be implemented in the 2nd year.

The description of the material determination and the results of the needs analysis can be described in the following sections.

3.1 Competence Required in Electrical Practice Lessons and Automotive Electronics

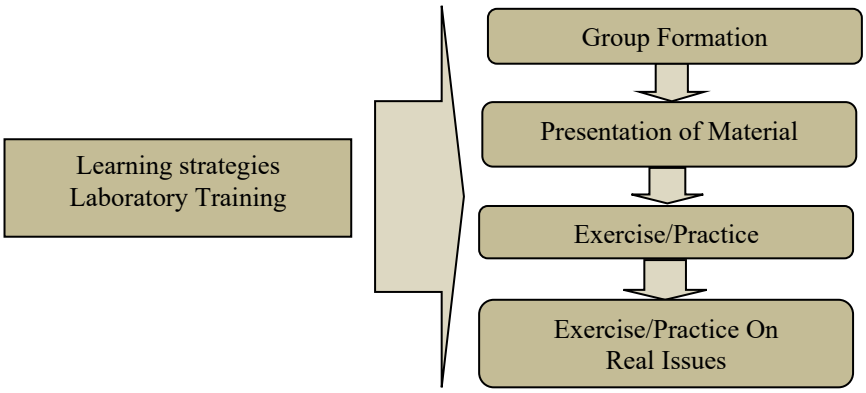
In the development of materials teaching materials electrical engineering and automotive electronics are packaged in 2 (two) integrated jobsheet. Each Jobsheet will be packaged in the format: 1) description of contents (objectives, prerequisites, instructions for use of the worksheet, competency standards), 2) content framework (introduction sheet, information sheet, instruction sheet, seft check sheet, evaluation sheet), 3) competence test. Competence maps in electrical engineering practice and automotive electronics are shown as follows.

ISBN : 978-602-99806-3-9



PK 1.1 Able to explain the concept of conventional ignition system practice automotive
PK 1.2 Able to release and re-assemble ignition system with coil ignition (Conventional Coil Ignation) as well as that put forward safety and health work.
PK 1.3 Able to identify, measure, adjust and improve the ignition system according to the specified standard.
PK 1.4 Able to produce reports of experimental results of automotive conventional ignition practice
PE 2.1 Able to explain the concept of electronic ignition system practice (inductive) including the IGF cable function between distributor and ECU.
PE 2.2 Able to remove and reassemble and examine key components that promote safety and health.
PE 2.3 Able to identify, measure and inspect major components and adjust the components of the ignition system according to the specified standard
PE 2.4 Able to produce reports of experimental results of automobile automotive ignition system practice.

One approach and learning strategy that can be used is learning laboratory training because it oriented constructivism learning theory with schematic steps can be described as follows [7].



In terms of the opportunity given by the lecturers to the students to explore / experiment in the learning process, show all the lecturers apply the approach and learning strategy laboratory training is

ISBN : 978-602-99806-3-9

seen from the results of the lecturer/instructor questionnaire that approach and learning strategy laboratory training implementation is ranked 1 (One) which means that the frequency of application is most often used by lecturers / instructors in the learning process of electrical and automotive electronics practice. Based on the results of the questionnaire can also be explained that the level of students' understanding of the concept and content of electrical engineering and electronics automotive that has been implemented previously shows the average score: 3.63 (medium) with the minimum score is: 2 and maximum: 5 while the percentage is very good: 5, 88% (4 people), good: 52.94% (36 people), medium: 36.76% (25 people) and less: 4.41% (3 people). The data indicates that there is still a need for improved improvements in preparation, practice learning and assessment processes, through reform of approaches and learning strategies and development of teaching materials in the form of an integrated jobsheet.

According to a Wena quote (2009) which states that learning objectives can be categorized into three domains, namely (1) cognitive domain, (2) affective domain, and (3) psychomotor domain. However, in this study, the focus of the study is the attitude domain (affective), interest and motivation of students in electrical engineering and automotive electronics in which there are several levels of knowledge, understanding, application, analysis, and evaluation. The description can be explained like the following sections.

1. Domain of Learners Attitudes to the Learning of Electrical Practice and Automotive Electronics

Based on the results of the students' assessment through questionnaires about the characteristics of the students, especially in the attitude (affective) of the students toward the practice of electricity and electronics automotive that has been implemented previously shows the average score: 114 (medium), while 18 students (26.47%) Very positive attitude statement and 50 students (73,53%) positive, and no student giving statement of neutral and negative attitude (0%). This statement of attitude means that there is still a need to improve again because, the attitude domain (affective) is a change from the learning process. So learning is not memorizing and not remembering, learning is one of the processes marked by a change in a person, the change can be shown in various forms such as changing his knowledge, his understanding, his attitude and his behavior, his skills, his abilities and abilities, his reactions, Acceptance and other aspects that exist in each individual[3].

2. Domain Interest Learners to the Learning of Electrical Practice and Automotive Electronics

So it can be said that interest in learning is a tendency that leads students to the fields that he likes without any compulsion from anyone to improve the quality in terms of knowledge, skills, values, attitudes, interests, appreciation, logic thinking, communication, and creativity[3]. Based on the results of questionnaires about the characteristics of students majoring in mechanical engineering of the Bali State Polytechnic to the interest of learning in electrical engineering and automotive electronics showed the average score of 75 included in the high category. While 17 students (25.00%) stated that their interest is very high, 51 students (75.00%) have high interest, and no students expressed their interest. With the number of 17 students (25.00%) stated that their interest is very high towards the study of electrical and automotive electronics practice, it means that the number of students is still low category, moreover there are no students who stated interest, and 51 students (75.00%) who Expressed high interest is still very necessary to do improvements again, One way that can be done is by the development of practical teaching materials that follow the principles of selection of teaching materials in the form of integrated jobsheet namely; Principles of relevance, consistency and adequacy[6].

3. Domain Motivation Learners Against Learning Electrical Practice and Automotive Electronics

Motivation is something that moves a person or a group to do or not do something [5]. High learning motivation is reflected by the non-breaking persistence to achieve success despite being confronted by difficulties. Related to the questionnaire about the characteristics of the students of engineering majors of the State Polytechnic of Bali to the motivation to learn in electrical practice and automotive electronics showed the average score of 75 included in the high category. Where 20 students (29,41%)

ISBN : 978-602-99806-3-9

have very high motivation, 48 students (70,59%) high motivation and no student (0%) motivation is. This means that there is still a need to increase efforts to motivate students' domains in the practice of electricity and automotive electronics, since approximately 30% of the number of highly motivated practitioners, as well as to newly motivated students is almost 71% Students who have no moderate motivation (0%) means that their motivation is still very low in the practice of electricity and automotive electronics. One of the efforts that can be done to develop the motivation domain of learners besides by developing teaching materials in the form of integrated worksheet is by extrinsic effort, among others: 1) giving praise, 2) giving advice, 3) giving motivation spirit, 4) gift inforcement , 5) punishment funishment and, 6) imitate someone who has sucsses[1]. It is expected that with the increase of motivation to study practice is very high, then the level of success and learning achievement of learners in the practice of electricity and automotive electronics become better.

4. Conclusion

1. Automotive electrical and electronics practices are grouped into 2 (two) types of practical job that are conventional ignition system practice and electronic ignition system practice where both types of job practice are arranged in 1 (one) competency standard with 8 (eight) basic competence With 8 (eight) indicators of learning outcomes.
2. Characteristics of students majoring in mechanical engineering year 2016/2017 1) 85.29% mostly aged between 20-21 years, 2) student attitudes toward practical learning mostly 73.53% stated positive, 26.47% very positive 3) student interest 25% very high, 75% high, 4) student motivation 29.41% stated very high, 70.59% high, no students who have moderate and low motivation, and 5) level of understanding of students to the concept of electrical and electronics practice automotive: 5.88% states very good , 52.94% good, 36.76% moderate, and 4.41% less, while 6) student suggestion mostly 79.41% suggesting practice material (jobsheet) needs to be developed / refined with more drawings of system set and brief explanation to make it easier to understand and understandable.
3. The most frequent learning approach and strategy used in automotive electrical and electronics practice is laboratory training.
4. Draft teaching materials in the form of integrated worksheet material developed based on a combination of competence standards contained in the curriculum based on the Indonesian National Qualification Framework (KKNI) of Mechanical Engineering Department of Bali State Polytechnic and KEP.116 / MEN / VII / 2004 on National Work Competency Standards Indonesia (SKKNI) in the field of light vehicle automotive.

5. Acknowledgments

This research was founded by DRPM Directorate General of Research and Development Reinforcement Ministry of Research, Technology and Higher Education Nomor: 023/SP2H/LT/DRPM/IV/2017 , date April 12, 2017

6. References

[1] Akhmad Sudrajat. 2010. How to improve motivation, interest in student learning, http://akhmadsudrajat. wordpress.com/2010/09/11, accessed March 25, 2017
[2] Depdiknas and BSNP. 2008. Socialization of Standard Instruments for Textbook Appraisal Lesson on Technology, Information and Communication Lessons. Jakarta: BSNP and Bookkeeping Center
[3] Depdiknas, 2006. Self Evaluation Documents Majoring in Mechanical Engineering. Denpasar: Politeknik Negeri Bali
[4] Dick, W & L.Carey. 2004. The Systematic Design of Instruction, 3rd USA: Harper Longman
[5] Lena Noviana, 2012, Attitude, motivation, interest in learning math, http://www. slideshare.net/Interest_Matematika_2011, accessed March 27, 2017
[6] Luhur EW 2017. KEPMEN Skkni Automotive Light Vehicle, http://www.scribd.com/doc/ 39310005 / Kepmen-Skkni-Automotive, accessed March 25, 2017.

ISBN : 978-602-99806-3-9

[7] Trianto, 2007. Constructivism-Driven Innovative Learning Models: Concepts, Theoretical-Practical Basis and Its Implementation. Jakarta: Achievement Library
[8] Wena, Made. 2009. Contemporary Innovative Learning Strategies. Jakarta: PT. Earth Script.

Proceeding International Joint Conference on Science and Technology (IJCST) 2017
ISBN : 978-602-99806-3-9

The yajna-based ashram learning model in the formation of character

Ketut Nurhayanti, and Putu Adi Suprapto
Jurusan Akuntansi Politeknik Negeri Bali, Indonesia
Kampus Bukit Jimbaran, Bali, Telp. (0361) 701981 (hunting) Fax. 701128

nurhayantiketut@gmail.com, putuadisuprapto@gmail.com

Abstract. Ashram learning model is a learning model that emphasizes the development of the character of learners by applying good behavior habituation to learners. With the background of problems in the world of education today that experienced the moral degradation of learners are characterized by free sex, brawl between students, drug use and other adolescent deviation behavior caused by not forming a strong character in learners. As an effort to minimize the problem is needed a concept of learning model in the world of education that uses the concept of religious teachings as a basis in the formation of character of learners. This study aims to analyze the teachings of yajna that will be applied to the ashram learning model in an effort to form the character of learners in Gurukula Junior High School. This research use qualitative research method by using research instrument of interview, observation and also documentation study. The results of data analysis in this study using qualitative description. The final result of this study is a document on yajna based ashram learning model, which includes the concept and characteristics of yajna based ashram learning model, yajna design on ashram learning model, yajna based ashram learning strategy and cognitive, affective and psychomotor development as well as character formation of learners.

1. Preliminary

Moral degradation that occurs in the younger generation in Indonesia, especially among young people is quite alarming. Adolescent deviant behavior such as drug abuse to cause criminal acts such as stealing, promiscuity, not only become a problem within the scope of the family but also a problem for society and government. Schools as formal educational institutions that owned by the government have a responsibility in providing solutions related to morality issues that involve young school-age generation. The understanding of the teachings of religion and being able to implement it is one solution to the problem of moral degradation of young people in Indonesia. The government has made various efforts to minimize deviant behavior of adolescents by doing improvements in education. Such as making a policy related to education, improvement of school curriculum and others. Education that only aims to shape the intellectual intelligence of learners must be addressed, because it is very important to form the emotional and spiritual capabilities so that learners in addition to having intelligence knowledge also has the intelligence in processing emotions and character.

Schools as formal educational institutions facilitate in developing the ability of learners in various domains, such as cognitive (knowledge), affective (social attitudes and spiritual attitudes) and psychomotirk (skills). Currently the model of learning applied in the school has started to develop, the learning process no longer runs conventionally by making the teacher as the center of information by

ISBN : 978-602-99806-3-9

lecture method, but there is already a problem-based learning model that aims to encourage students able to find, analyze and provide solutions to a problem. Contextual learning model aims to enable the learners to implement their knowledge in real life. Gurukula Junior High School is a Hindu educational institution that collaborates on two curricula, namely general curriculum and pasraman curriculum. By applying two curriculums then Gurukula Junior High School has a unique learning model that different from the model of learning applied to public schools.

Learning model is the most important part in planning the learning process because it covers the whole set of presentation of teaching materials to be delivered by teachers and related facilities that will be used in the learning process. Today, the learning model is experiencing rapid development, some teachers have applied various models of learning at the time of teaching in the classroom, such as problem-based learning model, contextual, cooperative and so forth. The whole learning model has a purpose so that learners are able to develop their skills from the cognitive, affective and psychomotor domains. Yajna based ashram learning model that is applied in Gurukula Junior High School is one of the learning models that are not yet known to the general public, the learning model that developed from the school with this pasraman education system makes the teachings of religion as the basis of the learning process of learners. Given that the yajna based ashram learning model is still undergoing development, it needs more in-depth study of the concepts and characteristics, the steps in the learning process, the assessment system and the purpose of applying the yajna based ashram learning model that leads to character formation.

2. Methodology

This research uses qualitative research type [1] qualitative research is a research method based on postpositivism philosophy, used to examine the condition of natural objects, (as opposed to experiment) researcher as a key instrument, sampling of data sources conducted purposively and snowball, Research at Bangli Gurukula First Preventative School, a school that implements the pasraman curriculum in the learning process. Collecting techniques with triangulation, data analysis is inductive/qualitative, and qualitative research results more emphasis on the meaning of the generalization. The type of research approach used in this research is qualitative descriptive research [2] the qualitative approach does not use flexiblely designed research designs. Thus the design in this study is temporary and will be held changes in accordance with the reality in the field.

A. Model of Yajna Based Ashram Learning

Ashram learning is a learning refers to the pasraman education system. Pasraman is a specialized educational institution in the field of Hinduism. The word pasraman comes from the word "dormitory" meaning it is the place of the learning process or education. Pasraman education emphasizes self-discipline, develops noble character, diligent, loves to work hard, and helps others. [3] The ashram school comes from the goal of providing total personality development opportunities. Ashram School is a residential school where boarding halls are free along with other facilities. The main goal of the ashram school is to provide separate skills from the provision of general education. The growing pasraman concept is now adopted from the ancient Hindu educational system in India. The ashram system illustrates the intimate relationship between teachers (acarya) with their students like the family. Therefore, this system is also known by the system of education gurukula. Students live in pasraman with teachers as family members and teachers act as parents.

Gurukula Junior High School is a formal school that uses two educational paths, namely general education and pasraman education. By applying these two educational paths, Gurukula Junior High School has the potential to apply various learning models. This is in accordance with the results of the study. [4] Schools collaborate on various learning models in the classroom as alternatives to special education paths such as Special Schools and Pasraman schools. Both schools have uniqueness in applying school curriculum that is not like the school in general. One of the learning models applied in Junior High School Gurukula is a yajna based ashram learning model. Current learning models such as contextual learning model, problem-based learning model, and cooperative learning model can be applied in yajna based ashram learning model by way of colonizing various stages in each learning process planning. In a contextual learning model that encourages students to apply real-world

ISBN : 978-602-99806-3-9

knowledge, the yajna based ashram learning model encourages students to directly practice the theory of religious teachings into real behaviors such as helping others, not stealing, and so on. In addition students are also given the opportunity to examine, find solutions to problems they experience in real dormitories. They are the stages of the problem-based learning model. Encourage students to learn to live together in an environment that is the goal of the cooperative learning model. The advantages of the ashram learning model is that the learning process does not only take place in the classroom but also outside the classroom by collaborating the two curriculum, so the teaching is unique by developing students' abilities from the cognitive, affective and psychomotor domains.

Yajna in the perspective of the Aryan nation is the interaction between agni and soma. Agni acts as a food and soma as food. Both interact to sustain the creation process that begins with the rta (universal law). According to [6] Pandit Yajña which man has to do is re-enactment of cosmic creation and regeneration with self-sacrifice and self-constitution cuts. This assumes a very symbolic rite of form. While the yajña is portrayed as a method of worshiping God, the yajña itself is considered a god in the Yajur Veda (16: 1; 31); it removes all sins and sanctifies the yajña's offender; It bestows upon him strength, power and dexterity by sanctifying the food he eats and the water he drinks. It causes health, happiness and wealth. The concept of yajna internalized in the ashram pursuit model at Gurukula Junior High School is a behavior that leads to service, devotion, sacrifice, offerings to God, all of which aims to maintain harmony and balance of the universe. The yajna based ashram learning model in Gurukula Junior High School has the following characteristics :

1. The teachings of religion as the basis of student activities in the ashram
2. Students live in dormitories
3. Applying the picket system to establish student discipline
4. 24-hour supervision
5. Learning process in and out of class.
6. Selection of learners using the standard of values, the willingness of families and / or learners and entrants from other parties such as from prisons.
7. Requires high operational funds
8. Requires teachers who meet their competence in the realm of teaching, educating, guiding learners.
9. Requires consistency, commitment, and consequences in every activity.

Based on these characteristics, the teacher has a very important role in applying the yajna based ashram learning model in Gurukula Junior High School. The statement is in accordance with the opinion [7] that although the planned curriculum is perfect but if the executor is unable to implement the planned curriculum then the learning process will never achieve the desired goal. [8] Competencies that a teacher must possess are performance, professional/academic mastery, academic material acquisition, skills acquisition/work process, mastery of interactional and personal adjustment. [9] 21st century teacher education is a paradigm shift in the context of learning, by applying transformational learning that is a model of teacher learning only as a facilitator for students. Teachers have an important role in the learning process, yajna based ashram learning model maximizes the role of teachers not only as executor but also as a facilitator for students experiencing the learning process.

Here is the role of teachers on yajna based ashram learning model that aims to form the character of learners as follows:

1. Teachers plan the learning process in the classroom
2. Teachers as exemplary models for students both in good behavior.
3. The teacher becomes a substitute parent for the student
4. The teacher carries out the assessment of students' social and spiritual behavior in the classroom and outside the classroom
5. The teacher carries out mentoring and supervision to the students after the formal learning process is completed.

ISBN : 978-602-99806-3-9

B. Step-by-step Model of Yajna-Based Ashram Learning

The flow of yajna based ashram learning process can be seen as follows

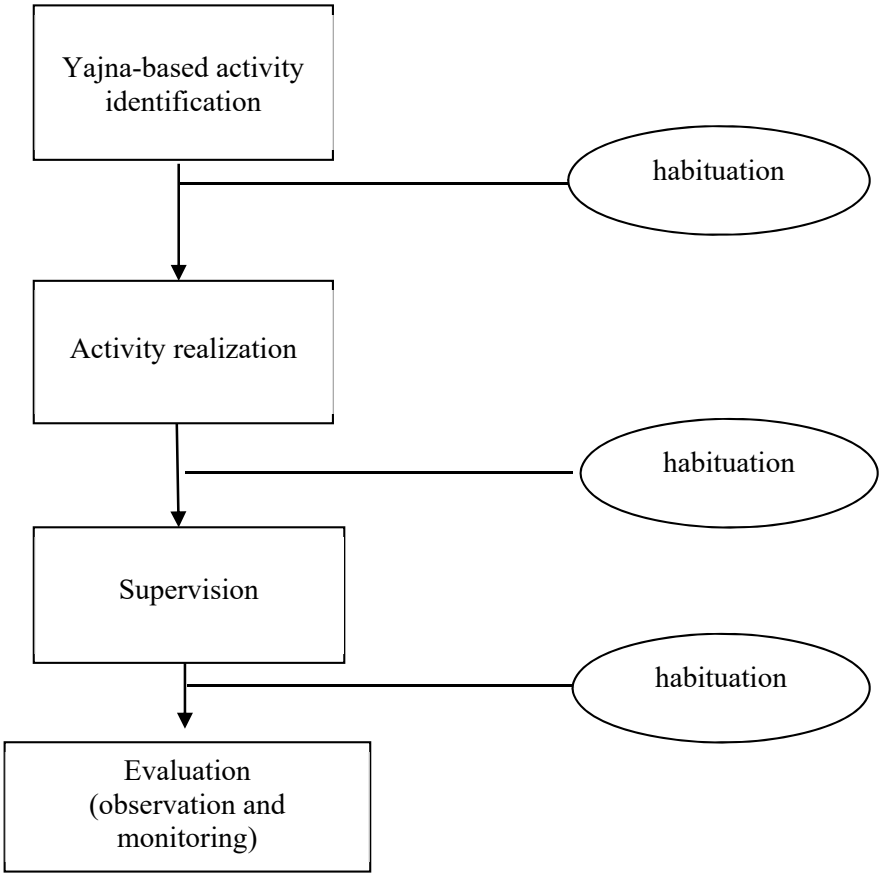


Figure 1. The flow of yajna based ashram learning process

The first stages to be done in yajna based ashram learning process are as:

1. Identification of activities based on yajna, in the early stages to create an activity program based on yajna teachings and analyzes the teachings yajna intended to be implemented and implemented by learners.
2. After the identification process, what must be done is to actualize the planned activities consistently and continuously.
3. The next step is supervision. The most important thing in the ashram learning process is the supervision, and the actualization of the planned activities if not supervised and mentoring then it will not run optimally.
4. The last stage is evaluation. Unlike the evaluation that is applied in other formal learning process, in the ashram learning process, the evaluation is conducted in the form of observation. Observations are conducted related to changes in behavior of learners after experiencing the learning process of ashram to provide punishment and awards to students.

The four stages are the output is habituation. Habituation is expected that the activities that have been planned, that actualitation will establish discipline students in carrying out every activity in school. Implementing each theory in the learning process requires a learning strategy. Yajna based learning strategy is a way that can be used by teachers to apply yajna based ashram learning model in the classroom or outside the classroom. Each learning strategy has advantages and disadvantages as well. In yajna based learning strategy has advantages that are as follows:

ISBN : 978-602-99806-3-9

1. Encourage the increased religiosity of students by carrying out prayer activities before the learning process begins.
2. Encourage increasing attachment between teachers and students
3. Encourage the development of cognitive, affective, psychomotor ability of students that leads to students' intellectual, emotional, and spiritual intelligence.

Lack of application of yajna based learning strategy is:

1. Requires maximum supervision and guidance on the behavior of learners both in class and outside the classroom.
2. Requires accuracy, discipline, patience in internalizing and actualize learning based yajna, given that after the learners are categorized as still in adolescence who have unstable emotional conditions.

Yajna-based learning strategy as the development of the ashram learning model is not useful maximally if only applied in the classroom, but must be applied outside the classroom, if the school implements the ashram / pasraman learning model it will be easier to actualize but if the school implements general pursuit in accordance with formal school presentation presents challenges, constraints faced greater than the school pasraman. This is related to monitoring system, guidance and evaluation that can not be done continuously and continuously because time and distance of student residence far from teacher supervision.

C. Curriculum Development in the Learning of Yajna-Based Ashram

The curriculum is in the core of the educational process [10]. Among the educational areas of education management, curriculum, and student services, the curriculum is the area that most directly affects the outcomes of education. In the development of the curriculum can at least be distinguished between the curriculum design or the written curriculum and the implementation of curriculum or curriculum deeds. Regulation of the Law Number 20 Year 2013 on the National Education System, the curriculum is defined as a set of plans and arrangements concerning objectives, content and instructional materials and ways used as guidelines for the implementation of learning activities to achieve certain educational goals. Based on the statement on curriculum understanding, curriculum development to make a change aimed at the improvement of the curriculum is very important in accordance with the development of science and technology.

Curriculum development as the basis for the development of yajna based ashram learning model should look from various domains especially in the realm of the concept of religious teachings that want to be applied in the curriculum in accordance with the level of ability of students and their environment. In pasraman schools that require students to stay in the ashram (dormitory) it is possible to develop curriculum whose output or outcome leads to self-development and life skills by taking on several activities such as self-serving that form students for self-reliance, serving others forming students to care for others and of course the activities programmed based on the teachings of religion, especially yajna.

D. Assessment System

Assessment is a central process in effective teaching [11]. Assessment serves as a bridge between teaching and learning that aims to help students develop their abilities. Following Dylan's assertion of the ashram learning model there are three aspects of students' abilities: the cognitive, affective and psychomotor domains. [12] Cognitive words are adjectives derived from nouns whose equivalent "knowing" means knowing. In the broadest sense of cognition is the acquisition, arrangement, and use of knowledge in subsequent development of the term cognitive becomes popular as one of the domains of human psychology which includes any mental behavior associated with the processing, information processing, problem solving, deliberate and confidence. Assessment in the cognitive domain through written tests and oral tests by looking at students' progress in studying knowledge, during the discussion process. So the assessment of the cognitive domain more implemented at learning process in the classroom. Assessment of the three domains is not only carried out through written tests but by observation of the students at the time of learning outside the classroom.

ISBN : 978-602-99806-3-9

In the cognitive domain, assessment can be done by looking at students' progress in emotion processing, life motivation, social and spiritual attitudes. The following is an affective development of students:

1) Ability to create conducive conditions in the ashram environment.
2) The ability to motivate oneself. Various personal problems experienced by students lead to depression and reduce life spirits to continue education to a higher level, because the affective ability of students need to be developed so that students are able to overcome the problems that are being experienced.
3) Ability to show high moral values to the community.

Schools should be able to facilitate the side in developing their skills to the fullest. Psychomotor assessment of students can be implemented by observing the skills of students during school activities. Yajna based ashram learning model is a model of learning based on the teachings of religion then to develop the psychomotor ability of school students to create activities likes in the realm of religious activities (1). Agriculture and Livestock, (2). Arts of kerawitan and dance, (3). Upakara Yadnya, (4) Yoga, Meditation, (5). Sports.

The assessment system on the yajna based ashram learning model is implemented inside and outside the classroom. The advantages of ashram learning model is requires students to live in ashram (dormitory) along with his friends then the assessment takes place comprehensively and continuously. The cognitive, affective and psychomotor development of students is a unity of life skills that must be possessed by students. These three developments correlate one with the other. Students who are able to develop their cognitive aspect will tend to be able to develop affective and psychomotor aspects although basically of the three aspects of development presentation is not the same.

E. Character Formation at Junior High School Gurukula

[13] Character education can be defined as the value of education, character education, moral education, aims to develop students' ability to make good decisions, retain what is good, and realize goodness in everyday life wholeheartedly. [14] Character education is not solely to teach what is right and what is wrong in children, but more than that character education instills habituation of the good that students understand, are able to feel, and want to do good. Character education is a mission similar to moral education. Character education can be formed when students perform activities that lead to goodness. [15] Character education is important for the growth of the human individual as a whole and should be done earlier, and educational institutions have the duty and responsibility to conduct moral education for the students as well as build a community culture for moral values. It is important that educational institutions not only pay attention to the students' academic competency needs, but also character development so that graduates become graduates who are ready to look academic and good. Schools as one of the educational institutions have responsibility for the development of good character of the students. Students are no longer evaluated on the basis of their intellectual development, but rather on their attitudes or behavior toward the environment. [16] Character education can be formed based on habituation in an activity. These activities are the transmission of values as a process of civilization, means of maintaining a code of ethics in society, moral education, and indeed it is a real educational process, that there is no education without value. Gurukula Junior High School in developing good character and reduce the bad character of his students by making various activities carried out during the formal learning process but at the time of non-formal learning process. Here is an example of activities that exist in Gurukula Junior High School in developing the character of both students.

Table 1 The process of character building students

ISBN : 978-602-99806-3-9

through various activities at Gurukula Junior High School

No	Activities	Character	Yajna
1	Saying "Om Swastyastu"	Friendly, polite	Nitya Yajna
2	Carry out flag ceremony every Monday or national day	Nationalism, discipline	Nitya Yajna
3	Carry out prayers every morning, afternoon and evening	Religious	Nitya Yajna dan Naimitika Yajna
4	Pray before starting the classroom lesson	Religious	Nitya Yajna
5	Throw garbage in its place	Responsibility, honest	Nitya Yajna
6	Clean the environment around the school (building and outside the building) on a regular basis	Responsibility	Nitya Yajna
7	Carry out cooking dues for all residents of the ashrama (ranging from providing food to the stage of processing the food)	Responsibility, independent.	Nitya Yajna
8	Learning at night together and helping each other if someone has learning difficulties	help each other	Nitya Yajna
9	Preparing personal needs	independent.	Nitya Yajna
10	Clean the cattle and pig pens every day	Responsibility	Nitya Yajna
11	Preparing religious ritual means at school	Religious, independent, responsibility	Nitya Yajna dan Naimitika Yajna
12	Conduct meditation regularly	Religious	Nitya Yajna dan Naimitika Yajna

Based on the response given by the students at the time of implementing various activities in the First School Gurukula, it appears that the students initially carry out the activity with the compulsion because of fear of the teacher, but after a long time become a habit that is routinely implemented so that the character wants began to be felt by various parties.

3. Conclusion

Description of the discussion about yajna based ashram learning model in shaping the character of students can be concluded that the concepts and characteristics of yajna based ashram learning emphasizes the application of yajna teachings as the basis of activities undertaken in the learning process. Yajna teachings are applied starting from simple teachings such as washing their own clothes, taking water for baths to the teachings of yajna to a higher level of meditation. Observation, monitoring and evaluation should be carried out continuously for 24 hours in order to achieve the goal of applying the yajna based ashram learning model. And the role of teachers is needed in the implementation of learning model based ashram yajna and operating costs are not small.

ISBN : 978-602-99806-3-9

Basically in applying yajna based ashram learning model requires four important things: seriousness, consistency, commitment and consequence. Because the application of yajna is basically requires discipline in order to lead to the formation and development of characters from students. Yajna based ashram learning model is able to develop students' skills both in terms of cognitive (knowledge) affective (social and spiritual attitudes) and psychomotor (skills) that lead to the formation of student characters.

Reference

[1] Sugiyono, 2010. Metode Penelitian Pendidikan pendekatan Kuantitif, kualitatif dan R & D. Alfabeta. Bandung.
[2] Moleong Lexy. 2012. Metodologi Penelitian Kualitatif. Bandung : Remaja Rosdakarya.
[3] K. Sujhata education in ashram school a chase of Andhra Paradesh . Journal of Educational Planning and Administration. 17-B (18) 1990
[4] I Gusti Ngurah Agung Wijaya Mahardika dalam jurnal "Teaching Hinduism For The Blinds: Study On Hinduism Teaching And Learning In SLB A Negeri Denpasar". International Journal of Hindu Science and Religious Studies Vol. 1 No. 1 May 2017.
[5] S. Ramanathan. Contribution To 'Weather Science In Ancient India' The Yajna Concept Of The Aryans. Indian Journal oj History oj Science, 21(1) i-i4 (i986)
[6] Pandit Srirama Ramanujacari srimatham.com. April 2013 Theori and Practice of Hindu Rituual Vol. 2
[7] Nana Sudjana. 1989. Dasar-Dasar Proses Belajar Mengajar. Bandung: Sinar Baru Algensindo
[8] Syamsu dan Sugandhi.2011. Perkembangan Siswa. Jakarta : Rajawali Pers
[9] Michael Dyson 2010. What Might a Person-Centred Model of Teacher Education Look Like in the 21st Century? The Transformism Model of Teacher Education Volume: 8 issue: 1, page(s): 3-21
[10] Nurdin dan Adriantoni.2016. Kurikulum dan Pembelajaran. Jakarta: Rajawali Pers
[11] Dylan Wiliam Assessment: The Bridge between Teaching and Learning. Voices from the Middle, Volume 21 Number 2, December 2013
[12] Menurut Syah, Muhibbin. 2014. Telaah Singkat Perkembangan Siswa. Jakarta: Rajawali Pers
[13] Elkind, David H & Sweet, Freddy. 2004. How to Do Character Education. An article, published in September 2004.
[14] Lickona, Thomas. 1991. Educating for Character: How Our School Can Teach Respect andResponsibility. New York, Toronto, London, Sydney, Aucland: Bantam books
[15] Kamaruddin SA. (2012). Character Education and Students Social Behavior. Journal of Education and Learning. Vol.6 (4) pp. 223-230.
[16] Tupari, Metta Santi The Implementation Of Character Education Through Java Language's Puja To Reinforce The Character Of Nation. International Journal of Hindu Science and Religiouus Studies Vol. 1 No. 1 May 2017.

Proceeding International Joint Conference on Science and Technology (IJCST) 2017
ISBN : 978-602-99806-3-9

Analysis and design of web-based management information system for garments manufacturing process

I K Suwintana[1], **I G A Oka Sudiadnyani**[2]
[1,2]Accounting Department, Bali State of Polytechnic
Bukit Jimbaran Badung Selatan 80361, Bali, Indonesia

[1]Email: tutswint@pnb.ac.id

Abstract. Information technology is needed for the management of the garment manufacturing process to producing of information a quickly and accurately. This research aims to analyze and design of web-based management information system for garments manufacturing process. This study conducted by the research and development method used the stages of software development. Starting from the system analysis, system design including database design, interface design, and writing program code. Web-based management information system was developed using the PHP programming language with Code Igniter Framework and MySQL database. The result of this research is web based application for garments manufacturing process which include production order process, sample making, cutting, embroidery, sewing, and finishing. This application is tested by using black box testing method, where the results show that the application function is running well.

Keywords: management information system, garments manufacturing process, web

1. Introduction

As the business grows, the intensity of the transactions handled will increase. In dealing with the complexity of various transactions, of course, requires the support of information technology in the management of the company. With the support of technology will enable the management of information quickly, relevant and accurate. Access to and the use of information can contribute to the success of business organizations [1]. Researchers agree that the systematic use of external data can help business organizations craft competitive positions in their sectors [2]–[6]

Similarly, for garment companies that handle transaction data related to the production process requires complete, accurate, and timely information. Accurate and timely information is needed by the management in making decisions. If handling transaction data is still done manually it will lead to possible errors such as recording errors, incomplete reports, inaccurate reports, or reports can not be done quickly. Complete but inaccurate information will be in vain, while quick but incomplete and inaccurate information will only mislead decision makers. Success depends on being able to collect, process, and organize data into accurate and timely information.

The empirical evidence that investment in information technology can contribute positively to the company's performance and productivity [7]. The use of information systems can provide information to help managers make managerial and staff decisions to accomplish the tasks assigned to them.

Information systems are virtual systems, their data represents the physical system of the firm [8]. An information system is an integrated and cooperating set of software directed information technologies supporting individual, group, organizational, or societal goals [9]. The information system is Assumed to mean computer-based systems, which are combinations of hardware, software, and

ISBN : 978-602-99806-3-9

telecommunications networks that people build and use to collect, create, and distribute useful information [10].

Web-Based Management Information System will provide convenience for Small and Medium Enterprises, especially those engaged in the field of convection to automate data processing previously done manually. Use of the application can be done online that provides information in real time. This information can be used as a reference for decision making quickly and accurately.

2. Methodology

This study uses a research and development (R & D) approach, the research aims to analyze and develop a system. The system in this research is web-based management information system for garments manufacturing process. Management Information System developed is designed to be accessible online.

Develop a Management Information System using Software Development Life Cycle (SDLC) methodology [11]. There are 6 main activities in SDLC: planning, defining requirement, designing, building, testing and deployment. One of SDLC methodologies is Rapid Application Development (RAD) model. RAD model was first introduced by James Martin in his book which has the same title [12].

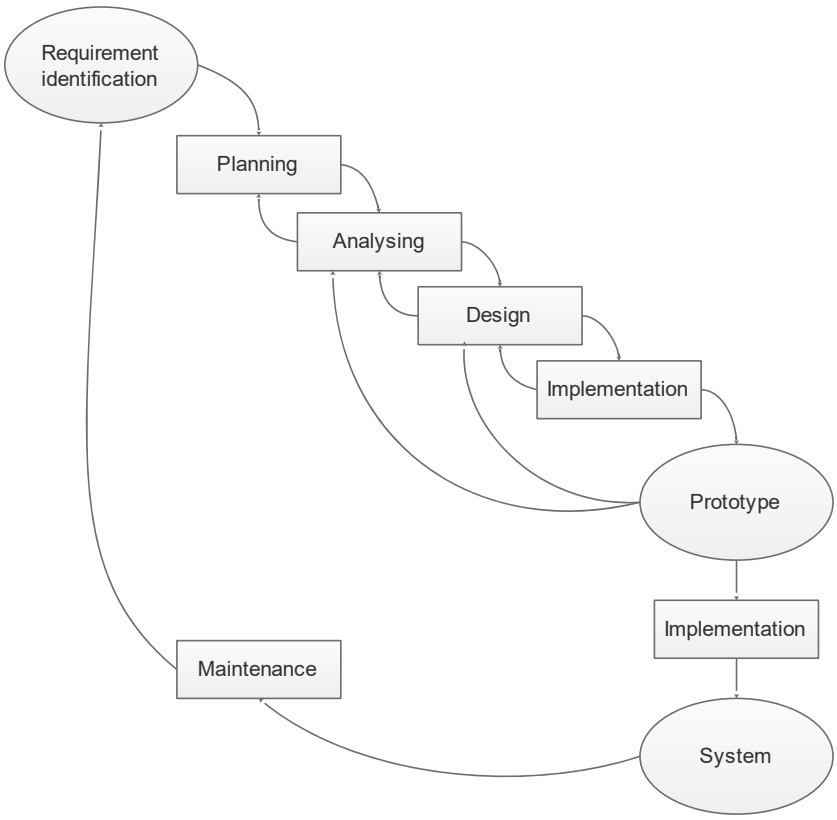


Figure 1. RAD model

Management Information System for Garments Manufacturing Process development using the RAD model. This model consists of a series of activities that can be grouped into several phases, as in Figure 1.

The first step is identifying requirement. Then some system requirements are 1) requirement to manage users, 2) requirement master data, 3) requirement to manage order production, 4) requirement to produce sample, 5) requirement to manage production (cutting, embroidery, sewing/assembling), and 6) requirement to access user profile. The next step is developing the prototype for each system requirement. Each system requirement went through basic SDLC processes: planning, analyzing, designing, and implementing.

ISBN : 978-602-99806-3-9

3. Result and Discussion

We named the Management Information System for Garments Manufacturing Process as SIMKonveksi. SIMKonveksi is designed based on the analysis that has been done directly through the interview technique. SIMKonveksi developed include Production Order, Sample production, Process Cut, Process Embroidery, Sewing Process, and Finishing. An overview of the application can be seen in Figure 2.

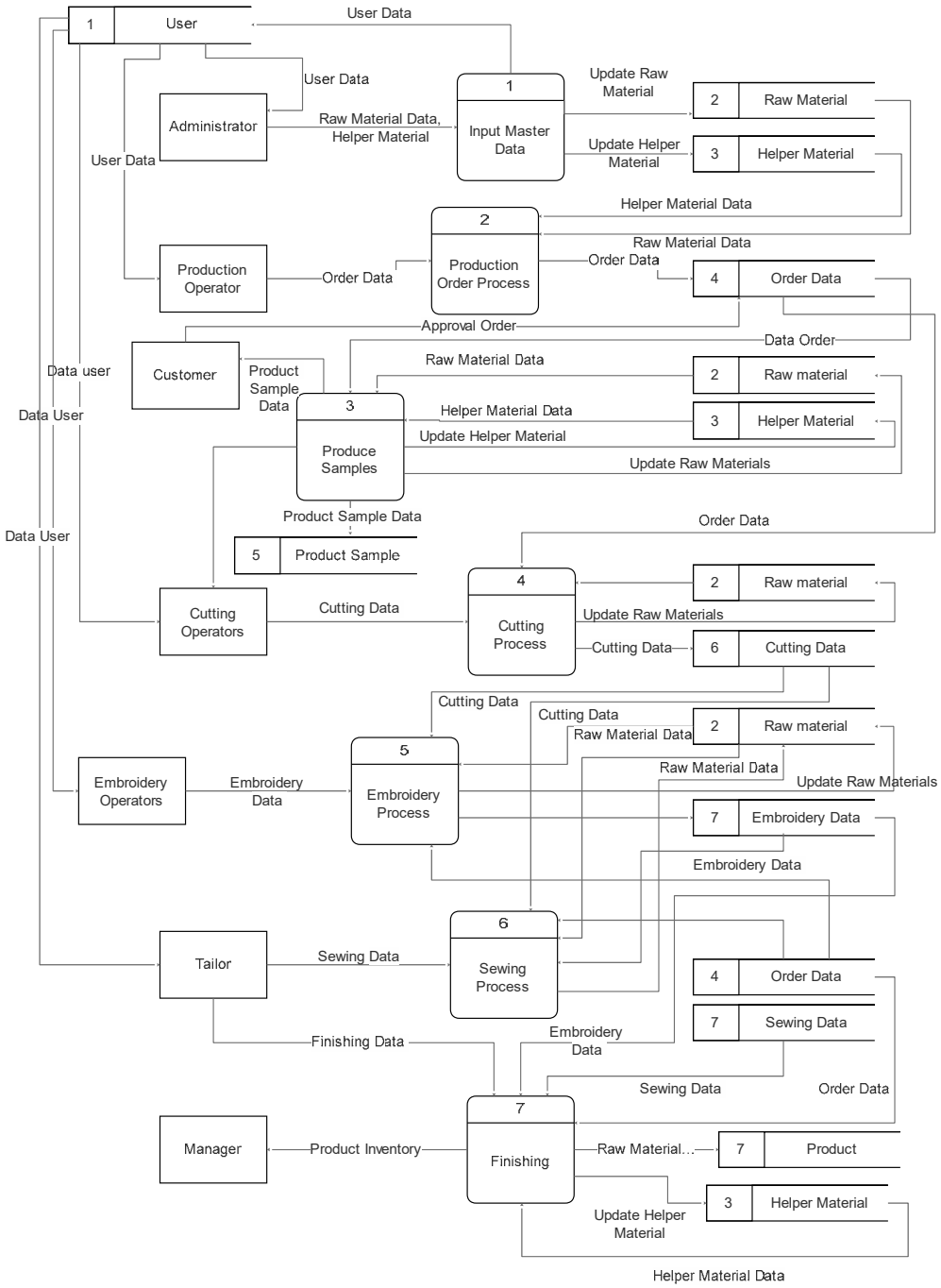


Figure 2. Data Flow Diagram of Application

Once there is a production order, then the production process begins with the process of making product samples. After obtaining approval from the customer, the process continues with the cutting process. If the product contains embroidery, the process is continued to the embroidery process. After the embroidery process is completed will proceed to the process of sewing and then the finishing process.

ISBN : 978-602-99806-3-9

Database used in accommodating data system information using MySQL DBMS. Application creation using PHP with Code Igniter framework and web page view using Bootstrap 3 Page view for Production Order List on Information System. The production list page is shown in Figure 3.

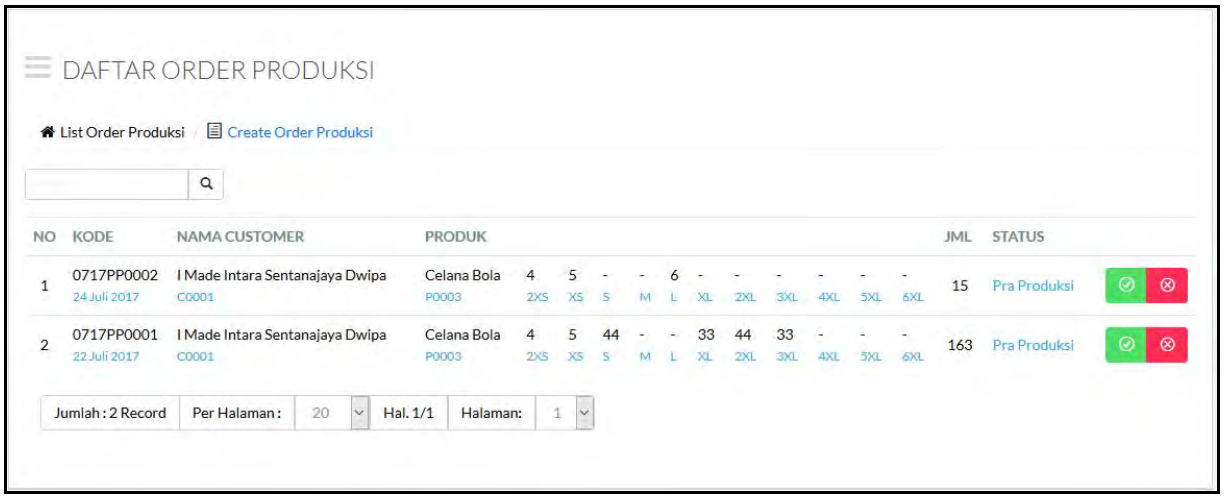


Figure 3. Production list page

The page for input / update of production data is shown in Figure 4.

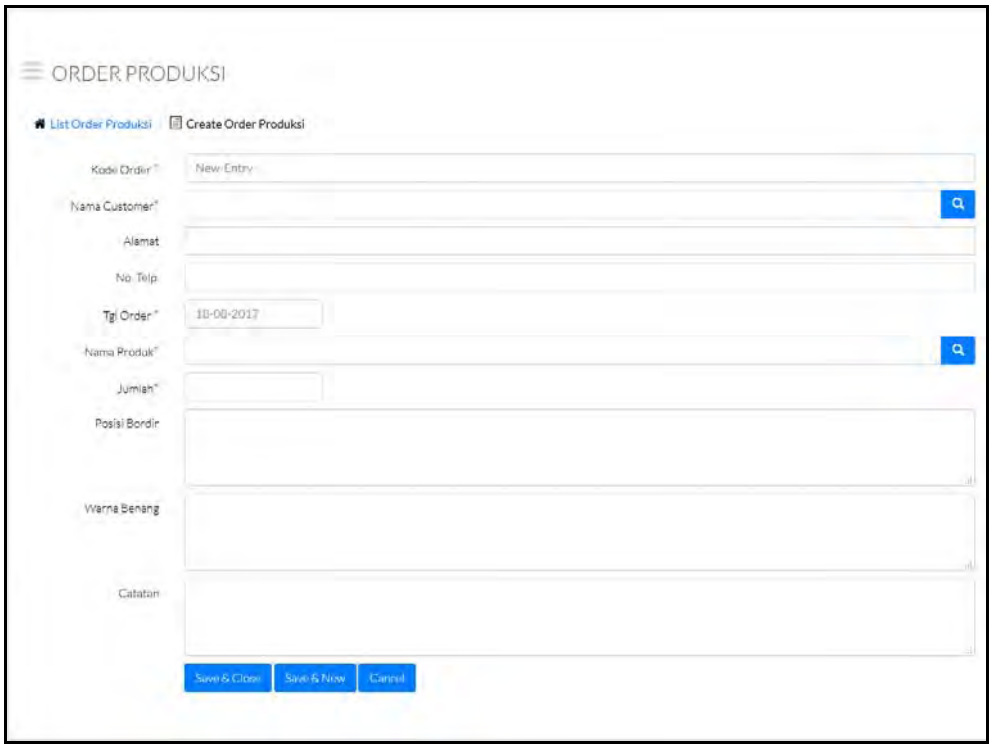


Figure 4. Input / update production data page

Testing applications using black box testing methods. Tests are done objectively involving nine testers. The scope and the test results shown in Table 1. The results show the functional outcome of applications has been running well.

ISBN : 978-602-99806-3-9

Table 1. Testing Application

Cluster Test	Test Items	Test Result
Master Data	Add data	valid
	Change data	valid
	Search data	valid
Order Produksi	Add data	valid
	Change data	valid
	Search data	valid
Sample Produk	Add data	valid
	Change data	valid
	Search data	valid
Cutting Process	Add data	valid
	Change data	valid
	Search data	valid
Embroidery Process	Add data	valid
	Change data	valid
	Search data	valid
Sewing Process	Add data	valid
	Change data	valid
	Search data	valid
Finishing Process	Add data	valid
	Change data	valid
	Search data	valid

4. Conclusion

Management Information System for Garments Manufacturing Process (SIMKonveksi) was developed by using RAD model. RAD is one of SDLC methodologies, so it consists of SDLC steps, which are requirement identification, planning, analyzing, design, and implementation. RAD model applies several iterations if needed. The programming language used to design applications is PHP with Code Igniter framework, application v using bootstrap 3, and database using MySQL DBMS. SIMKonveksi includes several modules, namely for production orders, product sampling, cutting, embroidery, sewing, and finishing. This application is tested by using black box testing method, where the results show that the application function is running well.

5. Acknowledgments

The authors would like to thank the Research and Community Service Center of the Bali State of Polytechnic, and the Ministry of Research, Technology and Higher Education, Republic of Indonesia which has provided funding for this research.

References

[1] Gregg D and Walczak 2007 Exploiting the Information Web *IEEE Transactions on System, Man, and Cybernetics* **37** p 109
[2] Aguilar F 1967 Scanning the Business Environment (New York: Macmillan)
[3] Porter M 1980 Competitive Strategy: Techniques for Analyzing Industries and Competitors (New York: The Free Press)

ISBN : 978-602-99806-3-9

[4] Glasmeier A, Fuellhart K, Feller I and Mark M 1998 The Relevance of Firm-Learning Theories to The Design and Evaluation of Manufacturing Modernization Programs *Economic Development Quarterly* **12** p 107-124

[5] Fuellhart K and Glasmeier A 2003 Acquisition, assessment and use of business information by small- and medium-sized businesses: A demand perspective Entrepreneurship Regional Development **15** p 229–252

[6] Malecki EJ and Poehling RM 1999 Extroverts and introverts: Small manufacturers and information sources *Entrepreneurship Regional Development* **11** p 247–268

[7] Alpar P and Kim M 1990 A Microeconomic Approach to The Measurement of Information Technology Value *Journal of Management Information System* **7** 2 p 55-66

[8] Mcleod R and Schell G 2007 *Management Information Systems* (New Jersey: Pearson Prentice-Hall)

[9] Watson RT 2007 *Information Systems Release 6* (University of Georgia)

[10] Jessup L and Valacich J 2008 *Information Systems Today: Managing In The Digital World* (New Jersey: Pearson Prentice Hall)

[11] Mutiawani V and Subianto M 2016 Web-based Agricultural Commodity Price Information System for Aceh Region, Indonesia *12th International Conference on Mathematics, Statistics, and Their Applications (ICMSA)* (Indonesia: Banda Aceh)

[12] Martin J 1991 *Rapid Application Development* (Indianapolis: Macmillan Publishing Company)

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

The influence of spreadsheet based modules implementation on statistics course achievement of Accounting Department students, Politeknik Negeri Bali

I Made Wijana [1], Anak Agung Putri Suardani[2]
[1,2]Accounting Department, Politeknik Negeri Bali
Jl. Kampus, Bukit Jimbaran, Badung, Bali, Indonesia

[1]madewijana@pnb.ac.id
[2]agungputrisuardani@pnb.ac.id

Abstract. This research aims to know the influence of spreadsheet based modules implementation on statistics course achievement of Accounting Departmen students, Bali State Polytechnic and to know their perceptions to implementation of spreadsheet based statistics modules. This research consists of three steps: The first step includes curriculum analysis and initial validation, the second step includes validation of material expert and limited trials implementation. At the third steps includes preparing prototype of spreadsheet based statistics modules and field trials implementation in order to investigate the influence of spreadsheet based modules implementation on statistics course achievement of Accounting Departmen students, Bali State Polytechnic and to know their perceptions of implementation of spreadsheet based statistics modules. The results of the research show that spreadsheet based modules implementation influent statistics course achievement of Accounting Departemen students, Bali State Polytechnic. Students perceptions of implementation of spreadsheet based statistics modules for overall aspects are the majority of them said good (97.7%), very good (2.3%), pretty good (0%), less good (0%), and not good (0%) or score average of 4.2, maximum score of 4.5 and minimum score of 3.5 out of 5.

1. Introduction

Statistics course is provided at almost all study program due to supporting other fields. According to Guide Line Book of Bali State Polytechnic (BSP) 2013, nine of threeteen program study programs in BSP provide Statistics course including Accounting Study Program. Statistics course supports other courses at study programs in Accounting Department BSP. Many students feel that statistics is a difficult course. They need teaching materials to help in learning statistics such as modules. Benefits of using the module proposed by some practitioners of education. According Santyasa (2009), learning using modules will be able to change the conception of the students towards scientific concepts, so their learning outcomes can be improved optimally of both quality and quantity. Rizkiawan (2014) concluded that the use of the modules have a high influence on student learning outcomes. Similarly, Ali and Ghazi (2010) found that teaching with modules more effective than traditional methods, especially for biology because students are given the opportunity to learn according to their ability level and needs.

Generally, statistics course consist of long formulas. Many students, especially students of Accounting Department find difficulty to understand and to calculate these formulas. For simplicity, we need tables to elaborate the formulas and can be easily applied to a spreadsheet program package for example MS Excel. Parker (1987) states that an electronic spreadsheet first came to public in the late 1970s when a Harvard Business School student and a programmer friend produced a microcomputer

ISBN : 978-602-99806-3-9

packed called Visical. In the begining 1980s a lot of spreadsheet software on the market such as Lotus, Symphony and others. Spreadsheet software is one of the software that strong ability in calculation based on tables. Nowadays, spreadsheet is widely used in many areas especcialy in education inclucing mathematics and statistics education. Calder (2010) mentioned that spreadsheets have given mathematicians and mathematics students a tool to extend the capacity and speed of computation. This has enabled students to better focus on the underlying mathematical ideas rather than on routine mathematical manipulation. Related to statistics education, Nash (2010) said there are some advantages of spreadsheets for teaching statistics such as: (1) Teachers can prepare templates in advance for students to follow and carry out particular computations (2). The spreadsheet calculation paradigm offers immediate updating of results when data are changed. (3) Spreadsheets are a fairly general computational tool, so they can often be "programmed" to perform nonstandard calculations. (4) Spreadsheet software now offers tools for many common statistical calculations. (5) Spreadsheets are a handy tool for data entry, editing, and manipulation prior to input to a standard statistics package for analysis.

In statistics education, spreadsheets can be used for all topics for example regresssion as described by Laviolette (1994). Martin and College (2010) are also developed tool for learning the multiple regression using spreadsheet. Futhermore, as demonstrated by Abramovich , Nikitina, and Romanenko (2010), a spreadsheet can be used as a medium for the development of three types of skills namely basic, professional, and advanced skills that are required for the STEM (science, technology, engineering, mathematics) workforce of the future. It showed how technology, in general, and a spreadsheet, in particular, can support the introduction of mathematical concepts through using basic skills in professionally-oriented computing applications.

Spreadsheets are also used to support teaching and learning in bussinees field as developed by Mays (2015). Therefore, it is necessary to develop spreadsheet-based especially for statistics course modules through this research. It is expected to be applied in the learning process in the Accounting Department of PNB as well as in other vocational colleges.

Based on the background above, then issue of concerns in this research are: (a) How does the influence of spreadsheet based modules implementation on statistics course achievement of Accounting Departemen students, Bali State Polytechnic? (b) How does Accounting Departemen students, Bali State Polytechnic's perceptions of implementation of spreadsheet based statistics modules? The purpose of this research are: (a) To know the influence of spreadsheet based modules implementation on statistics course achievement of Accounting Departemen students, Bali State Polytechnic, and (b) To Know Accounting Departemen students, Bali State Polytechnic's perceptions of implementation of spreadsheet based statistics modules.

2. Methodology

This research is conducted to develope spreadsheet based modules for Accounting Departemen students, Bali State Polytechnic involving three steps. The first step has been implemented with the results as can be seen in Wijana and Suardani (2015, pp. 173-182). In the second step, the modules are revised before validated by statistics experts. The third phase is to create prototype of a spreadsheet-based statistics modules and followed by field trials implementation in order to investigate the influence of spreadsheet based modules implementation on statistics course achievement of Accounting Department students, Bali State Polytechnic and to know their perceptions to implementation of spreadsheet based statistics modules. In this study, the population is all of second semester students of Managerial Accounting Department, Bali State Polytechnic academic year 2016/2017. The population consist of 180 students that are divided into sixt classes. Samples are taken using cluster method by taking four classes randomly. Furthermore, from each chosen classes were taken 22 student as field trials participants. So total number of sample are 88 students. Samples of the first class (44 students) are called Group I where the modules are applied while the second is called Group II (44 students), where the modules are not applied. Data collected are the results of evaluation on each module. Firstly, the data is analyzed their statistics (average value and standard deviation) of each group in each module. Furthermore, means difference between the group I and group II are tested for all modules using t test. criteria that mean of group I greater siginificantly than mean of group II if tvalue greater than tTable atau t(86,5%) =1.645.

ISBN : 978-602-99806-3-9

Perception of mahasiswa terhadap penerapan modul-modul berbasis spreadsheet di Jurusan Akuntansi Politeknik Negeri Bali is collected from group I using quitioner consisting three aspects: easier, efficiency, and independent in learning statistics. Then, the data is desribed theri mean and standar deviation.

3. Result and discussion

Field trial is conducted using seven modules and their supplements. The result for Module I entitled "Statistics Data" based on Politeknik Negeri Bali (2016, pp. 1-146) is described in Table-1a dan Table-1b.

Table-1. Distribution of Module I

Result of Field Trial Group I

Category	Interval	Group I		Group II	
		Frequency	%	Frequency	%
A	81 and greater	9	20.5	11	25
AB	76 – 80	22	50	1	2,3
B	66 – 75	4	9.1	3	6,8
BC	61 -65	1	2.3	8	18,2
C	56 – 60	0	0	13	29,5
D	41 – 55	8	18.2	8	18,2
E	40 and less	0	0	0	0
	Total	44	100	44	100

By using the revised modules, field trials was implemented. As can be seen from Table1, the results for the first module entitled "Statistics Data", group I (where the modules are applied) got average value (1 = 75.41) is greater than the average value of group II (2 = 67.39) with standard deviation of 15.3 and 2.55. Mean difference test gives a value of t= 2.55 is greater than t table or t (86,5%)=1.645. It means that the average value of group I is significantly higher than the average value of group II (where the modules are not applied).

Similar to the result of Module I, the overall result of module I to module VII can be seen in Table-2a and Table-2b.

Table-2a. Field Trial Result

Module	Group I		Group II	
	$\overline{X}_1$	s_1	$\overline{X}_2$	s_2
I	75.41	14.09	67.39	15.36
II	79.55	15.36	72.73	12.87
III	88.34	11.65	72.73	18.63
IV	79.55	15.36	69.86	11.73
V	82.07	11.12	71.66	11.80
VI	82.75	12.76	0.00	16.40
VII	77.23	15.36	68.02	13.30
Overall	80.70	8.06	70.41	8.21

ISBN : 978-602-99806-3-9

Table-2b. Field Trial Result

Module	T_{value}	T_{tablel}	Remark
I	2,55	1,65	Significant
II	2,26	1,65	Significant
III	4,71	1,65	Significant
IV	3,32	1,65	Significant
V	4,26	1,65	Significant
VI	3,91	1,65	Significant
VII	3,34	1,65	Significant
Overall	5,93	1,65	Significant

Table-2a and Table-2b show that mean of group I is greater than mean of group II for all module. Mean difference test give all value of t are greater than t table or t (86,5%)=1.645. It means that the average value of group I is significantly higher than the average value of group II (where the modules are not applied).

As can be seen from Table-2a and Table-2b, for the overall results, group I (where the modules are applied) got average value (1 = 80,70) is greater than the average value of group II (2 = 70.41) with standard deviation of 8.06 and 8.21. Mean difference test give a value of t= 5.93 is greater than t table or t (86,5%)=1.645. The overall average value of group I is significantly higher than the average value of group II (where the modules are not applied). It means that spreadsheet based modules implementation influent statistics course achievement of Accounting Departemen students, Bali State Polytechnic. The difference of group I and group II achievement is clearer showed their frequency distribution by Table- 3a , Table-3b and Figure-1 using category according to Politeknik Negeri Bali (2013, pp. 1-146).

Table-3a. Distribution of Overall Modules Result of Field Trial Group I

Category	Interval	Frequency	%
A	81 and greater	9	20.5
AB	76 – 80	22	50
B	66 – 75	4	9.1
BC	61 -65	1	2.3
C	56 – 60	0	0
D	41 – 55	8	18.2
E	40 or less	0	0
	Total	44	100

Table-3b. Distribution of Overall Modules Result of Field Trial Group II

Category	Interval	Frequency	%
A	81 and greater	9	20.5
AB	76 – 80	22	50
B	66 – 75	4	9.1
BC	61 -65	1	2.3
C	56 – 60	0	0
D	41 – 55	8	18.2
E	40 or less	0	0
	Total	44	100

ISBN : 978-602-99806-3-9

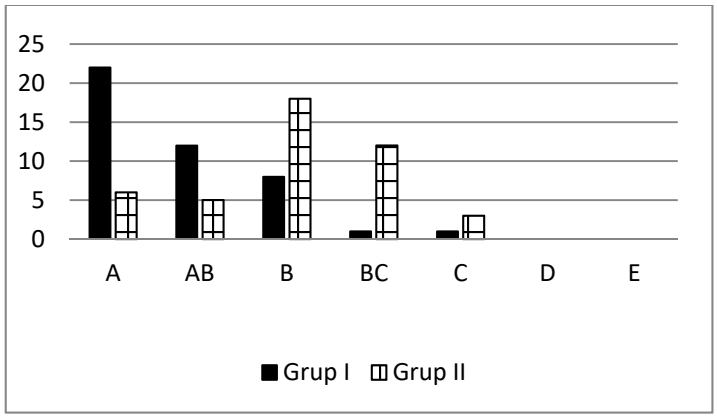


Figure-1. Distribution of Overall Modules

Furthermore, this research also investigate Accounting Departemen students' perceptions of implementation of spreadsheet based statistics modules. The results can be seen in Table-4a, Table-4b, Table-4c, and Table-4d

Table-4a. Aspect: Helps To Study Statistics

Aspect	Frequenc	%
Strongly	16	36,4
Agree	28	63,6
Quite Agree	0	0,0
Less Agree	0	0,0
Disagree	0	0,0
Total	44	100

Table-4b. Aspect: Efficient To Study Statistics

Aspect	Frequenc	%
Strongly	16	36,4
Agree	27	61,4
Quite Agree	1	2,3
Less Agree	0	0,0
Disagree	0	0,0
Total	44	100

Table-4c. Aspect: Independent To Study Statistics

Aspect	Frequenc	%
Strongly	0	0,0
Agree	41	93,2
Quite Agree	3	6,8
Less Agree	0	0,0
Disagree	0	0,0
Total	44	100

Table-4d. Aspect: Overall

Aspect	Frequenc	%
Strongly	1	2,3
Agree	43	97,7
Quite Agree	0	0,0
Less Agree	0	0,0
Disagree	0	0,0
Total	1	2,3

ISBN : 978-602-99806-3-9

Using Likert scales with the maximum score of 5, the score average of student's perceptions of implementation of spreadsheet based statistics modules for overall aspects is 4.2, maximum score of 4.5 and minimum score of 3.5 out of 5.

4. Conclusion

Based on the results achieved previously, then the conclusion can be drawn as follows: (1) spreadsheet based modules implementation influent statistics course achievement of Accounting Department students, Bali State Polytechnic, and (2) Student's perceptions of implementation of spreadsheet based statistics modules are for overall aspects the majority the said good (97.7%), very good (2.3%), pretty good (0%), less good (0%), and not good (0%) or score average of 4.2, maximum score of 4.5 and minimum score of 3.5 out of 5.

References

[1] Abramovich S, Nikitina GV, Romanenko VN. Spreadsheets and the development of skills in the STEM disciplines. Spreadsheets in Education (eJSiE). 2010 Jan **23**;3(3):5.
[2] Ali R, Ghazi SR, Khan MS, Hussain S, Faitma ZT. Effectiveness of modular teaching in biology at secondary level. Asian Social Science. 2010 Aug **18**;6(9):49.
[3] Anderson JE, Dayton JD. Instructional regression modules using XLISP-STAT. Journal of Statistics Education. 1995;3(1).
[4] Calder N. Affordances of spreadsheets in mathematical investigation: Potentialities for learning. Spreadsheets in Education (eJSiE). 2009 Oct 30;3(3):4.
[5] Juster TC. Spreadsheet Activities with Conditional Progression and Automatically Generated Feedback and Grades. Spreadsheets in Education. 2012;6(1).
[6] Laviolette M. Linear regression: The computer as a teaching tool. Journal of Statistics Education. 1994;2(2).
[7] Martin D. A Spreadsheet Tool for Learning the Multiple Regression F-test, t-tests, and Multicollinearity. Journal of Statistics Education. 2008 Nov;16(3):1-44.
[8] Mays T. Using spreadsheets to develop applied skills in a business math course: Student feedback and perceived learning. Spreadsheets in Education (eJSiE). 2015;8(3):1.
[9] Nash JC, Quon TK. Issues in teaching statistical thinking with spreadsheets. Faculty of Administration, University of Ottawa= Faculté d'administration, Université d'Ottawa; 1996 Mar.
[10] Politeknik Negeri Bali. 2016. Pedoman Pendidikan. Denpasar: Politeknik Negeri Bali.
[11] Rizkiawan, E.M. 2014. Pengaruh Penggunaan Modul TerhadapHasil Belajar Siswa Pada Kompetensi Dasar Mengidentifikasi Sistem Starter. Departemen Pendidikan Teknik Mesin. FPTK-UPI. http://repository.upi.edu/ (Accessed 14 May 2016)
[12] Santyasa, I. W. 2009. Metode Penelitian Pengembangan dan Teori Pengembangan Modul. Makalah disajikan dalam pelatihan bagi para pendidik TK, SD, SMP, SMA, dan SMK tanggal 12-14 januari 2009, di kecamatan Nusa Penida Kabupaten Klungkung.
[13] Wijana IM, Suardani AP. PENGEMBANGAN MODUL MATA KULIAH STATISTIKA BERBASIS SPREADSHEET UNTUK JURUSAN AKUNTANSI POLITEKNIK. Jurnal Teknodik. 2015 May 26;19(2):173-82.

Acknowledgment

The author would like to thank:
1. DRPM DIKTI that has funded this research.
2. Director of Bali State Polytechnic who approved this research

ISBN : 978-602-99806-3-9

Community based village management model in Blimbingsari tourism village, Melaya, Jembrana, Bali

I Nyoman Meirejeki, Luh Mei Wahyuni, Cok Istri Sri Widhari, and I Made Widiantara
Politeknik Negeri Bali, Kampus Bukit Jimbaran Badung Bali 80364

nyomanmeirejeki@pnb.ac.id

Abstract. Until the year 2018 Bali Local Government through the Tourism Department has launched that there are 100 tourist villages in Bali. Based on existing data today, there has been formed 42 tourist villages scattered throughout Bali. From the 42 tourist villages that have been formed there some of them have succeeded, and there some of them haven't been succeesfull. Actually, the tourism potency is good but the number of tourist arrivals decrease. Blimbingsari Tourism Village has long been designated as a tourist village and there have many tourists visited this village. In order this tourism village is able to be managed sustainably, it is necessary to create a good management model. Therefore, this study aimed to create a community base tourism model before the goal was reached, it would first be explored and described what were the potencies of Blimbingsari Tourism Village that could attract tourists to visit, and to describe who were visiting. This research was conducted by direct fielding, interviewing and spreading questionnaires to the tourists and focus group discussion (FGD). From the analysis of tourism potencies that the most popular tourism in Blimbingsari Village was spiritual tourism, the most visited tourists were domestic tourists, they got information from friends. The most prominent impression of tourists after visiting it : it's a beautiful and clean village. From the analysis and (FGD) conducted then later it was arranged the management model. In the model, it was formulated and agreed the task of each steak holder and the contribution derived from the management of the tourism village**.** Therefore it is expected the management has strong foundation in carrying out the tasks so that this tourism village can be managed in a sustainable manner.

1. Introduction

Bali Tourism has been known since long ago, not only by domestic tourists but by foreign tourists who visited Bali a lot. The development of such a rapid tourism unfortunately did not occur evenly throughout Bali. Tourism development has been only concentrated in southern part of Bali, while eastern Bali, northern and western Bali is still needed a touch for development. This is the challenge of the government in order that tourism cake could be enjoyed evenly throughout Bali. For the development of tourism in North Bali, east and west, of course the government should have a different concept with tourism in southern Bali. The reason is , if all the concepts are the same then the diversity as a characteristic of Bali will be lost. For that reason, the government and the Indonesia tourism development corporation (ITDC) are thinking of developing a community base tourism, one of the forms that will be developed and developed is a tourist village. This was conveyed by ITDC's vice president at Bali Post March 3, 2017. In line with the research results of the United Nations The Economic and Social Commission for Asia and the Pacific (UNESCAP, 2003) showed that some of the profits generated from the international tourism sector would return to the countries of origin of tourists. In Indonesia according to Kodhyat (2003) Indonesia's tourism was estimated to create leakage between

ISBN : 978-602-99806-3-9

50% to 80%. Leakage leaks might occur due to foreign investment in hospitality and other sectors in the tourism industry, management fees, franchise fees, technological assistance, import goods and promotional costs worldwide (Mathieson and Wall, 1990; Holden, 2008).

To provide greater benefits to the community and reduce the leakage level, the future tourism development will be promoted by building a tourism village. For the development of the tourism village of Bali through the tourism office proclaimed there are 100 tourism villages until 2018. Nuryanti (1992) defined the tourist village is a form of integration between attractions, accommodation, and supporting facilities presented in a community life structure that integrates with the ordinance and Traditions that apply. Until now in Bali there are 42 tourism villages have beeb developed. From all the tourism villages have been developed, there some growing and there are also tourism villages that haven;t developed where the number of guests who visit only slightly. Observations generally showed that villagers still have difficulty in managing so many types of businesses and so complicated of the works of newly acquired hospitality. After all, managing a tourism business is not as easy as managing a farm. The society which has been accustomed to agrarian life can not simply switch professions as tourism service providers, because these two areas have very different characteristics.

Blimbingsari Village is one of the tourism villages in western Bali precisely in Melaya district Jembrana regency, about 120 Km from the city of Denpasar, including the village visited by a lot of tourists at the moment.. Blimbingsari Tourism Village can be developed until now of course there is a cause, there is a potency that has attracted tourists to visit even live in this village. In order that this tourism village can continue to grow, it needs to have good management, therefore the involvement of each stake holder needs to be formulated clearly so that the management that has been running can be sustainable.

Based on the description can be formulated the purpose of this research is to create a model of village-based tourism management and to describe the tourism potencies of Blimbingsari Tourism Village and the characteristics of tourists who visit it. With the existence of a good management model is expected the tourists who visit this tourism village is increasing, the welfare of the community is increasing, for the future that this model can be followed by other tourism villages.

2. Method

The necessary data will be collected by plunging directly into the field, interviewing with tourism managers and community leaders, distributing questionnaires to tourists and conducting FGDs whose participants are community representatives, tourism managers, home stay representatives, representatives of culinary managers .

After the required data is obtained, it will be analyzed with qualitative descriptive analysis starting from pre coding, coding, categorization, tabulation and description creation. Furthermore, the data presented in the description, drawings, or tables in the model making will be done together with community leaders by conducting FGD.

3. Discussion

From the analysis conducted obtained the results that Blimbingsari tourism village has a variety of potencies that have been packaged into tourism products such as:

1 Spiritual Tour

Blimbingsari village with its church and congregation are often visited by tourists, from various regions even from abroad, because of the uniqueness of worship couldn't be found in other areas, called Contextual Worshiping. Tourists who come can participate in worshiping together with the community. Worshiping is usually done every first week in the beginning of the month, people who are worshiping by wearing traditional clothing, music that played is traditional music (gambelan) and language preface is Balinese language, songs played by using Balinese language and interspersed with Indonesian or English so all people who join the worshiping Understand. After having lunch will be continued by giving explanation about the history of Blimbingsari Village or Church

This sharing package is quite popular for tourists considering the history of the village and church could not be separated in addition to the history of the village and this church is a unique history, which tells

ISBN : 978-602-99806-3-9

about how the struggle and grief of the predecessors and founders of the village and church or Blimbingsari congregation, In this case walking from several areas in Denpasar / Badung to choose this area which used to be the dense forest to be their residence. Sharing about the history of the village or church can be led by a pastor or it could be by a tourism manager.

2. The Cultural Arts Tourim

This cultural art tourism is about the uniqueness and uniqueness of culture, can be in the form art, ceremony and art work of the village community. For example Blimbingsari Village Community has jegog group / Sekehe jegog and also gambelan group / sekehe gambelan. Gambelan is usually used to accompany worshiping on the first Sunday of each month while jegog is often used to entertain guests / tourists who come, and tourists can enjoy dance and besides that they can also engage in these activities by dancing or ngibing accompanying jogged dancing. Other activities that can be followed by tourists are learning to dance, learning to beat, making traditional food such as Sate Lilit and making penjor.

3. Nature Tourism and Environmental Maintenance

In SK. MENPARPOSTEL No .: KM. 98 / PW.102 / MPPT-87, Tourism Object is any place or natural state that has tourism resources built and developed so it has an attraction and cultivated as a place visited by tourists. Blimbingsari village is a village near the forest, most of its people occupation as farmers in particular gardening, the land they have planted coconut, banana, chocolate and other plants thus the village becomes very green.

Many tourists who come to Blimbingsari want to witness its beautiful nature, the green trees arranging a neat house. To be more enjoyable of the green village Blimbingsari tourists can choose activities that blend with nature in the form of trekking activities. There are three trekking tracks available to tourists, they can choose according to the time available or according to their ability, 2 hours, 3 hours and 6 hours. In addition to trekking tourists can also choose other activities such as:

A. Tracking Bird Watching,
B. Bali Starling Conservation.
C. Tree planting.
D. Various trees and historic springs

4. Agro Tourism and Home Industry

In agro tourism at the village of Blimbingsari, there are some activities that tourists can do, such as picking and processing of chocolate fruit, feeding cattle, copra industry, brown sugar and liquid smoke making.

5. Educational and Special Interest Tourism

The special interest tourism programs that tourists can choose during their holiday in Blimbingsari village including : Live in Program, Camping, Balinese Dance and gambelan training

Tourists Characteristics visited Blimbingsari Tourism Village

For explaining the characteristics of tourists visiting Blimbingsari Village will be seen from several things: gender, age, country of origin, destination of arrival, source of information, frequency of arrival and their impression to the village after their visit. From the results of the research, the data were obtained as follows: tourists who visited Blimbingsari Village Most of the men (64%), from age group, were aged 20 to 49 years, 78% The most visitors come from Indonesia that is as much as 74%, tourists come to Blimbingsari Tourism Village mostly is to do spiritual tourism 48%, the source of information means is from where the tourists get information about Blimbingsari Village from the research results obtained 54% of tourists Obtain information from their friends. Based on the results of research conducted the most is the number of tourists who visited just once as much as 78%, no tourists who give the impression is not good, all of them have very good impression, some say beautiful, clean, fertile and unique . Most impressions are the beautiful Blimbingsari Village Tourism: 46% and clean : 42%

Management Model of Blimbingsari Tourism Village

ISBN : 978-602-99806-3-9

Until this research has been conducted Blimbingsari tourism village does not have clear management model, thus the manager does not have clear guidance in doing his duty. If it happens continues, it will have an unfavorable impact on subsequent developments. By conducting FGDs together with community leaders, finally it is agreed on the model of Blimbingsari village tourism management as follows

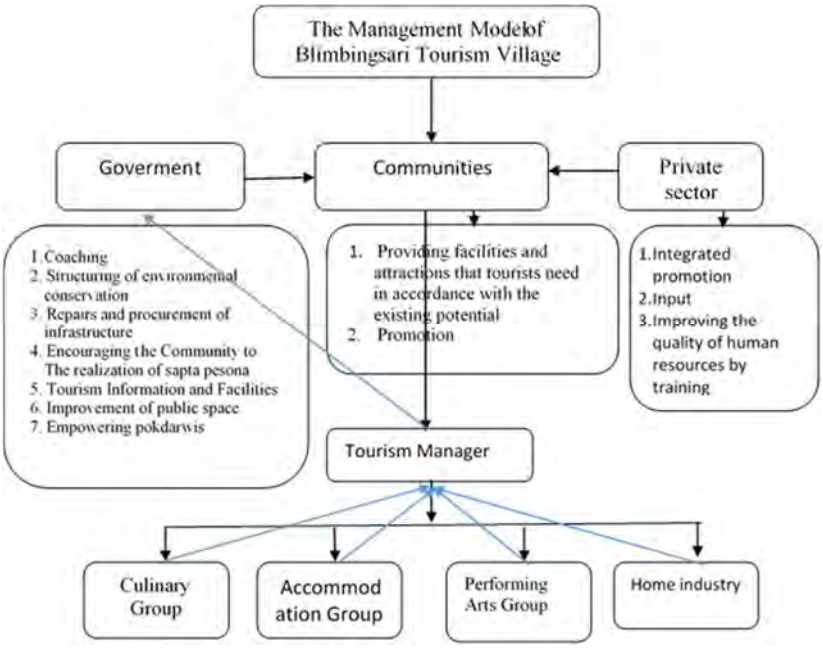


Figure 1. The Management Model of Blimbingsari Tourism Village

The most frequent problems in the management of tourism destination or tourism village is how and how much they get the contribution of the role they do, if all feel clear and fair of course does not happen the problem, if the opposite happens this will result in less good and if it is not soon found the way out, it will have bad impact on the management, the image of the tourist village, if this happens is not impossible that the tourist village just stay name.

Blimbingsari Tourism Village is very aware of it, because it was during FGD done. Witnessed by heads of villages, BPDs, tourism managers, Customs, community leaders, representatives of homestay owners and industry representatives (culinary) together discuss and agree on the contributions of each stakeholder to the home stay owner, the manager , Government, culinary, home industry and church.

4. Conclussion

Based on the results of the analysis of data collected it can be concluded that

1. Tourism potency that attracts tourists to visit Blimbingsari Tourism Village is spiritual tourism in the form of religious worshiping, cultural tourism such as jegog with joged, gambelan to accompany song during worshiping, nature tourism can see the beauty of the village by doing trecking or just a walk in the morning, bird watching like jalak bali, agro tourism and home industry.
2. Characteristics of tourists visiting Blimbingsari Village, and most them are domestic tourists 74%, the purpose of arrival is to participate in spiritual worshiping or spiritual tourism 48%, tourists get information from friends 54% and 32% of church, arrival frequency one Time visit : 78%, more than once: 22% of tourists impression after visiting almost no one has bad impression 46% have beautiful impression, 42% cleaner and the rest is unique and fertile.
3. Village management model of Blimbingsari tourism has been agreed together with their respective duties and contributions, and village government and management will soon be socialized the model and after that it will be implemented soon.

ISBN : 978-602-99806-3-9

Reference

Anstrand, Melker, 2006, Community-Based Tourism and Sicio-Culture Aspects Relating to Tourism a Case Study of a Swedish Student Excursion to Babati (Tanzania). Laporan, Tidak diterbit-kan.

Damanik. H. **Kodhyat**, (1983), Sejarah Pariwisata dan Perkembangannya di Indonesia, Gramedia ... No.3/November **2003**

Demartoto, Argyo, 2009, Pembangunan Pariwisata Berbasis Masyarakat, Surakarta: Sebelas Maret University Press

Fandeli.C (2002) Perencanaan Kepariwisataan Alam, Fakultas Kehutanan Universitas Gajahmada, Bulaksumur, Yogyakarta.

Hatton, Michael J., 1999, Community Based Tourism in the Asia-Pacific, Canada: School of Media Studies a at Humber College.

Irawan, Koko. 2010. Potensi Obyek Wisata Sebagai Daya Tarik Wisata. Yogyakarta: Kertas Karya

Kementerian Kebudayaan dan Pariwisata Republik Indonesia. 2011. Buku Kearifan Lokal di Tengah Modernisasi. Pusat Penelitian dan Pengembangan Kebudayaan Badan Pengembangan Sumber Daya Kebudayaan dan Pariwisata Kementerian Kebudayaan dan Pariwisata Republik Indonesia. Jakarta [diaksess 25 November 2013

Kusumaningrum, Dian. (2009) Persepsi Wisatawan Nusantara Terhadap Dayatarik Wisata di Kota Palebang Tesis PS. Magister Kajian Pariwisata: Universitas Gajah Mada.

Nasikun (2000) Globalisasi dan Paradigma Baru Pembangunan Pariwisata Berbasis Komunitas. Pengusahaan Ekowisata.Chafid Fandeli, ed. Fakultas Kehutanan. Yogyakarta: Universitas Gadjah Mada

Nicolau J.L., Más FJ (2005) Heckit modeling of tourist expenditure: evidence from Spain, International Journal of Service Industry Management 16(3), p.271-293 http://www.emerald-library. com/ft diakses 27 Mei 2011

Nuryanti, W. 1999. Heritage, Tourism and Local Communities, Yogyakarta: UGM Press

Pantin, D. and Francis, J., 2005, Community Based Sustainable Tourism, UWISEDU

Pitana, I Gede dan Gayatri, Putu G. 2005. Sosiologi Pariwisata. Penerbit Andi. Yogyakarta

Priasukmana Soetarso & R.Mohamad Mulyadi (2001) Pembangunan Desa Wisata : Pelaksanan Undang undang otonomi daerah. Info Sosial Ekonomi Vol.2 No.1

Sinaga, Supriono. 2010. Potensi dan Pengembangan Objek Wisata Di Kabupaten Tapanuli Tengah. Kertas Karya. Program DIII Pariwisata. Universitas Sumatera Utara

Suansri, Potjana, 2003, Community Based Tourism Handbook, Thailand: REST Project

UNEP and WTO. 2005. Making Tourism More Sustainable. United Nations Environment Programme and World Tourism Organization

United Nations Economic and Social Commission for Asia and the Pacific,UNESCAP, 2003, Poverty Alleviation Through Sustainable TourismDevelopment: 7 dalam http:// books. google.co.id, diakses 12 Juli 2011

UU No. 9 Tahun 1990 tentang kepariwisataan

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

Formulation of creative tourism products in the area nature tourism Pandawa beach Badung Bali

I Dewa Gede Ari Pemayun, Luh Linna Sagitarini, and A. Agung Putu Swabawa
Politeknik Negeri Bali, Bukit Jimbaran Campus Badung Bali 80364

aripemayun@yahoo.com

Abstract. This research was conducted in coastal resort area of Pandawa village of Kutuh, sub-district of Southern Kuta Badung. The goal was to identify the potential of Pandawa coastal area that could be developed into tourism products either became the object or became the media of various tourist attractions and to know the perception of tourists to the natural conditions, the socio-cultural conditions, and the condition of tourism infrastructure of Pandawa beach. Data collection waere conducted by using survey method, questioner, interview, documentation, and literature study. Analytical tool used to analyze data was quantitative analysis in the form of descriptive statistic with the help of Likert scale, and using qualitative analysis technique in the form of descriptive analysis From the analysis results showed that there were five identifiable natural potentials at Pandawa beach which could be developed into tourist attractions and those tourist attractions, namely: towering limestone cliffs, white sandy beaches, Seaweed, clear blue sea, and Coral Garden. From the socio-cultural aspect, there were the socio-cultural potential various types of regional arts and customs, including: traditional dances and dance performances in the form of Ramayana Ballet which were performed regularly during ceremonies at Desa temple, Puseh temple, and Dalem temple, Cremation ceremony which had their own charms could be witnessed by tourists, and mutual work system was still thick. There were cultural objects in the form of temples with Balinese buildings styles with their own ornaments. There were also statues of Dewi Kunti and Panca Pandawa on the cliffs along the road to the Pandawa beach. While the perception of tourists to the natural conditions of Pendawa beach, socio-cultural, infrastructure, and the existence of tourism facilities showed that the perceptions of both foreign and domestic tourists to tourism Pandawa beach products got an average score of 3.07 for domestic tourists and 2.90 for foreign tourists so both were in good conditions. From the four components of tourism products assessed, the best value was the condition of the natural environment with a score of 3.23 for domestic tourists and 3.19 for foreign tourists, while the lowest score was the existing tourism facilities in Pandawa beach with a score of 2.97 For domestic tourists, while for foreign tourists the lowest score was public infrastructure with score of 2.30, it,s including less category. Nevertheless, if it's sought by the average perception of tourists to the components of Pandawa Beach tourism products, they were still including good catagory.

1. Introduction

Pandawa Beach is one of the tourist areas in Kutuh Village, located approximately 3 km from the Nusa Dua Tourism area and Uluwatu Temple. The location of this beach is hidden behind a row of rocky hills only overgrown with bushes, but the government of Badung regency has realized the tourism potential of Pandawa beach. And starting in 2002 began to be made road access to Pendawa Beach and data collection, so it,s easy tobe passed by the vehicle and can attract visitors.

In December of 2012 Pandawa Beach was officially opened which started with the Pendawa Beach festival. The potentials owned are: beach scenery with clean white sand, and calm waves, free from

ISBN : 978-602-99806-3-9

pollution and merchant merchants so that tourists can do marine tourism activities freely. Many emerging food stalls selling fried rice, fried noodles, grilled sea fish and some western food. The food stalls provide sun loungers with umbrellas which can be rented. With the development made by the Badung Regency, Kutuh Village and Pendawa Beach Management Agency, produced results that could be seen from the more and more of tourist visits level. Where the level of tourist visits both foreign and domestic tourists from February 2013 to January 2014 were quite fluctuatively where in April, July , September and October decreased, but overall increased by 26.59% for domestic tourists and 34.37% for foreign tourists. For twelve months from February 2013 to January 2014, the average monthly rate of 32,760 persons for domestic travelers and 4,603 for international travelers.

Pendawa Beach has a strategic location, if it's connected with 4A concept, ie distance and travel time to destinations measured from the airport "accesable" from Ngurah Rai airport Tuban and hotel in southern Badung. The tourist attraction of "attractions", Pendawa beach has the potential for marine tourism attractions and paragliding, the existence of supporting tourism facilities "amenities, which is currently still revamping and the existence of tourism agency" ancillary "that is the governing body of Pendawa beach. Building tourism in Pandawa Beach means agreeing to also build tourist attraction, it's "attractions" especially tourist attraction man-made, meanwhile for natural and cultural appeal is only required arrangement and packaging. Because the distance and travel time to the "accesable" destination close to Ngurah Rai Airport will eventually encourage the government to build a proper highway for tourist transport to Pandawa Beach, which is currently the working of the road to Pandawa Beach has been begun, while the facilities supporting tourism "amenities "Such as hotels, inns, restaurants have also been started to be prepared.

With the number of tourist visits to Pandawa Beach, the issuance letter of the Joint Decree of the head of Kutuh village and Bendesa Adat (the head custom) of Kutuh villge Kutuh Number 01 Year 2013 on the Improvement of the Formation of Kutuh Beach Regulation Team (KBRT) which regulates the arrangement of Kutuh Beach area covering Pandawa Beach, Timbis Beach and And Gunung Payung beach. Specifically, the establishment of the Kutuh Beach Regulatory Body Team establishes the rights, obligations and authorities that include: 1) Obligations consisting of: a) carrying out data collection and mapping of the potentials in the coastal area of kutuh, b) creating master plan and detailed plan, c) To formulate work programs, grouping activities and carry out physical activities in accordance with the needs of the field referring to Rpjm-Desa 2010-2015, d) undertake structuring, supervision and guidance on activities caused by communities or groups in the coastal area of Pandawa in accordance with authority constraints , e) carrying out the management of income sources in relation to existing activities, as long as the absence of a specific management body has been established; f) recruiting required personnel in accordance with existing financial needs and conditions; g) reporting the tasks to the bundle and Bendesa each Month, 2) Right consisting of: a) can manage fund operational which includes the costs of structuring, technical operational costs and other operational costs derived from the results of the management of the beach area or any other source of income provided by the Kutuh Custom Village and Village government and third party assistance in accordance with the provisions given by the village head and Bendesa Adat Ie, b) the operational funds mentioned in letter a above in the allocation may be further stipulated by the PKPK Team, 3) the authority consisting of: a) to improve the management of the PKPK Team to cooperate with the village authorities or other parties by first coordinating with Perbekel Kutuh and Bendesa Adat Kutuh, b) seeks other sources of income to sustain the organizing and operational costs of the PKPK Team.

As a new tourism destination, the Kutuh Coastal Regulation Team together with the village government of Dinas, Desa Adat Kutuh together with the Badung Regional Government started to organize the Pendawa beach in hopes of becoming the object and attractive attraction even becoming a new paradise on the Island of the Gods. However, in order for the arrangement and development in accordance with market demand, its development is directed, in line with the meaning of Sapta Pesona which has been stipulated by the Decree of Minister of Tourism, Post and Telecommunication Number: KM.5 / UM.209 / MPPT-89 which can create a sense of security, Order, Hygiene, Coolness, Beauty, Friendliness, and Memories that will be expected to become the leading tourist destination and sustainable. For that reason it is necessary to be explored potential owned, find the input to the perpetrators of tourism, academics and tourists to compiled blueprint creative tourism product

ISBN : 978-602-99806-3-9

development in Pendawa Beach. Based on this matter can be formulated special purpose of this research is To Describe the potential and attraction of existing tourism at coast of Pandawa and to know perception of tourists to tourism product that is available at Pandawa
beach

2. Research Methods

The number of samples taken as many as 5 times the number of variables in accordance with that proposed by Malholtra, (in Widayat 2004: 27) so the number of samples 5 x 20 = 100 tourists. The technique used is Accidental Sampling (Suharsimi Arikunto, 2015

Data were collected by survey method, questionnaires, and interviews with both managers and travelers. The data were analyzed by quantitative analysis technique, that was, analytical technique to analyze quantitative data by using descriptive statistics used to measure the nature, opinion and perception of a person or group about social phenomenon (Umar, 2005: 69). And descriptive analysis techniques to identify the potential of coastal tourism attractions Pendawa, as well as the physical condition of facilities and infrastructure, natural potential, culture and attractions that exist.

3. Discussion

The Potency and Attraction of Pandawa Beach. Pandawa Beach has a variety of potencies that can be developed into tourist objects and attractions as well as a medium to conduct tourist attractions, which include: 1) The limestone cliffs towering on the edge of the Pandawa beach is a very interesting scenery, so this potency can be a natural tourist attraction. 2) The white sandy beach that stretches for 2 Km in Pandawa beach area which is adorned with yellowish white sand and fascinating, is the attraction for tourists visiting Pandawa beach. Beach with yellowish white sand gives a very cheerful nuance, so it is very potential to be developed some attractions and tourist business, which are: the para sailling and tourism business in the form of: leasing long chair, beach umbrella and traditional massage. 3) Seaweed, where before the Pandawa beach had been opened , ie in 2012, community efforts in the village of Kutuh mostly as fishermen and seaweed-powered. Seaweed cultivated in the sea Melasti (before being named Pandawa Beach) was a source of income from the community in the village of Kutuh. Where the seaweed produced was sold to the beverage and rujak traders, some of them were exported. The seaweed produced is potentially developed into a variety of snacks or cakes and a variety of beverages that can be packed into souvenirs for tourists who visit the Pandawa, beach or can be enjoyed directly at the time of visit. Seaweed cultivation can serve as an agro tourism attraction that can be enjoyed by tourists, ranging from planting, maintenance, harvesting, and processing of seaweed. 4) Clear blue sea, where the sea view Pandawa beach is calm and friendly with a wave that is not so big that spoil the eye, especially in the afternoon with the amazing sun set. The sea potency in Pandawa beach is very potential to be developed for some tourism products, which include various businesses that include: canoe rental, fishing boat rental, and surfing which are tourist attractions of the sea. 5) Coral Garden is virgin, where for the future potential coral reefs on the Pandawa beach is very strategic to be developed into objects and attractions diving and snorkeling, considering that the location of Pandawa beach is very close to the popular tourist area, closed to Nusa Dua area and Kuta tourist area.

For the potential of social culture which is the potency that existed in the life of the community of Kutuh village in the form of various types of regional arts and customs. Where the people still preserve the traditional dance and dance performances in the form of Ramayana Ballet which is regularly performed during ceremony at Pura Kahyangan Tiga (Desa temple, Puseh Temple, and Dalem Temple) in Kutuh Village. This dance is also often performed at the Pandawa beach stage along with kecak dance and barong dance. There are also customs in the form of traditional ceremonies and traditions in the form of cremation ceremonies that have a special attraction that can be witnessed by tourists and the system of mutual aid that is still sustainable. Likewise there are cultural objects in the form of a temple with Balinese buildings styles with ornaments and there are statues of Dewi Kunti and Panca Pandawa on the cliff along the road to the Pandawa beach. At the Pandawa beach there is also a beach area that is sanctified by local people. There are at least six sanctified areas in this area, namely cupid stone area, melasti ceremony, Dalem temple, drinking water wells of villagers, sawan wela, and sawan sambang.

ISBN : 978-602-99806-3-9

As for the potential human resources that exist in Kutuh village **,** where people who are old who originally a**s** fishermen and seaweed farmers, now most of the profession switch as an entrepreneur of the providers of tourism facilities. Where they are all empowered in the development of Pandawa Beach attractions. Their efforts include leasing canoes, loungers, fishing boats, traditional fishing gear, selling souvenirs, and culinary (food and beverage) businesses. All businesses that provide tourism products that are a means of tourism are done by the local community of Kutuh village under the arrangement of management of Pandawa Beach attractions. While the young generation is still largely educational, so it is very potential for the development of Pandawa beach effectively in the future become a popular tourist attraction. Especially from those who still take education, most take the field of tourism studies.

For the potential of social culture which is the potency that existed in the life of the community of Kutuh village in the form of various types of regional arts and customs. Where the people still preserve the traditional dance and dance performances in the form of Ramayana Ballet which are rgularly performed during ceremony at Pura Kahyangan Tiga (Pura Desa, Puseh Temple, and Dalem Temple) in Kutuh Village. This dance is also often performed at the Pandawa beach stage along with kecak dance and barong dance. There are also customs in the form of traditional ceremonies and traditions in the form of cremation ceremonies that have a special attraction that can be witnessed by tourists and the system of mutual aid that is still sustainable. Likewise there are cultural objects in the form of a temple with Balinese buildings styles with ornaments and there are statues of Dewi Kunti and Panca Pandawa on the cliff along the road to the Pandawa beach. At the pandavas beach there is also a beach area that is sanctified by local people. There are at least six sanctified areas in this area, namely cupid stone area, melasti ceremony, temple dalem, drinking water wells of villagers, sawan wela, and sawan sambang.

As for the potential human resources that exist in Kutuh village, where people who are old who originally as fishermen and seaweed farmers, now most of the profession switch as an entrepreneur of the providers of tourism facilities. Where they are all empowered in the development of Pandawa Beach attractions. Their efforts include leasing canoes, loungers, fishing boats, traditional fishing gear, selling souvenirs, and culinary (food and beverage) businesses. All businesses that provide tourism products that are means of tourism are done by the local community of Kutuh village under the arrangement of management of Pandawa Beach attractions. While the young generation is still largely educational, so it is very potential for the development of Pandawa beach effectively in the future become a popular tourist attraction. Especially from those who still take education, most take the field of tourism studies.

Tourist Perception Against Pandawa Beach

To know the perception of tourists to tourism products contained in the beach Pandawa used range of values in various categories as the basis of assessment. Where the perception of tourists to tourism products contained in Pandawa beach include the perception of tourists to the condition of the natural environment, social culture, public infrastructure, and tourism facilities that are components of tourism products. The range of values used were as follows:

Table 1. Perception Assessment Range

Value	Criteria Range	Criteria
4	3,26 – 4,00	Very good
3	2,51 – 3,25	Good
2	1,76 – 2,50	Enough
1	1,00 – 1,75	Less

Based on the research results obtained by the assessment of the natural environment, socio-cultural conditions, public infrastructure, and tourism facilities such as the following table

Table 2. Condition of Pandawa Beach Tourism Object

ISBN : 978-602-99806-3-9

No.	Component of tourist product	Condition of perception results					
		Domes	Expl.	foreign	Expl.	Mean	Expl.
1	Nature	3.23	Good	3.14	Good	3.19	Good
2	Social culture	3.04	Good	3.04	Good	3.04	Good
3	Public infrastructure	3.05	Good	2.3	Less	2.68	Good
4	Tourism facilities	2.97	Good	3.1	Good	3.04	Good
Total Average		3.07	Good	2.9	Good	2.99	Good

From the table above showed that the perception of both foreign and domestic tourists to tourism products Pandawa Beach got an average score of 3.07 for domestic tourists and 2.90 for foreign tourists so both were in good condition. Of the four components of tourism products assessed, the best value was the condition of the natural environment with a score of 3.23 for domestic tourists and 3.19 for foreign tourists, while the lowest score was the existing tourism facilities in Pandawa beach with a score of 2.97 For domestic tourists, while for foreign tourists the lowest score was public infrastructure with a score of 2.30 including less category. Nevertheless, if sought by the average perception of tourists to the components of Pandawa Beach tourism products including good, was still included in the good category.

4. Conclusions and Suggestions

Based on the results of the analysis that has been done can be drawn some conclusions as follows :

1. Potency and attraction in Pandawa Beach that can be developed into objects and attractions or tourism products, including: towering lime stone cliffs, white sandy beaches, seaweed, clear blue sea, coral garden (coral garden)
2. The perception of tourism to the natural condition of Pandawa beach as a whole in good category, to the overall socio-cultural condition related to the Pandawa coast in good category, to the general infrastructure that exist in the good category, but the perception of foreign tourists in the category enough to get attention Management Pandawa beach, to the existing tourism facilities on the Pandawa beach in good category
3. Strategies that need to be done for the development of Pandawa beach as a popular tourist attraction in the future are: arranging the natural environment in Pandawa beach, preserving existing customs and increasing the creation of art and culture, increasing capacity, quantity and quality of public infrastructure on the Pandawa beach, increasing the number and quality of tourism facilities operating in the coastal area of Pandawa and improving environmental management and management of Pandawa's coastal operations based on professionalism

Given the potency that has not been utilized optimally, especially the coral reefs, it is advisable to make a feasibility study on the development of coral reefs as objects and attractions leading attractions that can be offered to tourists. In addition to the perception of foreign tourists on the condition of public infrastructure is still lacking, it is recommended to increase the capacity, quantity and quality of public infrastructure and need to improve services related to information required by tourists.

Reference

Adisasmita, R. 2008. Concepts and Theory of Regional Development. Graha Ilmu, Yogyakarta.

Alavalapati, R Janalni R. 2000. Tourisn Impact Modeling For Resource Extraction Regions, Annals of Tourism Research, Vol. 1, 188-207.

Arsyad, L. 2005. Introduction to Regional Economic Development Planning. BPFE. Yogyakarta.

Bangun, M. 2004. Coastal Area Based Fishery Coastal Development Secanggang District Langkat Regency. Thesis. University of Northern Sumatra. Field

Bakkara, RianaUWK and Sunantri, Yudy. 2012. Analysis of Tourism Potential Bahari Through CBT (Community BasedTourism) Approach in Tanjung Tanjung Utama. International UniversityBatam.

ISBN : 978-602-99806-3-9

Bull, Adrian, 1991. The Economics of Travel and Tourism, First published, Longman Cheshire Pty Limited, Melbourne Australia

Denis L Foster, 2000. Fist Class An Introduction to Travel & Tourism, Second Edition, Jakarta: Pt. Raja Grafindo.

Erli. 2006. Development of Singkawang City Coastal Area: A Regional Marketing Approach. Thesis. ITS. Surabaya

Gunn, Clare A., (2002). Tourism Planning: Basics, Concepts, Cases, Taylor and Francis Books, Inc., New York.

Keraf, 2000. Cultural Dimensions of Coastal Ecology in Marine Tourism Development. Naskah Seminar, Denpasar Cultural Studies Udayana University

Kusmayadi & Endar Sugiarto, 2000. Research Methodology In The Field Of Tourism, PT Gramedia Pustaka Utama, Jakarta

Machtucha. 2005. "Strategy of Marine Tourism Object Development Coastal Area Kenjeran in Surabaya". Denpasar: Udayana University

Marpaung, Happy, 2002. Tourism Knowledge. Alpabeta, Bandung

Murdana. 2010. Tourism Development of Gili Trawangan Island Ecowosata-Based Marine. (Tersis Magister Program in Tourism). Denpasar: Udayana University

Nurif, M. 2006. *Strategi Pengembangan Kawasan Parawisata Dengan Pendekatan Marketing Places (Studi Kasus Pengembangan Parawisata Lamongan)*. Tesis. ITS. Surabaya.

Nuryanti, Wiendu. 1993. Concept, Perspective and Challenges, makalah bagian dari Laporan Konferensi Internasional mengenai Pariwisata Budaya. Yogyakarta: Gadjah Mada University Press. Hal. 2-3). di unduh tanggal 17 Juli 2012 pada http://depokrejo.com/artikel/ read/desa_wisata/

Peter Mason, 2003. *Tuirism Impacts, Planning and Managenent,* P Elsevier Butterworth-Heinemann Linancre House, Burlington

Pendit, S Nyoman, 2002. *Ilmu Pariwisata Sebuang Pengantar Perdana*, PT Pradnya Paramita, Jakarta

Pitana, I Gde, Gayatri Putu G, 2005. *Sosiologi Pariwisata.*Andi Offset, Yogyakarta

Pitana, I Gde. 2005. *Sosiologi Pariwisata, Kajian sosiologis terhadap struktur, sistem, dan dampak-dampak pariwisata.* Andi Offset,Yogyakarta

Rangkuti, Fredy, 2004. *Analisis SWOT Membedah Kasus Bisnis,* Gramedia, Jakarta

Robert Christie Mill, 2000. *Tourism The International Business, Edisi Bahasa Indonesia*, Pt. Rajagrafindo Persada, Jakarta

Saaty, Thomas L. *2008.* Decision making with the analytic hierarchy process : *Int. J. Services Sciences, Vol. 1, No. 1,*

Sapta Nirwandar 2011. Pembangunan Sektor Pariwisata: Di Era Otonomi Daerah, di unduh pada 21 Maret 2011 pada http://www.scribd.com/doc/35092726/440-1257-PembangunanSektor Pariwisata1

Siti N. 2001. Rencana Pengembangan Fisik Kawasan Wisata Bahari di Wilayah Pesisir Indonesia. Bulettin Taman Dan Lanskap Indonesia. Perencanaan, Perancangan dan Pengelolaan Volume 3, Nomor 2, 2000. Studio Arsitektur PertamananFakultas Pertanian IPB Bogor

Tarigan, R. 2008. *Perencanaan Pembangunan Wilayah*. PT. Bumi Aksara. Jakarta.

Theobald ,William F, 2004. *Gobal Tourism Third Edition*, Elsier, Burlington

undang-undang No 10 Tahun 2009 tentang Kepariwisataan

WoinarskiLisa. 2006. Pulau Serangan : Dampak Pembangunan pada Lingkungan dan Masyarakat. Universitas Muhammadyah Malang. Kerja sama dengan Australian Consortium For In-Country Indonesian Studies.

Wirawan S. 2009. Pengembangan Objek Wisata Bahari Yang Berkelanjutan di Nusa Lembongan Kabupaten Klungkung. (Tersis Program Magister Pariwisata). Denpasar: Universitas Udayana.

Wiranatha A.S, Satriawan K, Antara M, Pjaasatawa IB. G, Raka Dalam A.A.G, Sudiarta K. 2010. Perencanaan Pengembangan Pariwisata Bahari Berkelanjutan di Kawasan Nusa Penida.

www.kompasiana.com/.../(55 …23 Mei 2014), potensi-pantai-pandawa-di-desa-kutuh-kab-badung-bali_

ISBN : 978-602-99806-3-9

Proceeding International Joint Conference on Science and Technology (IJCST) 2017
ISBN : 978-602-99806-3-9

Development of Evaluation Instrument Context, Input, Process, Product (CIPP) Learning Program in Politeknik Negeri Bali Environment

I Nyoman Gunung[1], I Ketut Darma[2]
[1]Chief researcher - Kampus Politeknik Negeri Bali, Bukit Jimbaran, P.O. Box. 80364 Kuta Selatan, Tuban Badung Bali Telp. (0361) 701981 Fax. 701128. Email: poltek@pnb.ac.id
[2] Members of the researcher- Kampus Politeknik Negeri Bali, Bukit Jimbaran, P.O. Box. 80364 Kuta Selatan, Tuban Badung Bali Telp. (0361) 701981 Fax. 701128.

imangunung@yahoo.co.id

Abstract. The study aimed to get valid and reliable CIPP model program evaluation instrument to measure effectiveness level of learning implementation in Politeknik Negeri Bali, in terms of component: context, Input, Process, and product. This study is a research and development (R & D) using nine from 10 steps Borg and Gall models. The evaluation model used is the Stufflebeam evaluation model CIPP. Data were collected using questionnaires, interviews, observations, and document studies. Number of questionnaire test subjects for 45 students, 20 lecturer questionnaires, questionnaire for Head of Study program 4 peoples, and admin questionnaire 6 peoples. The validity of the contents of the instrument is determined using the Aiken's suggested (V) agreement index, involving 5 validators. Item instrument validity was analyzed by using bivariate correlation between each score indicator with total score, instrument reliability was analyzed *formula alfa cronbach* formula using SPSS 23.00 for windows. The results showed: content validity using expert judgement with Aiken's index coefficient for 0.78 mean input component is classified as very good and feasible to use, the coefficient for average context component of 0.79 classification is very good and feasible to use, and for flat process components 0.76 classification is very good and feasible to use. The grain validity of all instrument grains has a correlation coefficient $r > 0.232$ and satisfies the reliability coefficient $\alpha > 0.70$. The result of evaluation of learning program of total contex component is at least good enough 93%. The total input component is at least 85% good enough. The total process component is at least quite good at 79.4%. Head of departement and head of study program from each department through UP2AI can use this instrument to evaluate the implementation of the learning process in Politeknik Negeri Bali.

1. Preliminary

Law No. 12 of 2012 on Higher Education article 59 paragraph (5) mentioned, Polytechnic is a Higher Education that organizes vocational education in various clusters of Science and / or Technology and if eligible, polytechnic can hold professional education. The third part of paragraph 2 of articles 16 paragraph (1) mentioned Vocational Education is a Higher Education diploma program that prepares students for jobs with particular applied skills to applied undergraduate programs (2012 Higher Education Act, 2012: 17 and 46). Polytechnic is one form of higher education that holds vocational education.

To be a graduate of the Polytechnic, it is necessary to have an education with a learning system that is designed properly in accordance with the times. So that should not think and act partially in

ISBN : 978-602-99806-3-9

implementing education and learning. Instead, it is necessary to think and act holistically, integratively, in an integrated way to achieve goals.

To build a future oriented program of learning required tools that support both hardware and software. It is necessary to evaluate these tools concerning pedagogic and academic competence of teachers / lecturers, supporting facilities, motivation of learners, academic culture of campus, subject matter, related to the success of learning program. To know the success of learning program in college, need a suitable evaluation system or model so that it can provide accurate information for stakeholders, especially high education leaders and beneficial to improve the learning program.

Based on the background of the above problems, there needs to be a systematic and comprehensive evaluation of the implementation of learning programs in PNB, with a standard program evaluation model. One of the most popular and dominant models in relation to the evaluation of learning implementation is the CIPP (context-Input-process-product) model developed by Stufflebean et al 1971 (Suharsimi, 2009)

PNB is one of vocational education institution in Bali. In its operation, PNB has vision and mission. The current vision of GNP is: to become a vocational higher education institution leading professional graduates of international competitiveness in the year 2025. While one of its mission is to print a reliable power oriented to market needs in the Field of Engineering and Trade with Tourism as the flagship.

Vocational education is a combination of theory and practice in a balanced manner with an orientation to the readiness of graduates. The lessons are concentrated on the apprenticeship of learning in special vocations. Therefore, in the learning process must be able to show the balance between aspects, theory, practice and social.personal.

Every program including a program of learning in PNB, must have advantages and disadvantages in the implementation. Therefore, this research is conducted to be able to know the weakness, then do the improvement and refinement, so hopefully will be able to improve the quality of education for the future. A number of universities can not implement the curriculum well. This is influenced by several aspects, namely the curriculum concept planning that is less appropriate to the condition of the school and learners, school stakeholders who do not understand the method of implementation, unprofessional management, and limitations of capabilities

College as a system composed of components context, input, process, output, and outcome. The success of the objectives of the education program (output), is determined by its implementation (process), and its implementation is strongly influenced by the level of readiness of all things (input) required for the implementation (Slamet, 2005: 1).

According to the CIPP model, evaluation is a process of delineation, the acquisition and selection of meaningful information that can be used as a basis for decision-making and selection of alternative decisions. The CIPP evaluation model uses the word context, Input, process, and product as the evaluation target. This model considers that the program is evaluated as a system (Suharsimi, 2004: 29). The CIPP model is a standard evaluation model.

The results of CIPP model evaluation can be used as the basis for the decision-making of four kinds of decisions: (1) planning that influences the selection of the objectives and objectives of the activity), (2) the structuring that determines the optimal strategy and the procedure design in achieving the objectives), (3) Implementations that provide tools for program implementation and improvements to existing programs); and (4) recycling whether an activity needs to be continued, altered or discontinued.

CIPP model evaluation results provide the right results as a basis for decision making, required the existence of valid and reliable instruments. The instruments used should be able to provide a consistent and consistent picture of what to measure. The purpose of this study (1 of 2 years) to obtain valid and reliable instruments measure the effectiveness of the learning implementation in PNB in terms of components: 1) context, 2) inputs, 3) processes, and 4) products.

2. Research methods

This type of research is research and development (Research and Development Model), the development is done by testing model or product. Model or product testing is a very important part of

ISBN : 978-602-99806-3-9

development research, which is done after the product design is completed. The model or product trial aims to determine whether the product made is feasible to use or not. Model or product trials also look at the extent to which the product being created can achieve goals and objectives. Trials were performed 3 times: (1) expert test, (2) limited testing conducted on small groups and (3) field testing. This is so that the quality of the model or product developed is completely valid construct empirically. The steps in analyzing the research and development include: (1) preliminary study, (2) planning, (3) hypothetical model development, (4) hypothetical model review, (5) revision, (6)) Limited trials, (7) revision of trial results, (8) broader trials, (9) final model revisions

3. Results and Discussion

First, the needs analysis phase obtained information that there is no evaluation instrument of the learning process program that comprehensively covers students, lecturers, and administrators. Second, the planning stage is done by arranging the instrument details, the step taken is to make the grating instrument evaluation program learning process. Refers to the CIPP model by Stufflebeam (from Ward Mitchell Cates, 1990) looks at four dimensions: context dimension, input dimension, process dimension and product dimension.

Third, is the preparation of the prototype of the program evaluation instrument of the learning process, in accordance with the instrument grille. Next done assembly in accordance with the intended response.

Fourth, the review of the hypothetical model is to validate the instrument by five validators. In his research, the researchers chose five experts from different perspectives with different criteria based on the goal but homogeneous by importance and its relation with the variables to be validated. Validator1 and 2 are experts in the field of evaluation, validator 3 and 4 educational experts, experts 5 vocational practitioners (Polytechnic lecturer). Expert revision obtained input in the form of variable sentences research, addition and reduction of the number of variables, data processing. Fifth, the revision of the hypothetical product of the initial design of the program evaluation instrument of the learning process was then revised and became a new design.

Sixth, is a limited trial phase, begins with instrument dissemination activities, then program evaluation instrument of learning process, in a limited trial on the process of learning process of stage I in the field of engineering of Politeknik Negeri Bali, consist of 25 students, 6 lecturers, and Administration 2 people.

Seventh, the revision of the limited test of the design of the evaluation instrument of the program implementation of the learning process is improved and becomes the evaluation instrument of the implementation of the learning program II.

Eighth, extensive testing on learning activities in the field of engineering Polytechnic Negeri Bali, a number of 75 people consisting of students 45 people, the chairman of Prodi 4 people, 20 lecturers, and administration of 6 people. Furthermore, the revision of the broader test of the instrument design of the evaluation of the program implementation of the learning process is improved and becomes the evaluation instrument of the implementation of the learning program III.

Ninth, the revision of the extensive test of the design of the evaluation instrument of the implementation of the learning program III is improved and becomes the final evaluation instrument, shown in table 1. as follows.

Table 1. The subjects of extensive experimental research on the development of learning program evaluation instruments in PNB

No	Subject	Total
1	PNB Student	45
2	Head of study program	4
2	Lecturer	20
3	Administrasion	6
	Total	75

ISBN : 978-602-99806-3-9

Validity in the test instrument using the content and validity of the item. Content validity is obtained by developing the instrument through a grid compiled based on theoretical studies. The verification of the validity of the items is done on the research variables whose data are collected through a closed questionnaire. In this research, the validity test is done on the research instrument items by correlation bivariate between each score indicator with total score for student questionnaire, lecturer, head of program and administration of department. The reliability test is done with the cronbach's alpha formula, with the help of SPSS version 23.0 for Windows.

Extensive trials resulted in 34 valid grains for student respondents, 15 for 10 lecturer respondents for the department administration respondents, then compiled the items into an instrument of learning program evaluation instrument in PNB. After the effectiveness test, the evaluation instrument design of the learning program implementation becomes a model of evaluation instrument of the implementation of the final learning program in PNB.

Table 2 Summary of Results of Extensive Test Reliability Analysis

No	Responder	Alpha Coefficient	Conclusion
1	Student	0,932 > 0, 70	Reliable
2	Head of Study program	0.944> 0,70	Reliable
3	Lecturer	0,95 > 0,70	Reliable
4	Administration	0,963> 0,70	Reliable

Table 2 can be explained that for student respondents with number of 74 point shows the coefficient of 0.932> 0.70, for lecturers/ academic respondents with number of 47 grains shows the coefficient of 0.963> 0.70, For respondents chair Prodi with 25 points indicate the coefficiency of 0.944> 0.70, for administrative respondents with the number of points 6 shows the coefficient of 0.963> 0.70. Thus based on the calculation of statistical reliability of the instrument known that the instrument is reliable.

Evaluation of the evaluation of the developed learning program is conducted to evaluate the overall learning activities that include students, lecturers/ academicians, Head of study program and Administrator. First, the administration of evaluation is a step that is done by designing the instrument form in accordance with the required. The evaluation instrument of the learning program is designed in the form of an evaluation manual. The book is equipped with: (1) Working instructions, (2) Respondent identity, (3)Assessment analysis. Second, the implementation of evaluation is a step Introduction

Assessment analysis. Second, the implementation of evaluation is a step that is done by giving the book evaluation to students, lecturers/ Academic community, and administrator to fill in the questionnaire.

The data were analyzed by three steps, namely: (1) scoring the respondent's answer by likert scale technique with 5 scale, (2) summing the total score of each component and (3) grouping the scores obtained by the respondents based on the trend level. The scoring in this evaluation uses a scale of 5. Data obtained through questionnaires were assessed by looking at the categorization of the trend level. The ideal high score is achieved when all the items on the component or variable are achieved when all the items on the component or variable get a score of 5 and the ideal lowest score is achieved when all the items on the component or variable get a score of 1. The four scores are subsequently substituted into the level of inclination used Criteria in the evaluation based on the above criteria compiled standard score category tendency component and indicator of variable research that is with the category very good, good, good enough, bad, very bad. The score of each item is calculated by the formula. Categorization of program evaluation level of learning process of student input component using criteria like table 3 below

ISBN : 978-602-99806-3-9

Tabel 3 Classification of Test Results Scores

Persentase (%)	Kategori
$85 \leq N \leq 100$	Very good (A)
$70 \leq N \leq 84$	good (B)
$55 \leq N \leq 69$	good enough (C)
$40 \leq N \leq 54$	bad (D)
$0 \leq N \leq 39$	very bad (E)

Context analysis shows that according to the students a number of 45 respondents very good category 24, good 18, good enough 2 and bad 1. Lecturer a number of 20 respondent very good category 4, good 12, enough 2 and bad 1. According to admin 14 respondent very good category 4, good 7, and bad 3.

Analyze the input shows, according to the students a number of 12 respondent very good category 3, good 7, good enough 1 and bad 1. Lecturer/ academic civity number of 20 respondents very good category 5, good 8, good enough 5 and bad 2. According to student 6 respondents Very good category 1, good 3, very bad 3. According to Head of study program number of 6 respondents very good category 4, and 2 good.

Process analysis shows that according to the students a number of 45 respondents very good category 15, good 25, good enough 3 and bad 2. According to lecturers a number of 12 respondent very good category 2, good 12, good enough 5, bad 1. According Head of study program number 6 respondents category very good 4, and good 2

The results of the analysis of the test results of the instrument, namely: Aiken index coefficient for the average context component of 0.79 classification is very good and feasible to use, for the input component 0.78 means entry in the classification is very good and feasible to use, and for component process 0, 76 classification is very good and feasible to use. The grain validity of all instrument grains has a correlation coefficient $r > 0.232$ and satisfies the reliability coefficient $\alpha > 0.70$. The result of evaluation of learning program of total context component is quite good 93%. The total input component is at least 85% good enough. The total process component is at least quite good 79.4%

4. Conclusions and suggestion

Conclusion

Development of program evaluation instrument of learning process yields valid prototype and reliability based on content validity using expert judgment with Aiken index coefficient for context component average 0,79 classification is very good and feasible to use, for average input component 0,78 means to enter in Classification is very good and feasible to use, and for average 0.76 process component classification is very good and feasible to use. The grain validity of all instrument grains has a correlation coefficient $r > 0.232$ and satisfies the reliability coefficient $\alpha > 0.70$. The result of the evaluation of the total context component learning program is at least 93% good enough. The total input component is at least 85% good enough. The total process component is at least quite good 79.4%

Suggestion

Head of department and head of study program from each department through UP2AI can use instruction program evaluation manual to evaluate the implementation of learning process in PNB

ISBN : 978-602-99806-3-9

Reference

[1] Arikunto, Suharsimi 2002. *Prosedur Penelitian Suatu Pendekatan Praktek*. Jakarta: Penerbit PT. Rineka Cipta.

[2] Arikunto Suharsimi. & Cepi Safruddin AJ. 2004. *Evaluasi program pendidikan, panduan teoritis praktis bagi praktisi pendidikan.*. Jakarta: Bumi Aksara

[3] Mardapi Djemari. 1999. *Pengukuran, penilaian dan evaluasi*. Makalah disampaikan pada Penataran evaluasi pembelajaran matematika SLTP untuk guru inti matematika di MGMP SLTP tanggal 8–23 Nopember 1999 di PPPG Matematika Yogyakarta.

[4] Mardapi Djemari.2002. *Kurikulum 2004 dan Optimalisasi Sistem Evaluasi Pendidikan di Sekolah*. Makalah disampaikan pada Seminar Nasional Kurikulum 2004 Berbasis Kompetensi, tanggal 10 Januari 2003 di Universitas Ahmad Dahlan Yogyakarta

[5] Mardapi Djemari. 2003. *Desain dan penilaian pembelajaran mahasiswa*. Makalah disajikan dalam Lokakarya Sistem Jaminan Mutu Proses Pembelajaran, tanggal 19 Juni 2003 di Universitas Gadjah Mada Yogyakarta.

[6] Morrison, D.M. & Mokashi K. & Cotter, K. (2006). *Instructional quality indicators: Research foundations*. Cambrigde. Diambil pada tanggal 17 Juni 2017 dari www.co.nect.net

[7] Muyasaroh, (2014). "Pengembangan Instrumen Evaluasi CIPP Pada Program Pembelajaran Tahfiz AL-Quar'an di Pondok Pesantren". *Jurnal Penelitian dan Evaluasi Pendidikan* Tahun 18, Nomor 2, 2014

[8] Muyasaroh,(2014). "Pengembangan Instrumen Evaluasi CIPP Pada Program Pembelajaran Tahfiz AL-Quar'an di Pondok Pesantren". *Jurnal Penelitian dan Evaluasi Pendidikan* Tahun 18, Nomor 2, 2014

[9] Stufflebeam, D.L. & Shinkfield, A.J. (1985). *Systematic evaluation*. Boston: Kluwer Nijhof Publishing.

[10] Stufflebeam, D.L. 2003. *The CIPP model for evaluation* ,the article presented at the 2003 annual conference of the Oregon program evaluators network (OPEN) 3 Oktober 2003. Diambil pada tanggal 25 Juni 2017, dari http://www.wmich.edu/evalctr/cippmodel

[11] Sukardi. 2014. *Evaluasi Program Pendidikan dan Pelatihan*. Jakarta: PT. Bumi Aksara

[12] Zamroni, 2005. "*Mengembangkan kultur sekolah menuju pendidikan yang bermutu*". *Makalah* disampaikan pada Seminar Nasional Mengembangkan Kultur Sekolah diYogyakarta pada tanggal 23 Nopember 2005.

[13] Undang-Undang RI. No. 12 Tahun 2014 Tentang Pendidikan Tinggi

[14] Permendikbud Nomor 49 Tahun 2014 tentang Standar Nasional Pendidikan Tinggi

[15] Rencana Strategis (Rensra) Politeknik Negeri Bali 2015-2019

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

The effect of administration system and tax reports on line on service quality and restaurant's tax-payer compliance in Badung Regency

Nyoman Sentosa Hardika[1], I Ketut Sukayasa[2], and Ni Nyoman Yintayani[3]
[1, 2, 3] Accounting Department - Bali State Polytechnic
Jl. Kampus, Bukit Jimbaran, Badung, Bali, Indonesia

Abstract. Administration system and tax reports have significant role in increasing tax-payer compliance as well as the quality of service. The purpose of this research is to describe the effect of implementation of administration system and tax reports by on line on the quality of service and restaurant tax-payer compliance in area of Badung Regency. This research is quantitative research which use primary and secondary data and then analyzed using structural equation model (SEM). The analysis result shows that administration system and tax reports by on line have significant effect on tax-payer compliance, which shown by significant values 0,00 (0,00<0,05). The quality of service has significant effect to taxpayer compliance is shown by significant value as 0,00 (0,00<0,05). Administration system and tax reports by on line do not have significant effect on quality of service shown by 0,30 (0,30>0,05). For institution, in this case Regional Revenues Agency of Badung Regency, it is suggested to increase services, accuracy and simplicity of administration and reports system as well as to tax payer to continually update the new tax regulations to increase tax-payer compliance.

1. Introduction

Technology development has significant progress nowadays, as well as in archived technology (Dewi, 2009). The progress in archival technology is a new innovation in processing archive that is electronic archives. Electronic archives, surely, more practical and has lower risk. Sophisticated electronic archives are archival technology which is implemented by any public institution as well as businesses.

Modern tax administration system is the improvement or perfection of administration performance which done by individuals, groups or institutions to become efficient, economical and faster. Modernization in tax administration system can be done through registration tax payer by on line, reports tax return/ tax letter of notification (SPT) by on line. Modernization, moreover, is implementation of latest information technology in tax services by on line such as e-registration, e-SPT, e-Filling etc.

On line tax system has a favorable effect on restaurant's entrepreneur in Badung regency. Tax payer has no need to count the tax amount to be paid because the system has done it automatically. The implementation of this system can be done because of collaboration between Bali Regional Bank (BPD Bali) and Regional Revenue Agency of Badung (Dispenda Badung).

From all restaurants in area of Badung regency till 2016, it is recorded 223 registered restaurants as tax-payers on line and the rests do it manually. Fulfilling tax obligation of tax payer is manifested in the form of compliance in doing tax obligation such as counts correctly, pays and reports on time.

Based on the background above, the author can formulate the problem in this research is how the effect of tax administration system and tax reports by on line on quality of service and restaurant's tax payer compliance in Badung regency. Accordancing to the problem formulation, this research has

ISBN : 978-602-99806-3-9

purpose to analyses the effect of implementation of tax administration system and tax reports on quality of service and restaurant's tax payer.

2. Methodology

The technique used for collecting data was a self-developed questionnaire, self-assessment items measured on the 5-point Likert scale, and open questions. Respondents were chosen through random sampling method, from 223 registered restaurants as tax-payers on line. By using Taro Yamane Formula is obtained 69 sample registered restaurant as tax-payers on line.

The dependent variable is taken as Y that indicates compliance of taxpayers, and the independent variable consists of administration system and tax payments on line and service quality. Administration system and tax payments on line consists of tax payments to the local state treasury of Badung regency (X1) and data transmission of tax payment through on-line media (X2). The quality of the service consists of the performance of the appearance (X3) and the active role of the tax payer (X4).

3. Research hypothesis

Based on the explanation above, the hypothesis will be tested in this research are:

H1 : Administration system and tax reports by on line have significant effect on service quality of restaurant's tax payer in Badung Regency

H2 : Administration system and tax reports by on line have significant effect on restaurant's tax payer compliance in Badung Regency

H3 : Service quality to tax payer has significant effect on restaurant's tax payer compliance in Badung regency.

4. Literature review and theoretical framework

After 10 years passed, tax reformation in 1983 continued by reformation in 1994 and 1997 which has changed previous law and establish a new law. In follow-up reformation, income tax tariff has been lowered again and start to introduce final income tax. Beside that, for the first time, local tax and local retribution have been formulated into a law. In the local level, Badung regency has established local regulation concerning taxing to restaurant and hotel, that is Peraturan Daerah Kabupaten Badung Nomor 15 Tahun 2011 tentang Pajak Hotel (Badung Local Regulation Number 15 Year 2011 about Hotel Tax) and Peraturan Daerah Nomor 16 Tahun 2011 tentang Pajak Restoran ((Badung Local Regulation Number 16 Year 2011 about Restaurant Tax).

Research model development in order to know the driving factors of individual in using certain system, has been done a lot. Technology Acceptance Model (TAM) developed by David F.D (1989) is one of models which has been used a lot in research of information system (IS) because it is simple and easy to be implemented. TAM model which is naturally adopted from The Theory of Reasoned Action (TRA) model which is theory of reasoning action and developed by Fishbe and Ajzen (1975) with one premise that someone's perception and reaction about something will determine someone's attitude and behavior. The Theory of Reasoned Action (TRA) is a special model that has proven to predict and explain someone's behavior in using technology in diverse areas. One of the models is Unified Theory of Acceptance and Use of Technolog (UTAUT) which is developed by Venkatesh, et al. (2003). UTAUT model is one of the latest model which is suitable to be used to identify factors about acceptance of using e-Filling because this model is the result of combination of previous models which has eliminated the weakness and combine superiority of previous models to become a new model.

However there is inconsistency result, so it is appropriate to do another research using UTAUT model to test this model. Research done by Winna (2012) explained that performance and effort expectation have effect to someone's behavior interest to use e-Filling, and on the other hand, complexity, experience, safety and secrecy do not have effect to interest in using e-Filling. This result is consistent with research by Venkatesh, et al. (2003). The same result shown by the research done by AlGhamdi et al. (2012), Affandy and Mahendra (2013), Widyawati (2013), and also by Andayani and Bendi (2013. There is also another research that shows a different result done by Alshehri et al. (2012) which did research using UTAUT model and analyzed benefit acceptance of e-Government. The result shows that

ISBN : 978-602-99806-3-9

performance expectation, effort expectation and facility condition have positive effect to the interest of using e-Government, and the other hand social factors did not have significant effect. Another research also shows different result done by Djunaidy dkk (2013), and Al-Qeisi et al. (2015).

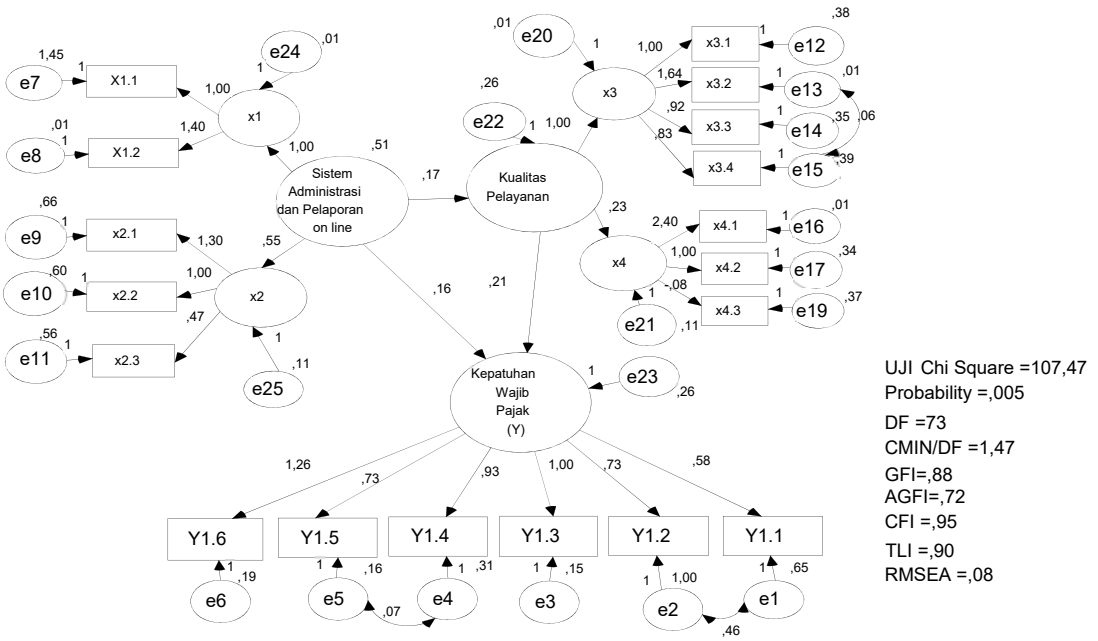
Tax payer compliance defines as counting and reporting tax obligation on time to all information needed, fill in correctly amount owed tax, paid it on time without any coercion. Disobedience arises if one of conditions as defined is not fulfilled (Kiryanto dalam Hardika, 2006). Tax payer compliance can be divided into two which are voluntary compliance and direct enforcement (Marquardt in Hardika, 2006). In tax system using self-assessment system, it is emphasized on voluntary compliance and it is a significant factor. Voluntary compliance can be realized properly if it is supported, such as, by implementation of sanction to tax violations explicitly, less personal contact between tax officer and tax payer and there is a good tax administration.

Deterrence theory is based on beneficial paradigm and has closed relationship with exchange theory in sociology science and utility theory in economic science. This theory explains about a model which consider about potential costs and benefits will be gotten from certain decision chosen. Material and physical loss come up from legal sanction as a potential loss cause of illegal action taken. Therefore, related to deterrence theory, someone's perception to legal certainty will effect someone's commitment to do illegal action. Deterrence theory is researching about a deterrent effect by implementing punishment to behaviour illegally or unwanted behaviour. Punishment can be given in three forms which are legal sanction (*state-imposed punishment*), defective (stigma), and social sanction (*peer-imposed punishment*) and feel guilty (*self-imposed punishment*) (Grasmick and Green in Hardika, 2006), Furthermore, Gibb classifies general deterrence into absolute deterrence (prevention of criminal act) and restrictive deterrence (restriction of the number of times an individual commits a crime) (Hardika, 2006).

5. Results and Discussion

5.1. Test goodness of fit

Overall suitability of the model can be tested using some indicators of absolute vales. Using method developed by AMOS program which accommodate all conformity indicator models at least there are 30 statistical indicators of conformity (Byrne, 2001:80). As shown, that all indicators of Goodness of Fit test are stand in range of values that are expected and therefore this model is accepted. Above table shows the values of x2 – Chi square, GFI, AGFI, CFI, TLI, IFI, NFI, CMIN/DF, FMIN, RMSEA, nearly it almost shows good result and can be accepted.



ISBN : 978-602-99806-3-9

5.2. The significant effect of administration system and tax reports by on line to service quality of tax payer

The effect of administration system and tax reports by on line on service quality of tax payer as shown in above table is 0,17 with standard error 0,16 and critical ratio 1,04. Insignificant properties shown in the table based on the value of t-table is bigger than 0,05. Therefore, the hypothesis that states administration system and tax reports by on line have significant effect on service quality of tax payer is unacceptable. It means that administration system and tax reports by on line do not have effect on service quality. The reason is because both tax reports and tax payment by on line are not dependable to tax officer. It is because there is no direct personal contact between tax officer and tax payer in giving those services.

The effect of administration system and tax reports by on line on service quality of tax payer is small that indicates that there is not enough reasons to support that the effect of administration system and tax reports by on line to service quality of tax payer. The result of this current research is different with a research by Santi, Musadieq and Heru Susilo (2015) which showed that e-Tax quality has significant effect to service quality of tax payer. It is understandable because the former research was more emphasized on the benefit of administration system and reports by on line compared with quality of e-Tax. Administration system and tax reports facilitate payment and delivery tax reports easier and have small effect to service quality by tax officer. The former research was more emphasized on quality of e-Tax and the current research is emphasized on benefits and convenience that can be provided by administration system and tax reports by on line

5.3. The effect of administration system and tax repots by on line to tax payer compliance

The effect of administration system and tax reports by on line on tax payer compliance is 0, 16 with standard error 0, 08 and critical ratio 2, 62. Based on result test, p value is less than 0, 05. Therefore, the hypothesis that states administration system and tax reports by on line have significant effect on tax payer compliance is acceptable. It means that administration system and tax reports by on line have positive and significant effect to tax payer compliance. Improvement in administration system and tax reports will increase tax payer compliance. It happens because it is difficult for tax payer to do tax avoidance and tax evasion.

This results of study support theoretical and empirical views of previous study. This result of this study is accordance with Marquardt (1975), Witte and Woodbury (1985), and Jakson and Milliron (1986) in Hardika (2006) which stated that implementation of tax administration system had effect to tax payer compliance. This result is also similar with Sari (2015), Santi, Musadieq, and Heru Susilo (2015), Fahmi and Fauzan (2012), and Putra, Endang Siti Astuti, and Riyadi (2015) which stated that implementation of modern tax administration system had significant effect on tax payer compliance.

In self-assessment system, tax payer's compliance contains the understanding that tax payer has obligation to count, take into account, pay and report tax accurately, completely and on time. Westat in Jackson and Milliron (1986) stated that : people tend not to care about the amount of money paid when tax collection is done with withholding. Someone will be motivated to avoid paying tax if tax payment done by his/herself.

Tax audit's result as a form of direct enforcement does not give enough significant result for the increase of tax revenue (Marquardt, 1975). Tax payment will be more successful when done by direct enforcement instead of voluntary compliance. In these societies, withholding tax collection is more helpful in increasing tax payer compliance. This condition is supported by prospect theory (Jackson and Milliron, 1986) and detterence theory (Grasmick and Green, 1980) in Hardika (2006).

5.4. The effect of administration system and tax reports by on line to tax payer compliance through service quality

The result of this study is similar with the findings by Marquardt (1975), Witte and Woodbury (1985), and Jakson and Milliron (1986) in Hardika (2006) which stated that tax administration system had effect to tax payer compliance. These results are similar with the findings by 2015), Santi, Musadieq, and Heru Susilo (2015), Fahmi and Fauzan (2012), and Putra, Endang Siti Astuti, and Riyadi (2015) which stated

ISBN : 978-602-99806-3-9

that implementation of modern tax administration system had significant effect to tax payer compliance through service quality. Reduction in the occurrence of direct contact with apparatus/ tax officers, improvement to data bank will be able to improve tax payer compliance.

6. Conclusion

Based on the description analysis and discussion above, some conclusion can be drawn:

1. Administration system and tax reports by on line have positive effect and significant on tax payer compliance. Improvement in administration system and tax reports will increase tax payer compliance
2. Service quality has positive effect and significant on tax payer compliance. The better the service provided by apparatus/ tax officer, it will raise the awareness of the tax payer to carry out his tax obligations. Tax payer will voluntarily performance his tax obligations either obligation to register, reporting tax letter of notification (SPT), recording and bookkeeping and paying of tax.
3. Administration system and tax reports by on line have no effect to service quality. There is no significant effect of administration system and tax reports caused by the reasons either payment and tax reports by on line are not dependable to tax officer in giving service. There is because tax payer does not have direct contact with apparatus / tax officer.

7. Recommendation

Based on the findings in this study we hereby make recommendation that will increase tax payer compliance as it has been concluded that not only the increasing of accuracy and simplicity of administration system and reporting, but also the increasing the service to tax payer, the agency in this case, Regional Revenue of Badung Regency, it is suggested to increase the service to tax payer, increase communication and information to tax payer while for tax payer is always expected to follow new tax regulations through update regulations in order to increase tax payer compliance update to administration system and reporting.

References

Alshehri, Mohammed, Steve Drew, and Rayed AlGhamdi. 2012. Analysis of Citizens' Acceptance for e-Government Service: Applying the UTAUT Model. Presented to IADIS International Conferences Theory and Practice in Modern Computing and Internet Applications and Research. Griffith University. Brisbane. Australia

Al-Qeisi, Kholoud., Denis, Charles., Hegazy, Ahmed., & Abbad, Muneer. 2015. How Viable is the UTAUT Model in Non-Westren Contexs? International Business Research, 8(2) 2015.

Affandy, Didied Poernawan, and Mahendra, Aldillah Reza. 2013. Faktor-Faktor yang Mempengaruhi Minat Pemanfaatan Sistem Informasi Pengelola Keuangan Daerah (SIPKD) (Studi Kasus pada Pemerintah Kota Belitar). Universitas Brawijaya.

Andayani, Sri, and Bendi, R. Kristoforus Jawa. Sekolah Tinggi Teknik Musi. Jurnal HOAQ-Teknologi Informasi, 2(1) Desember 2013.

Anggraeni, Monica Dian dan Endang Kiswara, 2015. Pengaruh Pemanfaatan Fasilitas Perpajakan Sunset Policy terhadap Tingkat Kepatuhan Wajib Pajak. Skripsi Tidak Dipublikasikan, Fakultas Ekonomi, Universitas Diponegoro.

Byrne, Barbara M. 2001. *Structural Equation Modelling With AMOS : Basic Concept, Applications, and Programming*. Lawrence Erlbaum Associates Inc Publishers. 10 Industrial Avenue Mahwah New Jersey 07430

Chuttur, Mohammad Yasser. 2009. Overview of the Technology Acceptance Model : Origins, Developments and Future Directions. Sprouts : Working Papers on Information Systems. Indiana University, USA

Dewi, A.A. Ratih Khomalyana. 2009. "Analisis Faktor-Faktor yang Mempengaruhi Penerimaan Wajib Pajak terhadap Penggunaan E-filling." Skripsi Tidak Dipublikasikan, Fakultas Ekonomi, Universitas Diponegoro.

ISBN : 978-602-99806-3-9

Djunaidy, Arif, and Indahyanti, Uce. 2013. Pengukuran Penerimaan Instrumen Terhadap Teknologi Learning Manajement SystemMenggunakan ModifikasiModel Unified Theory of Acceptance and Use of Technology (UTAUT).Institut Teknologi Sepuluh Nopember. Jurnal Sistem Informasi, 4(4), h: 242252.

Fasmi, Lasnofa and Fauzan Misra. 2012. Pengaruh Modernisasi Sistem Administrasi Perpajakan terhadap tingkat Kepatuhan Pengusaha Kena Pajak di Kantor Pelayanan Pajak (KPP) Pratama Padang. Skripsi Tidak Dipublikasikan. Fakultas Ekonomi Universitas Andalas.

Fukofuka, Paula. 2013. The Contextual Framework of Corporate Income Tax Evasion. Journal of Accounting and Taxation. Vol. 5(2). pp. 27-37

Hair, Joseph F., Rolph E. Anderson, Ronald L. Tatham, and William C. Black, 1988. *Multivariate Data Analysis*. New Jersey : Prentice Hall, Inc.

Hardika, Nyoman Sentosa. 2006. Pengaruh Lingkungan dan Moral Wajib Pajak terhadap Sikap dan Kepatuhan Wajib Pajak pada Hotel Berbintang di Provinsi Bali. Disertasi Tidak Dipublikasikan. Program Pascasarjana Universitas Airlangga.

Lie, Ivana dan Arja Sadjiarto. 2013. Faktor-faktor yang Mempengaruhi Minat Perilaku Wajib Pajak Untuk Menggunakan E-Filling. Jurnal Vol. 3, No. 2. Universitas Kristen Petra

Ngadiman and Daniel Huslin. 2015. Pengaruh Sunset Policy, Tax Amnesty, dan Sanksi Pajak terhadap Kepatuhan Wajib Pajak (Studi Empiris di Kantor Pelayanan Pajak Pratama Jakarta Kembangan). Jurnal Akuntansi Volume XIX, No. 02. Universitas Tarumanagara

Park, Sung Youl. 2009. An Analysis of the Technology Acceptance Model in Understanding University Students' Behavioral Intention to Use e-Learning. Educational Technology & Society. 12(3). Page 150-162

Putra, Yanuar Toma, Endang Siti Astuti, and Riyadi. 2015. Pengaruh Penerapan Sistem Administrasi e-Registration, e-SPT, dan e-Filling terhadap Tingkat Kepatuhan Wajib Pajak. Jurnal Administrasi Bisnis – Perpajakan (JEJAK) Vol. 6, No. 1. Universitas Brawijaya

Rahayu, Sri. 2009. Pengaruh Modernisasi Sistem Administrasi Perpajakan terhadap Kepatuhan Wajib Pajak Badan pada KPP Pratama Bandung. Jurnal Akuntansi. Vol. 1, No. 2: 119138

Razak, Abubakari Abdul and Christopher Jwayire Adafula. 2013. Evaluating taxpayers attitude and its effect on tax compliance decisions in Tamale, Ghana. Academic Journals. Vol 5(3). pp 48-57

Santi, Ari Novita, Mochammad Al Musadieq and Heru Susilo. 2015. Pengaruh Kualitas e-Tax Terhadap Kualitas Pelayanan dan Kepatuhan Wajib Pajak (Studi atas Wajib Pajak Pada Dinas Pendapatan Daerah Kota Malang). Jurnal Administrasi Bisnis – Perpajakan (JEJAK) Vol. 6, No. 1. Universitas Brawijaya

Sari, Novi Purnama, Kertahadi, and Maria Goretti Wi Endang NP. 2015. Pengaruh Penerapan e-SPT Terhadap Kepatuhan Wajib Pajak Badan Dalam Melaporkan SPT (Studi Kasus Pada KPP Madya Malang). Jurnal Administrasi Bisnis – Perpajakan (JEJAK) Vol 6, No. 1. Universitas Brawijaya

Sitorus, Daniel W C M, Topowijono, and Devi Farah Azizah. 2015. Pengaruh Pemahaman Perpajakan, Sanksi Perpajakan dan Biaya Kepatuhan terhadap Kepatuhan Wajib Pajak (Studi pada Wajib Pajak Orang Pribadi di KPP Pratama Singosari. Jurnal Administrasi Bisnis – Perpajakan (JEJAK) Vol. 6, No. 1. Universitas Brawijaya

Sugihanti, Winna Titis and Zulaikha. 2011. Analisis Faktor-faktor yang Mempengaruhi Minat Perilaku Wajib Pajak untuk Menggunakan e-Filling (Studi Empiris pada Wajib Pajak Badan Kota Semarang). Skripsi Tidak Dipublikasikan, Fakultas Ekonomi, Universitas Diponegoro.

Thomas, Troy Devon, Lenandlar Singh and Kemuel Gaffar. 2013. The Utility of the UTAUT model in Explaining Mobile Learning Adoption in Higher Education in Guyana. International Journal of Education and Development using Information and Communication Technology (IJEDICT). Vol. 9. Issue 3. Pp 71-85

Venkatesh, Viswanath., Morri, Michael G. s., Davis Gordon B., & Davis, Fred D. 2003. User Acceptance Of Information Technology: Toward A Unified View. MIS Quarterly, 27 (3), pp: 425-478.

Vythelingum P., Soondram' H. and Jugurnath B. 2017. An assessment of tax morale among Mauritian taxpayers. Journal of Accounting and Taxation. Vol. 9(1). pp. 1-10.

ISBN : 978-602-99806-3-9

Widyawati, Ikha. 2013. Analisis Faktor-Faktor yang Mempengaruhi Minat Pemanfaatan Sistem Informasi dan Penggunaan Sistem Informasi (Studi Empiris Pada BMT di Karisidenan Pati). Fakultas Ekonomi:Universitas Muria Kudus.

Williams, Michael D., Nripendra P. Rana and Yogesh K. Dwivedi. 2015. The unified of theory and use of technology (UTAUT): a literature review. Journal of Enterprise Information Management. Vol. 28 Iss 3 pp. 443 – 488.

Wulandari, Ni Putu Ary and I Ketut Yadnyana. 2016. Penerapan Model Unified Theory of Acceptance and Use of Technology di Kota Denpasar. E-Jurnal Akuntansi Universitas Udayana. 14.2. Page 1270-1297

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

Analysis of sales budget and actual sales at CV Sumberjaya

Made Dana Saputra[1], **Made Agus Putrayasa**[2]
[1,2]Accounting Department, Politeknik Negeri Bali
Bukit Jimbaran Badung Selatan 80361, Bali, Indonesia

danasaputra@pnb.ac.id

Abstract. The Sales Budget is also referred to as a key budget in the budgeting process, since the budget is the basis for the preparation of other types of budgets.. The aims of this study are to find out the budgeting approach and to determine the cause of the variance between sales budget and actual sales at CV. Sumberjaya in 2016. This type of study used not only descriptive quantitative analysis which was analyzed by variance analysis but also descriptive qualitative analysis. This study concludes that the company uses a top-down approach in the process of budget preparation. Then sales variance analysis shows that the unfavorable sales quantity variance happen in all five sales areas. After that the calcuation of sale price variance revealed only one area (Ubud) got unfavorable variance and the two areas (Kuta and Mengwi) achieved favorable variance.

1. Introduction

Every Company certainly must have a plan in order that its activities within can be focused, but in the face of uncertain conditions then its management should find out the best strategy in order to optimize the achievement of goals and survival. Planning involves setting goals as a guide for the planning process by requiring all departments and other organizational units to establish their goals for the future [1]. With this planning an activity will have a guidance of the implementation of work, for the established plan can be achieved, then the company needs to hold control. Control monitors performance and implements necessary changes. By controlling, managers make sure the organization's resources are being used as planned and that the organization is meeting its goals such as quality and safety. When managers implement their plans, they often find that things are not working out as planned. The controlling function makes sure that goals are met [2]. One tool that can meet planning and control needs is budget, because Budgeting empowers all in the organization to understand organizational goals in terms of their responsibilities and be held accountable for budget plans and results since they can be compared [3]. Budgeting is synonymous with managing an organization.

The company in achieving its goals required a budget preparation. In the preparation of the budget there are two alternative preparation of the budget that is comprehensive and partially. Comprehensively means the company prepares the budget in a comprehensive scope, where the type of activities covered include all activities of the company, both the field of marketing, production, finance, and general administration. While partially is the company budget is compiled with a limited scope that only covers part of the company's activities, for example the company only preparing the sales budget.

Budgets can be used as a means to communicate information about the company's plans from the management to all employees and improve coordination of all parts in running the company's activities. In addition, the budget also serves as a reference to assess the company's performance. Performance evaluation can be done by comparing performance realization with planned performance so that

ISBN : 978-602-99806-3-9

correction action can be done. One of the budgets in the company is the sales budget. Sales budget has a strategic role in supporting the company's activities to achieve its goal of earning profit. This sales budget will be made first compared to other budgets. The sales budget is a detailed plan of company sales over the coming period, including plans for the type of product to sell, the number of products to sell, the price of the product to be sold, the time of sale and the place / area of sale.

Preparation of sales budget is intended to achieve company goals in optimizing profits through planning, coordinating, supervising, and controlling sales activities. Sales budget has a very important role in determining the quality and quantity of goods including price, time and place of sale so that the more clear the sales budget of a company is presented, the easier the management of the company to carry out planning, coordination, monitoring and evaluation of sales activities.

Sales budgets are key budgets for other budgeting, sales budgets must be made carefully and thoroughly. If there is a mistake in the preparation of the sales budget, then the other budget also tends to be wrong and will ultimately affect the sales company that is the spearhead in obtaining profit. The realization of the sales budget can be used as a determinant tool in making decisions concerning the sale or preparation of the sales budget for the coming period and can contribute better to the company's profit [4].

CV. Sumberjaya which produces bottled drinking water (AMDK) in the form of gallon water sales, in 2016 the new company makes a partial budget that is the sales budget. The sales budget and sales realization CV. Sumberjaya for the year 2016 is as follows:

Sales Budget	Sales Realization	Variance
264.000 unit	231.364 unit	32.636 unit
Rp2.555.375.000,00	Rp2.372.138.000,00	Rp183.237.000,00

Based on the sales budget, the realization of the sales budget is not in accordance with the established and the realization is under the budget. Therefore, it is necessary to evaluate and settle the condition because the sales budget will affect all activities within the company. Based on this background, the author conducted a study on "Sales Budget Analysis and Actual Sales at CV Sumberjaya".

2. Methodology

The research was conducted at CV. Sumberjaya, Jl. Mengwitani, Mengwi District, Badung District - Bali. The time of this study began in May to August 2017. Types of Data used in this research were quantitative and qualitative data. At first, the quantitative data in this study is the report of sales and realization of the CV. Sumberjaya year 2016. Then the study used the organizational structure and its duties with related parties on the CV. Sumberjaya as qualitative data.

Primary data in this research is the result of interview with related parties at CV. Sumberjaya about the parties involved in budgeting, methods used in the preparation of the budget, the techniques used in the preparation of the budget, the cause of the difference in sales budget. In the other hand, secondary data in this research is organizational structure along with job description and sales budget report CV. Sumberjaya and its realization in 2016.

Data collection methods used in this study are: First of all, Interview is a method of collecting data directly by holding question and answer with related parties such as accounting CV. Sumberjaya that deal with the issues studied about the parties involved in the preparation of the budget, the method used in the preparation of the budget, the difference in sales budget. Secondly, Documentation that is collecting data by researching and observing data such as notes and company documents related to research conducted, such as company brief history, organizational structure, job description, sales budget report and sales realization of CV Sumberjaya in 2016.

ISBN : 978-602-99806-3-9

2.1 Data Analysis Technique

The analytical techniques used in this study are as follows:

2.1.1 Quantitative Analysis

Quantitative analysis is an analysis technique in the form of calculations using the formula. The technique used in this study is the analysis of the variance in the sales budget by finding the variance between the budget with the actual sales in 2016 on the CV. Sumberjaya. The value of the variance or difference can be used to determine whether the difference is favorable or unfavorable. The variance that occurs in the sales budget can be due to the variance in the quantity and price.

The formula used in the analysis of sales budget variance is [5]:

2.1.1.1 Variance On Sales Budget

2.1.1.1.1 Quantity Variance

Quantity variance is the difference that occurs over units of products that have been planned in the budget. Mathematically, the quantity variance can be formulated in the form of the formula, as follows:

$$PK = (KR - KB) \times HB \quad (1)$$

Information :

PK = Quantity variance

KR = Actual Quantity

KB = Budget Quantity

HB = Budget Price (per unit)

If KR >

2.1.1.1.2 Price Variance

Price difference is the difference that occurs over the selling price per product unit that has been planned in the budget. Mathematically, the price difference can be formulated in terms of formulas, as follows:

$$PH = (HR - HB) \times KR \quad (2)$$

Information :

PH = Price Difference (per unit)

HR = Actual Price (per unit)

HB = Budget Price (per unit)

KR = Actual Quantity

2.1.2 Descriptive Qualitative Analysis

Qualitative analysis in this study is a description of the results of the research obtained so that later can be used to answer the budgeting done on the CV. Sumberjaya and can know the cause of the difference between the sales budget with the realization of sales in 2016.

3. Result and Discussion

3.1 Budgeting Process At CV. Sumberjaya

The preparation of operational budget at CV. Sumberjaya began in November using the Top Down Budgeting method. Top Down Budgeting is a method of budgeting compiled by top management / superiors directed to subordinates who fully make decisions in the preparation of the budget is top management / supervisor, while subordinates only as executor only. Sales budget on CV. Sumberjaya is done by the operational manager along with the owner.

The top-down budgeting method has weaknesses such as:

a. Lack of subordinate commitment

b. Often unworkable

c. Difficult to achieve goals

This is in line with the results of research from M. Fadli [6] who did research on CV Jaya Art Palembang 2013. The method of budgeting conducted by CV Agung Jaya Art Palembang is the method of top-down Budgeting.

3.2 Sales Budget Variance Analysis

The variance between the sales budget and actual sales in 2016 is as follows:

ISBN : 978-602-99806-3-9

Table 1. Sales Budget and Actual Sales

Sales Area	Actual	Budget	*Variance*		Remark
			Rupiah (Rp)	Percentage (%)	
Ubud	350.988.000	406.250.000	(55.262.000)	-14%	*Unfavorable*
Denpasar	457.380.000	552.500.000	(95.120.000)	-17%	*Unfavorable*
Kuta	428.580.000	409.500.000	19.080.000	5%	*Favorable*
Tabanan	433.910.000	505.000.000	(71.090.000)	-14%	*Unfavorable*
Mengwi	701.280.000	682.125.000	19.155.000	3%	*Favorable*
Total	2.372.138.000	2.555.375.000	(183.237.000)	-7%	*Unfavorable*

Based on Table 1 above, Sales variance incurred for each sales area are different, for example the unfavorable variance that occurred in the city of Denpasar sales area of 17% of the budgeted or Rp.95.120.000.00. On the other hand Mengwi sales area experienced a favorable variance of 5% or Rp.19.080.000.00. This variance is then analyzed further using the analysis of the sales quantity and price variance.

3.2.1. Sales Quantity Variance Analysis

Sales quantity variance analysis is used as the basis for evaluation of the budget by comparing the Budget sales quantity with actual sales quantity multiplied by the selling price per unit budget. Sales quantity variance analysis in CV. Sumberjaya can be seen in the following table.

Table 2. Quantity Sales Variance

Sales Area	Actual (unit)	Budget (Unit)	Budget price / unit (Rp)	Sales Quantity variance (Rp)	Remark
Ubud	29.249	32.500	12.500	-40.637.500	unfavorable
Denpasar	45.738	55.250	10.000	-95.120.000	unfavorable
Kuta	42.858	45.500	9.000	-23.778.000	unfavorable
Tabanan	43.391	50.500	10.000	-71.090.000	unfavorable
Mengwi	70.128	80.250	8.500	-86.037.000	unfavorable

Based on Table 2, it is known that the budget sales quantity is greater than actual sales quantity (unfavorable variances). Based on sales analysis per month and interviews with the sales department, it is known that there are some indicators that cause avorable quantity variance.

a. Ubud Sales Area.
   The unfavorable variance is caused by the decline in demand as a result of the decline in the number of tourists visiting the hotel or restaurant directly affects the level of sales of drinking water.
b. Denpasar Sales Area
   The unfavorable variance is caused by some unsubscribed agents due to the inclusion of similar business products and also related to internal factors ie the budget set in the Denpasar sales area is too high which ignores the previous in's sales data.
c. Kuta Sales Area

ISBN : 978-602-99806-3-9

The unfavorable varince in Kuta is due to the decrease in the number of tourists visiting the hotel or restaurant therefore affects the level of sales of drinking water.

d. Tabanan Sales Area
   Tabanan area suffer unfavorable variance due to fiercer competition with similar businesses.
e. Mengwi Sales Area
   Mengwi area face the same problem as Tabanan sales area.

3.2.2. Sales Price Variance Analysis

The sales price variance analysis is used as the basis for evaluation of the budget by comparing the budget sales price per unit with the actual sales price per unit multiplied by the actual quantity of sales. Analysis of sales price variance in CV. Sumberjaya can be seen in the following table.

Tabel 3. Sales Price Variance

Sales Area	Actual Price / Unit (Rp)	Budget Price / Unit (Rp)	Actual Quantity	Sales Price Variance (Rp)	Remark
Ubud	12.000	12.500	29.249	-14.624.500	unfavorable
Denpasar	10.000	10.000	45.738	-	-
Kuta	10.000	9.000	42.858	42.858.000	Favorable
Tabanan	10.000	10.000	43.391	-	-
Mengwi	10.000	8.500	70.128	105.192.000	Favorable

Based on Table 3, it is known the favorable and unfavorable happened in the sales area of Ubud, Kuta and Mengwi. Based on monthly sales analysis and interviews with the acoounting and sales department, it is known that there are some indicators that cause price variances.

a. Ubud Sales Area
   The sales price variance in Ubud's sales area is Rp14.624.500,00 (unfavorable). This is because there is a promotional fee provided by the CV. Sumberjaya initially included in the selling price, then the company management realized the error and then make the adjusment for it by recording the fee as administrative and general expense.
b. Kuta Sales Area
   The sales price variance in Kuta's sales area is Rp14.624.500,00 (favorable). The variance of this price is due to the component of the selling price that has not taken into account changing external conditions such as rising bottle cap prices and cleaning wipes.
c. Mengwi Sales Area
   The sales price variance in Mengwi's sales area is Rp105.192.000,00 (favorable). This difference occurs because the CV Sumberjaya Management made a mistake in determining the selling price margin per gallon.

4. Conclusion

The purpose of this study are to find out the budgeting approach and to determine the cause of the variance between sales budget and actual sales at CV. Sumberjaya in 2016.

The results of the analysis that has been done to actual sales and sales budget on CV. Sumberjaya pointed out that

a. The process of preparing the sales budget using Top Down method with techniques used in the preparation of the budget is by using qualitative methods (non statistical method or opinion method).
b. Unfavorable sales variance occurs in the sales area of Ubud, Denpasar and Tabanan sales while Kuta and Mengwi Sales Area has favorable sales variance.

ISBN : 978-602-99806-3-9

c. The entire sales area is experiencing an unfavorable sales volume variance. The reasons for this are the decline in the number of hotel guests, the increasing competition in the mineral sales business, and the set sales targets that are too high.
d. Other calculations relating to the selling price variance show that the Kuta and Mengwi Areas get favorable variance on the other hand only the Ubud area that sells the products is below the budgeted price. Further examination of the variance indicates that CV Sumber Jaya management made a mistake in calculating the selling price of its products.

The results of this study are expected to provide feedback to the company so that in the coming year the budgeting process can be improved and the calculation of the target price and quantity of sales take into account the internal and external aspects of the company.

5. Acknowledgments

The author is greatly appreaciate the support from head of accounting departement, the Director of Bali State Polytechnic and the Head of P3M.

References

[1] Warren CS, Reeve JM and Duchac JE 2009 *Managerial Accounting* (Ohio: South-Western Cengage Learning) p229
[2] Bateman TS and Snell SA 2015 *Management: Leading and Collaborating In A Competitive World* (New York: McGraw-Hill Education) p14
[3] Needles BE, Powers M and Crosson SV 2014 *Financial and Managerial Accounting* (Ohio: South-Western Cengage Learning) p908
[4] Armin and Kusminaini 2015 Sales Budget Analysis on Sales Realization at PT Anugerah Pharmindo Lestari Palembang Branch. *Journal of Economics & Entrepreneurship* **Vol 10 number 1**
[5] Steven GJ 2000 Sales Variances: Time for Hard Sell *CIMA Global.* Available at http://www.cimaglobal.com/Documents/ImportedDocuments/CI_Sept_00_p23_24.pdf
[6] Fadli M 2013 Analisa Prosedur dan Varians Anggaran Penjualan pada CV Agung Jaya Art Palembang. *The Juornal Poltek PalComTech.* Available at http://news.palcomtech.com/wp-content/uploads/2012/01/M.-Fadli_analisisprosedurdanvarians.pdf

ISBN : 978-602-99806-3-9

The study of development of marine eco-tourism as an alternative of livehood of community of Tulamben and Amed of Karangasem Regency of Bali Province

I Gede Made Subagiana, Sagung Mas Suryaniadi, Ni Luh Made Wijayati
Email : ratihhostel@yahoo.com

Abstract. Developing marine eco-tourism as an alternative source of livelihood to accelerate poverty alleviation in Karangasem regency, where 6.88% of the population of 27,800 people are classified as poor (CBS of Bali, 2014), various efforts have been made by the Regional Government such as developing marine eco-tourism in Tulamben Village, Kubu Sub-district and Amed Village, Abang District of Karangasem Regency. Developing of marine eco-tourism resulted in a shift in livelihood patterns of the population from the agricultural sector to the tourism industry sector. The problem in this research is "Is Marine Eco-tourism Development feasible to be an alternative livelihood for Tulamben and Amed people of Karangasem Regency?" The research objectives are to assess whether marine eco-tourism development is a viable alternative livelihood for Tulamben and Amed communities. The method used is the Contingent Valuation Method: Willingness to Accept (WTA), Willingness to Pay (WTP) and Economic Potential Analysis and SWOT analysis (Klasen and Miller 2002). Result: the Contingent Valuation Method shows WTP value of Rp.176.500 higher than WTA value of Rp.154.500. Analysis of Economic Potential, from analysis of the economic potential of Marine Ecotourism, can create value Rp.4.728.964.500 from every tourist visit to an object. From the above two analyses, it can be concluded that Marine Ecotourism is very feasible as an alternative livelihood. To complement the analysis of marine eco-tourism development strategy with SWOT, it can be recommended as follows:• Improving cooperation with domestic and foreign travel agents• Providing an information center related to Marine Ecotourism activities.• Increasing safety insurance for tourists• Improving the quality of human resources, through on-going training.

Keywords: Marine Eco-tourism, alternative livehood

INTRODUCTION

1.1. Background Karangasem

Regency is the eastern district of Bali Province whose topography in the western part is a hilly or mountainous area with steep slopes where the soil structure is dry land while in the North, East and South is a coastal area. Because the land is barren due to the vomit of Mount Agung volcano erupted in 1963. Karangasem has become the second poorest population in Bali Province after Kelungkung regency. The number of poor people in Bali Province in 2011 to 2013 can be seen in Table 1 as follows:

ISBN : 978-602-99806-3-9

Table 1. The number of poor people in Bali Province

Regency / City		Number of poor population (000)			Percentage of the poor population		
		2011	2012	2013	2011	2012	2013
1	Jembrana	17,6	15,3	14,9	6,56	5,74	5,56
2	Tabanan	24,2	21	22,5	5,62	4,9	5,21
3	Badung	14,6	12,5	14,5	2,62	2,16	2,46
4	Gianyar	26	22,6	20,8	5,4	4,69	4,27
5	Klungkung	10,7	9,3	12,2	6,1	5,37	7,01
6	Bangli	11,4	9,9	12	5,16	4,52	5,45
7	**Karangasem**	**26,1**	**22,7**	**27,8**	**6,43**	**5,63**	**6,88**
8	Buleleng	37,9	33	40,3	5,93	5,19	6,31
9	Denpasar	14,5	12,7	17,6	1,79	1,52	2,07
	Total	**183,1**	**158,9**	**182,8**	**4,59**	**3,95**	**4,49**

Source: Bali In Figures 2014 (based on the National Socioeconomic Survey - September)

The number and percentage of the poor in nine (9) regencies in Bali Province in 2013. Karangasem Regency was ranked into the second (2) after Kelungkung 7.01%. The percentage of poor level in Karangasem is 6.88% of the Karangasem population spread over eight (8) sub districts, consisting of 75 villages, including Tulamben village of Kubu Subdistrict and Amed of Abang Subdistrict, Karangasem Regency (Bali in Figure 2014). The population of Karangasem district is 480,700 inhabitants. For more details, it can be seen in Table 2 as follows:

Table 2 Population of Karangasem 2010—2015.
Male + Female (x1000)

District		2010	2011	2012	2013	2014	2015
1	Rendang	37,06	37,43	37,80	38,17	38,58	38,88
2	Sidemen	31,69	31,90	32,12	32,27	32,47	32,65
3	Manggis	44,17	44,37	44,58	44,79	44,99	45,20
4	Karangasem	82,95	83,61	84,30	84,85	85,57	86,21
5	**Abang**	61,18	61,36	61,53	61,75	61,98	62,15
6	Bebandem	45,31	45,43	45,53	45,67	45,76	45,94
7	Selat	38,22	38,43	38,61	38,81	39,03	39,19
8	**Kubu**	**57,22**	**57,47**	**57,73**	**57,99**	**58,22**	**58,48**
Total		**397, 80**	**400,00**	**402,20**	**404,30**	**406,60**	**408,70**

Source: Population Projection, Central Bureau of Statistics of Karangasem

From Table 1 and 2 above it can be concluded that 6.88% of the population of Karangasem in 2013 were 27,800 people classified as poor. Seeing this reality Local Government has taken various policies to accelerate poverty alleviation in Karangasem Regency. The Local Government has designed various programs contained in the Regional Long Term Development Plan (RPJPD), one of which is

ISBN : 978-602-99806-3-9

the Regional Ecotourism Development, it is based on the Minister of Home Affairs No.33 of 2009 on Guidance of Regional Ecotourism Development. Geographically Karangasem Regency is located at the eastern of Bali Island has coastal and mountainous areas with boundaries as follows:

North: Bali Sea
East: Lombok Strait
South: Ocean Indonesia
West: Regency of Klungkung, Bangli and Buleleng

Karangasem regency is in position 80 00'00"- 80 41'37,8 " south latitude and 115037'9,8 " - 115054'8,9 " east longitude. With an area of 839.54 km2 or 14.90% of the total area of Bali Province 5,632.86 Km2. Karangasem has a fairly long coastline (70 km) stretching from Tianyar to Padang Bai, it is a great hope for the local government to develop marine eco-tourism. Ecotourism is a natural tourism activity in an area by paying attention to elements of education, understanding, and support for natural resource conservation efforts, as well as increased incomes of local communities (Permen Dagri No.33 Th.2009, Regional Ecotourism Development). The types of Ecotourism developed in the area include: a. Marine Ecotourism b. Forest Ecotourism c. Mountain Ecotourism By taking into account the various potentials owned by the District Government of Karangasem with full confidence, establish Tulamben and Amed area became the center of the development of the Village of Marine Ecotourism in Karangasem Regency. It can be seen in Figure 1 as follows:

Figure 1 Village Position of Tulamben and Amed Ecotourism - Source: Wira Bali Tour, 2016

ISBN : 978-602-99806-3-9

1.2 The Potential of Marine Ecotourism of Tulamben and Amed Two ecotourism villages Tulamben and Amed, already familiar to the divers and snorkeling from overseas. These two areas are indeed their favorite destination for diving. Tulamben and Amed are the most beautiful diving spots in Bali, this is because of the beauty of coral crumbs, as well as various colors of ornamental fish and other marine biotas. Tulamben is famous for its sea wrecks, wrecked American Liberty ship, which was torpedoed by Japanese soldiers during World War II in 1942 (Wira Bali Tour, 2016). The livelihoods of Tulamben and Amed residents are mostly as fishermen and dry land farmers because of their barren and arid lands especially during the dry season, rainy season much better conditions for farmers to grow corn, peanuts, cassava and yam, farmers also exist as traditional fishermen. Since this area is proclaimed as the Village of Ecotourism Bahari, Tulamben and Amed grows rapidly, many of the locals work in the field of tourism, especially as a diving and snorkeling tour guide.

The main actors of tourism services today are the investors who have large capital, although there are some people who form a tourism business group. But most of them still feel as spectators. There is a presumption that the tourism entrepreneur is only concerned with the benefits for himself and never involve the surrounding community. In addition, the community views the lack of local government's role in facilitating the development of community-based tourism, this raises the conflict of utilization of environmental services between tourism business actors and local communities. However, if the management of tourism is done well and precisely, is environmentally friendly and sustainable, with the involvement of local communities it will be able to supplement the income and encourage the community to keep the natural resources and the environment. This situation makes tourism beneficial for the improvement of people's economy and nature conservation. The form of tourism that can meet is eco-tourism activities. The right eco-tourism to be developed in Tulamben and Amed villages is a community-based Marine Ecotourism. In general, community-based ecotourism is an eco-tourism business that emphasizes the active role of the community. It is based on the fact that the community has knowledge about nature and culture that become potential and high selling point, (Depbudpar-WWF-Indonesia, 2009). As a coastal community, Marine Ecotourism based on the community is very potential to be developed. Recognizing this, in the development of community-based marine eco-tourism in Tulamben and Amed, it is necessary to pay attention to aspects of community capability, tourist interest, and environmental aspects. From the preliminary study results obtained the development of marine ecotourism in Tulamben and Amed villages, there are also many communities in both villages that are changing professions from dry land farmers and as fishermen move to the tourism industry sector. Based on the above background, the writer took the title of Marine Ecotourism Development Study as an Alternative Livelihood for Tulamben and Amed Community of Karangasem Regency of Bali Province. Our research is different from previous studies conducted by others before, where many researchers only observed about the environmental conservation and economic benefits of Marine Ecotourism but our research focuses on the feasibility of changing livelihoods from the agricultural sector to the Marine Ecotourism industry.

Problems

Based on the above description, then the main issues are:

- Is the development of marine ecotourism appropriate for alternative livelihoods for Tulamben and Amed community of Karangasem Regency?

RESEARCH METHODOLOGY

Research Stages

This study uses a qualitative approach which will be studied various aspects under study by using data that is valid, reliable and accountable. Observation of the phenomena that occur in the field done carefully and carefully so that the data collected high accuracy.

This research is carried out in the following stages: Exploration of Potential, What can be done/offered by the community, What tourists want, Local Government Role, Conduct Willingness to Accept Analysis and Conduct Willingness to Pay Analysis. Then proceed with SWOT Analysis to determine the Strategy of marine Ecotourism development, then conduct a feasibility study to obtain the feasibility of Marine Ecotourism Development. Each activity can be formulated as follows:

ISBN : 978-602-99806-3-9

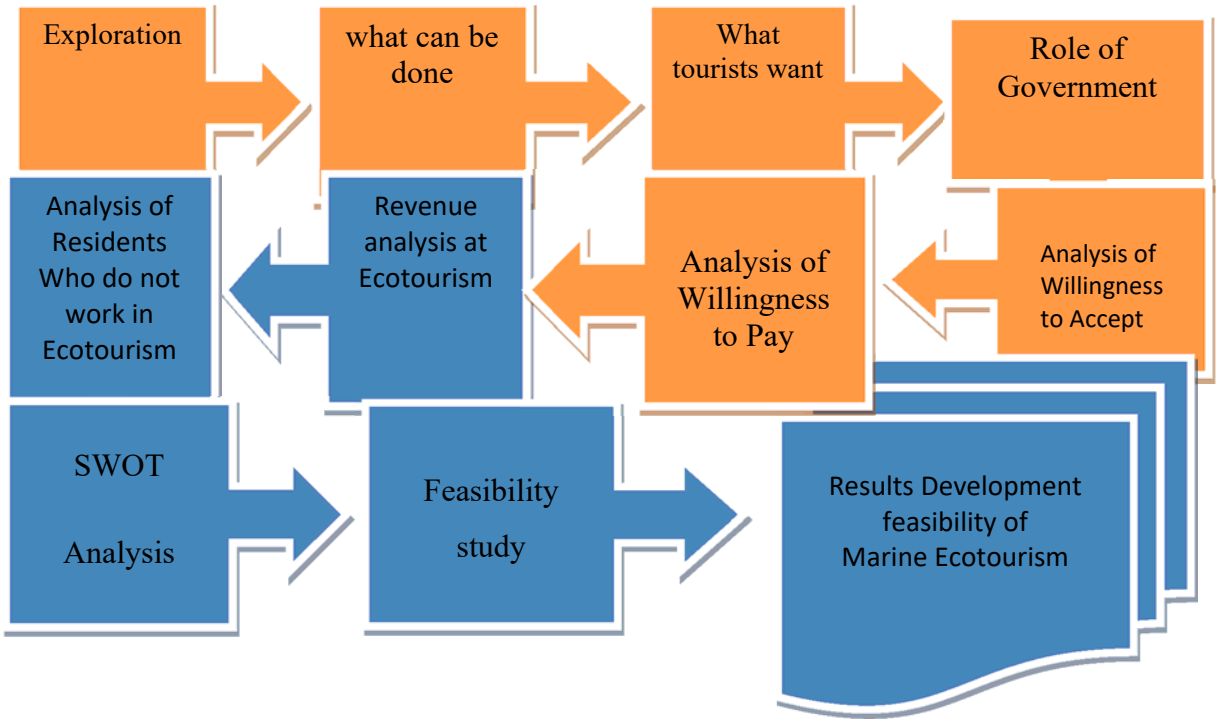


Figure 2 The Steps of the research

- Population and Sample

Population.

Population is a phenomenon consisting of objects / subjects that have certain characteristics set by researchers to be studied which then taken the conclusion (Sugiono, 2006: 72). The population in this study are those who are engaged in marine ecotourism, people who are not involved in Marine Ecotourism, Local Government and Tourists.

The sample is part of the population, where the determination of the sample in this case based on purposive random sampling. That is they are considered to know very well about the ins and outs of Marine Ecotourism Development. The sample size is selected: 30 tourists, 30 tourism actors respondents, people who are not involved in ecotourism 30 respondents and local governments as many as 10 respondents.

Data Sources, Data Collection Methods and Data Analysis

The research was conducted in Tulamben village, Kubu sub-district and Amed Abang Sub-district of Karang Asem Regency. The determination of informants based on Purposive sampling. Namely data collection techniques are done intentionally for certain purposes and considerations. In this case they are considered to understand about the Development of Marine Ecotourism. For this reason, reliable informant informants are needed and know deeply about the development of marine ecotourism. The informants chosen in this study are local community leaders who understand about the development of Marine Ecotourism.

As the main instrument in this study is the researcher himself, where researchers go directly to the field to make observations and interviews meet with respondents and informants. When conducting field observations, researchers always equip themselves with equipment such as tape recorders to record the course of the interview, a notebook containing a list of questions that should be asked and used to record the answers of the respondents.

Data collection technique

The data collection techniques used in this study are:

1. Observation, ie make direct observation to the object of research.

ISBN : 978-602-99806-3-9

2. Interviews, ie conducting interviews with field extension workers from the Tourism Office, tourism actors, fishermen and farmers in Tulamben and Amed villages.
3. Documentation, namely the way used by researchers who derived from theories on Marine Ecotourism Development.

Data obtained from observations, interviews and documentation are qualitative and quantitative data. The method used to analyze in this research is Conting Valuation Method: Willingness to Accept (WTA), Willingness to Pay (WTP). And Economic Potential Analysis and SWOT analysis (Klasen and Miller 2002).
The results achieved:

1. Identification and Inventory

Based on direct observation in the field of tourism Tulamben and Amed there are 19 potential activities of Marine Ecotourism that can be used as alternative livelihood.

The potential activities include:
- Diving
- Snorkling
- Fishing
- Lodging (hotels, villas, homestays, bungalows, hostels etc.)
- Restaurant
- Scuba diving school
- Equipment rental
- Car rental, motorbike and bike scoop.
- Money changer
- Provision of internet services
- Diving workers
- Boat rental
- Tracking
- Spa, beauty salon, massage
- Tour guide
- Attractions of Balinese arts, kecak dance etc.
- Travellagent, selling tour packages
- Tourist mocks
- Culinary, cuisine typical of the local community.

Population and Sample
Population.
A population is a phenomenon consisting of objects/subjects that have certain characteristics set by researchers to be studied which then taken the conclusion (Sugiono, 2006: 72). The population in this study are those who are engaged in marine ecotourism, people who are not involved in Marine Ecotourism, Local Government, and Tourists.
The sample is part of the population, where the determination of the sample in this case based on purposive random sampling. That is they are considered to know very well about the ins and outs of Marine Ecotourism Development. The sample size is selected: 30 tourists, 30 tourism actors respondents, people who have not involved in eco-tourism 30 respondents and local governments as many as 10 respondents.
Data Sources, Data Collection Methods, and Data Analysis
The research was conducted in Tulamben village, Kubu sub-district and Amed Abang Sub-district of Karang Asem Regency. The determination of informants based on Purposive sampling. Namely data collection techniques are done intentionally for certain purposes and considerations. In this case, they are considered to understand about the Development of Marine Ecotourism. For this reason, reliable

ISBN : 978-602-99806-3-9

informant informants are needed and know deeply about the development of marine eco-tourism. The informants chosen in this study are local community leaders who understand about the development of Marine Ecotourism.

As the main instrument in this study is the researcher himself, where researchers go directly to the field to make observations and interviews meet with respondents and informants. When conducting field observations, researchers always equip themselves with equipment such as tape recorders to record the course of the interview, a notebook containing a list of questions that should be asked and used to record the answers of the respondents.

Data collection technique. The data collection techniques used in this study are:

1. Observation, ie make a direct observation of the object of research.
2. Interviews, ie conducting interviews with field extension workers from the Tourism Office, tourism actors, fishermen and farmers in Tulamben and Amed villages.
3. Documentation, namely the way used by researchers who derived from theories on Marine Ecotourism Development.

Data obtained from observations, interviews, and documentation are qualitative and quantitative data. The method used to analyze in this research is Contingent Valuation Method: Willingness to Accept (WTA), Willingness to Pay (WTP). And Economic Potential Analysis and SWOT analysis (Klasen and Miller 2002).

The results achieved :

1. Identification and Inventory

Based on direct observation in the field of tourism Tulamben and Amed there are 19 potential activities of Marine Ecotourism that can be used as the alternative livelihood.

The potential activities include:

PE = WTP x W

PE = Rp.176.500,- x 26.793

PE = Rp. 4.728.964.500,-

It means that the economic potential of every tourist visit is Rp.4.728.964.500,-

in which :

PE = Potential of Tourism Economy

WTP Average = Average of WTP

W = Total number of tourist

Based on the above analysis it can be concluded that Marine Ecotourism is very appropriate to be used as an alternative livelihood for Tulamben and Amed Community of Karangasem Regency of Bali Province. Ecotourism Development Strategy Tulamben and Amed SWOT analysis details on SWOT Analysis Strength, Weaknesses, Opportunities and Threats how the potential of marine tourism of Tulamben and Amed. Strength Strength is the basis in determining the strategy of marine ecotourism development Tulamben and Amed to be developed as a Marine Ecotourism area. There are several strengths that Tulamben and Amed possession as follows:

Table 3 Strenght in SWT analysis

No.	Strenght
S1	Nature attraction and beach
S2	Beauty of underwater
S3	The area is strategic and easy to reach
S4	Full support from the community and Government

Weakness In marine ecotourism development strategy needs to minimize all the weaknesses, in order to achieve a great opportunity in the future development. There are some disadvantages of Tulamben and Amed tourism as follows.

ISBN : 978-602-99806-3-9

Table 4 Weakness in SWOT analysis

No.	Weakness
W1	Lack of tourist information and promotion
W2	Weak human and legal resources
W3	Insufficient clean water facilities
W4	Weak creativity of local tourism business

Opportunities

In a marine ecotourism development there needs to be an opportunity indicator. In order to determine a successful marine tourism object. There are several opportunities that have Ecotourism Bahari Tulamben and Amed.

Table 5 *Oppertunities* in SWOT analysis

No.	*Oppertunities*
O1	The location is strategic
O2	Improving the welfare of local communities
O3	Increased domestic and foreign tourists

Threat

Every threat we need to be aware of in the Development of Marine Ecotourism:

Table 6 *Threat* in SWOT analysis

No	*Threat*
T1	The existence of environmental changes
T2	Damaging visitor activities such as littering at sea.
T3	Tour competition
T4	Threat of abrasion

Strategy Formulation

The formulation of marine eco-tourism development strategy in Tulamben and Amed can be explained by using matrix. From this matrix analysis, we can recommend to those who take the policy as follows:

1. Improving the ease of transportation to the Tulamben and Amed Regions.
2. Increase cooperation with the Travel Agent in the country / abroad
3. Providing counseling to the local community about the importance of maintaining the environment.
4. Reorganize banners/pamphlet / nameplate to make it more beautiful and interesting to look at.
5. Improving the quality of human resources, especially skills that are special in accordance with the field.
6. Increase security insurance for tourists.
7. The existence of Information Counters for tourists, related to tourism activities.

ISBN : 978-602-99806-3-9

Table 7 The strategic alternative step of Marine Ecotourism Development

ISBN : 978-602-99806-3-9

Internal	Strength (S) S1 Natural attractions and beaches as well as underwater beauty S2 Potential of research and conservation S3 Leisure visitors S4 The naturalness and originality of the object area S5 Friendliness of the community S6 Adequate accommodations	Weakness (W) W1 Lack information and tourism promotion W2 Weak human resources and law W3 Insufficient clean water facilities W4 Weak creativity of tourism business, local community.
Opportunity (O) O1 Strategic location O2 Improve the welfare of local communities O3 Increased domestic and foreign tourists	S-O Strategy 1. Optimizing with agents travel tour (Tour package) 2. Improving transportation facilities. 3. Make cooperation with colleges in the field of research and conservation 4. Provide counseling the role and function of the importance of maintaining the environment	W-O Strategy 1. Arrange the board inforamasi in the form of banners, pamphlets and the like to be more interesting. 2. Increase quality of human resources especially specializing skills related to the profession.
Threat (T) T1 Potential environmental change T2 Destructive visitor activities such as dumping trash in the sea T3 Tour competition	S-T Strategy 1. Increase guarantee safety for travelers like insurance 2. Supervision and enforcement of regulations in protecting the environment	W-T Strategy 1. Include local people in tourism promotion and tourism marketing. 2. Regional designation.

Conclusion

ISBN : 978-602-99806-3-9

Based on the results of the analysis from the previous chapter it can be concluded that: - Result of identification and inventory. There are 19 potential marine business activities that need to be prioritized to continue to be developed such as: diving, snorkeling, fishing, restaurants, lodging, diving, scuba diving school, car / motorbike / bike rental, money changer, internet service, diving boat, tracking, SPA, tour guide, Bali art and cultural performances, travel agent, tourist attraction, local cuisine cuisine. - Marine Ecotourism is potential to be used as a livelihood alternative, because the community has extensive local knowledge and detailed about environmental condition and coastal resources. - The value that tourists are willing to pay for any marine business activity is higher than the value offered by the tourist actors. Namely WTP = Rp.176.500 while WTA = Rp.154.500 so there is a margin of Rp.22.000 every tourist visits the spot.

- The role of local government in ecotourism development is very dominant especially in terms of Planning, Utilization and Control of Ecotourism.

- Economic Potential. Based on the calculation that Willingness to Pay value obtained is greater than Willingness to Accept value. Economic Potential created by marine ecotourism is very big that is equal to Rp.176.500 x 26.793 = Rp.4.728.964.500. It means that every tourist visit on an object will give economic potential equal to Rp.4.728.964.500.

Based on SWOT Analysis it can be recommendedthat marine eco-tourism is very feasible to be developed with the following strategies:

• Improving cooperation with domestic and foreign travel agents

• Providing an information center related to Marine Ecotourism activities.

• Increasing safety insurance for tourists

• Improving the quality of human resources, through on-going training. So based on all the above analysis it can be concluded that it is feasible to develop marine ecotourism serve as an alternative livelihood for society of Tulamben and Amed Regency of Karangasem Province of Bali. Suggestion In this case the researcher suggests to the policy maker in this case Regional Planning Board (Bapeda) of Karangasem, so that in the function of Planning, Utilization and Controlling of Marine Ecotourism is expected to involve local community, because they have wide and detailed local knowledge about coastal environment.

BIBLIOGRAPHY

ISBN : 978-602-99806-3-9

Ashley, C, Haysom, G. 2006. "From philanthropy to a diffrent way of dooing business: strategies and challenges in integrating pro poor approchhes into tourism business". International Journal of development Southerm Africa Vol.23 No.22 pg.265-280.Rotledge, Taylor and Francis Group.

Central Bureau of Statistics of Karangasem Regency. 2010. Population Projection 2010—2015. (www.karangasemkab.bps.go.id/webb accessed 6 March 2016 at 10.10 Wita)

Central Bureau of Statistics (CBS) of Bali. 2014. Bali in Figures. (www.bali.bps.go.id/bali dalam angka, accessed 7 March 2016 at 15.19 Wita)

Department of Culture and Tourism-WWF-Indonesia. 2009. Study on Ecotourism Development. (http://www.coremap.or.id/ accessed 6 March 2016 at 15.44 Wita)

Fennel, D. A. 1999. Ecotourism: An Introduction. London and Newyork: Routledge

Gibson, C. 2009. Geographies of Tourism: Critical Research on Capitalsm and Local Livelihoods. Progress in Human Geography 33(4) 2009 pp 527-534.

Jamieson W. Goodwind H and Admunds C. 2004. Contribution of TourismTo Poverty Alleviation pro poor Tourism and The Challenge of Measuring Impacts. Transport Policy and Tourism Section, Transport and Tourism Division UNESCAP.

Klasen, L.V. and Miller, V. 2002. A New Wave of Power, People and Politics. The Action Guide for Advocacy and Citizen Participation. World Neighbour. Pustaka Utama, Jakarta.

Muhhanna, Emaad, 2007. Tourism Development Strategies and Poverty elimination. Problem and Persepectives in Management. Sumy: 2007,Vol 5, Iss 1,pg.37.14 pgs.

Nurisyah, S. 2001. Physical Development Plan of Marine Tourism Area in Coastal Region of Indonesia. Taman Bulletin and Lanscap Indonesia, Planning, Design and Management Vol.3 number 2, 2000.

Regulation of the Minister of Home Affairs No. 33, 2009. Ecotourism Development in the Region. (www.jkemendagri.go.id/produk- hukum/2009/07/07 accessed 15 April 2016 at 10.27 Wita)

PPSPL UMRAH. 2009. Study on Marine Ecotourism Development as Livelihood for Communities in Bintan Regency. Tanjung Pinang: Raja Ali Haji University.

Republic Costal Areas. Jurnal of Development Studies. Vol.43 No. 2. 340-359, ISSN 0022-0388. February 2007. New York. Rotledge, Taylor and Francis.

Rurumoen. 2012, Total Economic Concept. (www.rurumoen/blogspot.co.id accessed 9 April 2016 at 10.10 wita.

Scheyvens, R. & Momsen, J. H. 2008. Tourism and Proverty Reduction; issues For small Island States. Tourism Geographies. Vol 10, No.1, 22-41. Routledge Taylor and Francis Group.

Siegel. 1989. Multivariate Data Analysis. Jakarta: Gramedia Pustaka Utama.

Spradley, J.P. 1997. Methods of Ethnography. Yogyakarta: Tiara Wacana Yogya, page 330.

Steven C. Dinero. 2004. The Rumour of Calcuta: Tourism Charity and the Poverty of representation. Journal Of Third Word Studies, Spring 2004; 21,1. Reserch Library.pg.268.

Sugiyono, 2010, Qualitative - Quantitative Research Methods and R & D. Bandung: Alfabeta.

United Nation World Tourism Organization. 2007. Global Forecast and Profiles of Market Sigments. Vol.7.2007.

Wira Bali Tours, 2016. Amed dan Tulamben. (www.wira-balitours.com accessed 6 March 2016 at 9.51 WITA).

Wood, M. E. 2002. Ecotourism: Principles, Practices and Polices for Sustainability. UNEP.

Proceeding International Joint Conference on Science and Technology (IJCST) 2017
ISBN : 978-602-99806-3-9

Development of Computer – Based Student Working Practice Information System

I Made Sura Ambara Jaya[1], I Made Ariana[2]
Accounting Department, Politeknik Negeri Bali

Jalan Kampus Bukit Jimbaran, Kuta Selatan, Badung 80364, Bali, Indonesia

blimade39@yahoo.com

Abstract. The development of computer – based student working practice information system is needed so that the activities can be managed properly. The purpose of research is to develop model of computer – based student working practice information system. The approach used to develop information system is prototype approach. The activities undertaken are developing information system, and test of information system feasibility. Development of the computer – based student working practice information system consists of inputs, processes, and outputs development. Feasibility testing of information systems includes the technical feasibility and operational feasibility. The technical aspects measure the ability of hardware and operating system to respond the information system, simplicity and ease of use. Operational aspects relates the ability of users using the information system, the ability of the information system to produce information, and control applications of the information system. Instruments used in this test is the expert perception questionnaire with 4 Likert scale, from 1 (very poor) to 4 (excellent). The qualitative data were have analyzed descriptively, and quantitative data were analyzed by using percentage analysis. The result of research is a model of of computer – based student working practice information system. This information system model is feasible to support the implementation of student working practices.

PRELIMINARY

Work Practice is one manifestation of *Link & Match* program Bali State Polytechnic with the industrial world. Work Practice is one of the subjects that must be followed by students of the Department of Accounting Bali State Polytechnic. Work Practice held in semester VI for students of D3 Accounting Program, and in semester VIII for students of D4 Accounting Managerial Program.

The activities of Work Practice include a series of procedures that are quite long ranging from the selection of places for Work Practice, filing applications for Work Practice approval of Work Practice,

ISBN : 978-602-99806-3-9

Work Practice, Work Practice handover, handling Work Practice, monitoring, assessment by the company, award presentation to the company, with the Work Practice report exam. Internal parties to the relevant PNB in administrative procedures in the Accounting Department include: students, supervisors, administrative staff Accounting Department, Work Practice Coordinator, Head of Accounting Department, and Director of Bali State Polytechnic. In addition to internal parties Bali State Polytechnic, this procedure also involves an external party that is the supervisor at the Work Practice and leaders of agencies / companies where Work Practice.

The activities of Work Practice are routine, involving many parties, and long procedures. Therefore, the activities of this Work Practice need to be supported by computer-based information system Work Practice which is adequate so that all Work Practice activities can be managed properly. Based on the survey results it is known that the information system used is not sufficient to manage the Work Practice activities with many procedures and involving many parties. System information used can not afford reach out to all Work Practice. Therefore, the need for the development of computer-based information system Work Practice so that the administrative activities of Work Practice can be managed properly. information system Work Practice is very helpful in the preparation, implementation, and supervision of the activities of Work Practice in the Accounting Department of Bali State Polytechnic.

Based on the description in the background so that the main problem is: 1) What is the procedure Work Practice after the change of the organizational structure of the Department of Accounting Bali State Polytechnic ? 2) How is the development of computer-based information system Work Practice in accordance with the procedure Work Practice Accounting Department Bali State Polytechnic ?

The purpose of research are: 1) To determine Work Practice procedure after the change in the organizational structure of the Department of Accounting Bali State Polytechnic . 2) the development of computer-based information system Work Practice - in accordance with the procedure Work Practice Accounting Department Bali State Polytechnic

Computer-based information system is a collection of hardware *(hardware)* and software *(software)* designed to transform data into useful information Bodnar and Hopwood (2004: 3-4). Computerization can produce accurate information more quickly (Uding Sastrawan et al., 2012). Prototyping is an information systems development approach that consists of making an experimental system fast and cheap for end users to evaluate. Through interaction with the prototype, users can get an overview or idea of the information system requirements. Prototype is an experimental version of an information system or a system component, but its use is only for preparatory purposes. If the prototype can operate properly, it will be smoothed to meet user requirements (Laudon and Laudon, 2004: 395-396).

RESEARCH METHODS

The research model used is a model of research and development *(R esearch & Development).* The approach used in information system Work Practice development is the prototype approach. Types of data used are qualitative data and quantitative data. Research data were obtained from primary sources and secondary sources. Data were collected with several data collection methods, namely: Interview Technique, Observation Technique, Documentation.

RESULTS AND DISCUSSION

The field work practice system of Accounting Department consists of several procedures, namely registration procedure, briefing procedure, implementation procedure, monitoring procedure, move procedure, and reporting procedure of street vendors.

Information System Work Practice development of Computer

The results of information system Work Practice development can be described as follows

ISBN : 978-602-99806-3-9

1) Opening and Closing Applications

Application Field Work Practice information systems is done by *double click shortcut* information system Work Practice that have been provided. Next will be prompted to enter *the* correct *password.* Charging *the password* given 3 times the chance, when one application will be closed. To ***close out*** the application is done by clicking on the menu bar to initial view of information system Work Practice.

2) Entering Student Data

Student data input can be done by clicking on ***the students.*** Input student data can be done by importing data that already exist in academic administration in the form of excel. Input student data can also be done directly on ***the form*** provided

3) Entering Lecturer Data

Input data can be done by clicking faculty lecturers. Input lecturer data can be done by importing data that already exist in personnel administration in the form of excel. Input data lecturers can also be done directly on ***the form*** provided.

4) Entering Company Data

Input data can be done by clicking enterprise companies. inp ut corporate data can be carried out directly on ***the form*** provided.

5) Incorporate Request for Street work practice

Students requesting application letter to Work Practice must fill in the application letter of Work Practice. Students fill in data companies / agencies that want go to. If the company / agency is already registered then the student write no company code, if not yet registered then the student fill the data of the company / agency in full. Furthermore, the data inputted via the ***form*** as follows:

- Click on the call for Work Practice
- Choose no company code in the ***list box***
- Select the NIM no student in the ***list box***
- Fill in the number and date of the letter

6) Entering the Confirmation Data of the Work Practice

Students must make good communication with the company / institution that is designated as a street vendor. Companies / agencies provide approval directly or through students. Further approval is inputted in the following manner:

- Click the confirmation data of the Work Practice
- Choose no company code in the ***list box***
- Fill in the approval of the company / agency.

7) Incorporating Work Practice Supporters

Students who are definitely accepted Work Practice in the company / institution is given a lecturer supervising Work Practice. Input Work Practice supervisor is done in the following way:

- Click the data advisor field work practice
- Choose no company code in the ***list box***
- Select NIP lecturer in the ***list box.***

8) Print Report

a. Print the application letter of the Work Practice

Application letter where Work Practice are printed in the following manner:

- Click the application letter of the Work Practice
- Choose no company code in the ***list box***
- Select select preview / print.

b. Print the envelope of the application for Work Practice

Envelope application letter is made in the following ways:

ISBN : 978-602-99806-3-9

- Click on the samplop of the Work Practice application
- Choose no company code in the ***list box***
- Select select preview / print.

c. Student Handover Letter
News of the handover ceremony of Work Practice in Work Practice is done at the beginning of Work Practice. News of Work Practice student handover ceremony is printed in the following way:

d. Letter of Monitoring Work Practice
Monitoring conducted by supervisors in mid- Work Practice period. News of monitoring event can be printed in the following way:

e. Sell letter of Work Practice
Not done by the organizing committee Work Practice in the third month of the Work Practice period. Event news is not printed in the following manner:

f. Student's score letter
Value picking and charter submission are done at the end of the Work Practice period. The charter value and submission form are done in the following manner:

g. Thank you letter
Thank you letter printed in the following way:
- Click thank you letter.
- Choose no company code in the ***list box***
- Select select preview / print.

h. Envelope of thanks.
The thank-you envelope is printed in the following way:
- Click the thank-you letter envelope.
- Choose no company code in the ***list box***
- Select select preview / print.

i. List of Work Practice Students
Student list street vendors can be printed in the following way:

j. The list of students applying for Work Practice
The list of students who have applied for Work Practice can be printed in the following ways:

k. The Student List gets the approval of the Work Practice
List of students who have obtained approval from the company / institution where Work Practice can be printed in the following ways:

l. Attendance list
The list of students present on the event of Work Practice can be printed in the following way:

m. Activity control
During the implementation of Work Practice, students must complete daily activity controls signed by supervisors in the company. This form can be self-reproduced by the student as necessary. Control of student activity during Work Practice can be printed in the following way:

n. Company List
Information about the company / institution of student Work Practice is required for evaluation of the implementation of street Work Practice. This list can be a reference for student Work Practice next period. Work Practice The list of companies / agencies receiving street Work Practice can be printed in the following ways:

o. Company Per City
Companies / agencies receiving Work Practice can be classified based on the city where the company / institution is required to know the spread of student Work Practice Company /

ISBN : 978-602-99806-3-9

institution receiving Work Practice can be classified based on the city where the company / institution in the following way:

p. Rating company
At the end of the Work Practice period, the company gives value to student Work Practice The form of Work Practice student assessment by the company can be printed in the following way:

q. Charter for the company
The Polytechnic awarded the award certificates to the recipient companies of Work Practice. The charter for the company can be printed in the following manner:

r. Supervisor list, a list of Guidance, Guidance per lecturer, present a list of debriefing, Student Assessment by the lecturer, can be printed in the following manner:

CONCLUSIONS AND SUGGESTIONS

Based on the discussion it can be concluded as follows: 1) The system consists of several procedures Work Practice is the registration procedure, debriefing procedures, procedures for implementation, monitoring procedures, procedures to move, and reporting procedures Work Practice. 2) information system Work Practice consist of a computer-based input, process and output. Input consists of input data of students, lecturers, companies, applications Work Practice, Approval where Work Practice, registration Work Practice, and guide Work Practice. Data is processed to produce output associated with students, lecturers, companies, and Work Practice activities such as letters, envelopes, charters, and so forth.

Based on the discussion and the conclusion it can be put forward suggestions as follows: 1) The Accounting Department should use the information system Work Practice-based computers in the organization of activities of Work Practice. Information system is easy in administering the activities of Work Practice ranging from applications to reporting Work Practice. 2) The Accounting Department should appoint an employee who is assigned as the operator information system Work Practice so operators can use the information system Work Practice well so that it can provide support oftimal on the organization of Work Practice.

BIBLIOGRAPHY

Adininggar, Dika Ayu and A. Ali Wafa. 2016. Analysis of Field Work Practice Student Department of Economics PembangunanUniversitas Negeri Malang. *JPE*- Volume 9, Number 1

Arifin, Muhammad. 2014. Analysis and Design of Information Systems at the Job Training Agency / Company, *SIMETRIS Journal,* Vol 5 No 1, ISSN: 2252-4983

Bordnar, George H., Hopwood William S .. 2004. 9 th. *Accounting Information Systems.* New Jersey: Prentice-Hall, Inc.

Jogiyanto HM .. 2001. *Analysis and Design of Information Systems.* Yogyakarta: Andi Publisher

Karim, Syahrul. Yogiana Mulyani. Tuatul Mahfud, 2015. Quality Analysis Service Field Work Practice Program Students Department of Culinary Department of State Polytechnic Balikpapan. *Journal of Applied Science* No. 1 Vol. 2

Kemdikbud. 2 0 11. *Ratings Textbooks* .Jak a avg: Balitbang Kemdikbud.

Laudon, KC Kenneth, Jane P. Laudon. 2004. 8 th edition. *Management Information Systems,* New Jersey: Prentice- Hall, Inc.

McLeod, Raymond, George Schell. The translation by Teguh, Hendra. 2004. *Management Information Systems,* Jakarta: PT index.

Muslih. 2014. Analysis Internship Program Effectiveness for Sync *Link And Match* College with World Industries. *Journal of Management & Business* Vol 14 No. 01

ISBN : 978-602-99806-3-9

O'Brien James A .. 2004. *Management Information System.* Sixth Edition. New York: Mc.Graw- Hill

Post, Gerald V., David L. Anderson. 2004. 2 th edition. *Management Information Systems.* New York: McGraw-Hill

Rama, Dasaratha V. and Frederick L. Jones, 2006. *Accounting Information Systems.* Thomson South-Western.

Safitri, S. Thya. Didi Supriyadi. 2015. Design of Information Systems Web-Based Job Training with Waterfall Method. *Journal of Infotel.* Vol.7 No.1

Saragih, Pudin. 2014. Assessment of Industrial Parties Against the Level of Working Ability of Engineering Department of Mechanical Engineering Faculty of State University of Medan in Following the Industrial Work Practices. *Journal of Technology and Vocational Education*

Literature, Uding dkk .. 2012. Comparison of Application of Conventional Accounting System with Computer Based Accounting System at Trading Company. *Journal of Applied Science.* Issue II Volume 2.

Supriyadi and Sri Karnila. 2014. Design of System for Submission and Assessment of Field Work Practices at Tanjung Karang Polytechnic. *Journal of Information and Communication Technology,* ISSN: 2087 - 0868, Volume 5 Number 2

Surokim. 2016. The Influence of Field Work Experience and Self-Confidence on Student Readiness of SMK Negeri 15 Samarinda. *ejournal.psikologi.fisip-unmul.ac.id. PSIKOBORNEO* ISSN 2477-2674

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

Development of Accounting Model for Chicken Farming Business According to Financial Accounting Standard

Ni Ketut Sukasih[1], Ni Luh Nyoman Ayu Suda Susilawati[2]
Accounting Department, Politeknik Negeri Bali
Jalan Kampus Bukit Jimbaran, Kuta Selatan, Badung 80364, Bali, Indonesia

Email[1] : kasih.sukasih@yahoo.co.id

Abstract. The purpose of this research is to develop accounting guidelines for chicken farming which is in accordance with financial accounting standards. This research is a case study on the chicken farming business. The research model used is a research and development model. This type of research is descriptive research with the qualitative approach. The steps of research are: 1) to identify transactions to know the type and characteristics of transactions in chicken farming businesses; 2) to develop accounting guidelines which are in accordance with financial accounting standards for the chicken farming business. Accounting treatment includes recognition, measurement, presentation and accounting disclosure. The results of the research are: 1) the types and characteristics of transactions in chicken farming businesses is relatively similar to non-agricultural businesses in general. The difference in the accounting treatment associated with biological assets and biological products; 2) this research produces an accounting treatment model for chicken farming which is in accordance with financial accounting standards. It can be used as a reference in implementation of accounting treatment on the chicken farming business.

Keywords: accounting model development, chicken farming, and accounting standards

1. Introduction:

1.1 Back Ground

Financial report as a result the process accounting is crucial for company. According to iai the purposes of financial is to provide information related to the financial position, achievement (businesses) of the company, and change the financial position a company that are useful for users in decision-making economic. In addition, financial report also shows accountability corporate management by manage over resources entrusted to him.

ISBN : 978-602-99806-3-9

1.2 Main Problem

Based on the explanation in the background above and become main problem is how to develop a model of accounting that will be used for the chicken farming bussiness . Research would be held in 1 year with the formulation matter as follows:

1.2.1 How to identify the type and characteristic transactions that occurs in livestock chicken farming business?

1.2.2 How is the model of accounting for livestock chicken farming business according the accounting standard ?

1.3 Research Purposes

1.3.1 General Purpose

The general purpose of this research is to develop a model of accounting for the chicken farming business according to accounting standards.

1.3.2 Specific Purpose

The specific purpose to achieve is:

1.3.2.1 To identify the types and characteristics of transactions that occur in chicken farming businesses.

1.3.2.2 To develop a model of accounting for chicken farming businesses in accordance to accounting standards.

1.4 Research center

This Research was conducted to meet the implementation of agriculture PSAK 69 for financial statements annual which began in or after 1st of January 2018 .To impose PSAK 69 influences accounting for chicken farming bussiness.If not carried out there is no accounting model for chicken farming bussiness appropriate PSAK 69 practical used as reference in accounting treatment on chicken farming bussiness.The results of a model of accounting for chicken farming bussiness would give some references in learning the accounting.

2. Theory

2.1 Empirical Study

Cahyani and aprilina (2014), researched the application of their SAK was or higher evaluation ETAP for reporting biological assets on farms superior farm bogor . Pasaribu (2014) research on the application of accounting biological assets in PT Maiska Bhumi (review of the theoretical IAS 41). This research only discussed about some parts of the financial reports that talk about assets or biological assets. This research used their SAK was or higher etap or ias 41 as major criteria for PSAK 69 quality of agriculture not dkonvergensi by IAI .Development model of accounting for animal husbandry scope broader , and referring to their sak was or higher , especially PSAK 69 and PSAK other related.

2.2 Road Map Research

ISBN : 978-602-99806-3-9

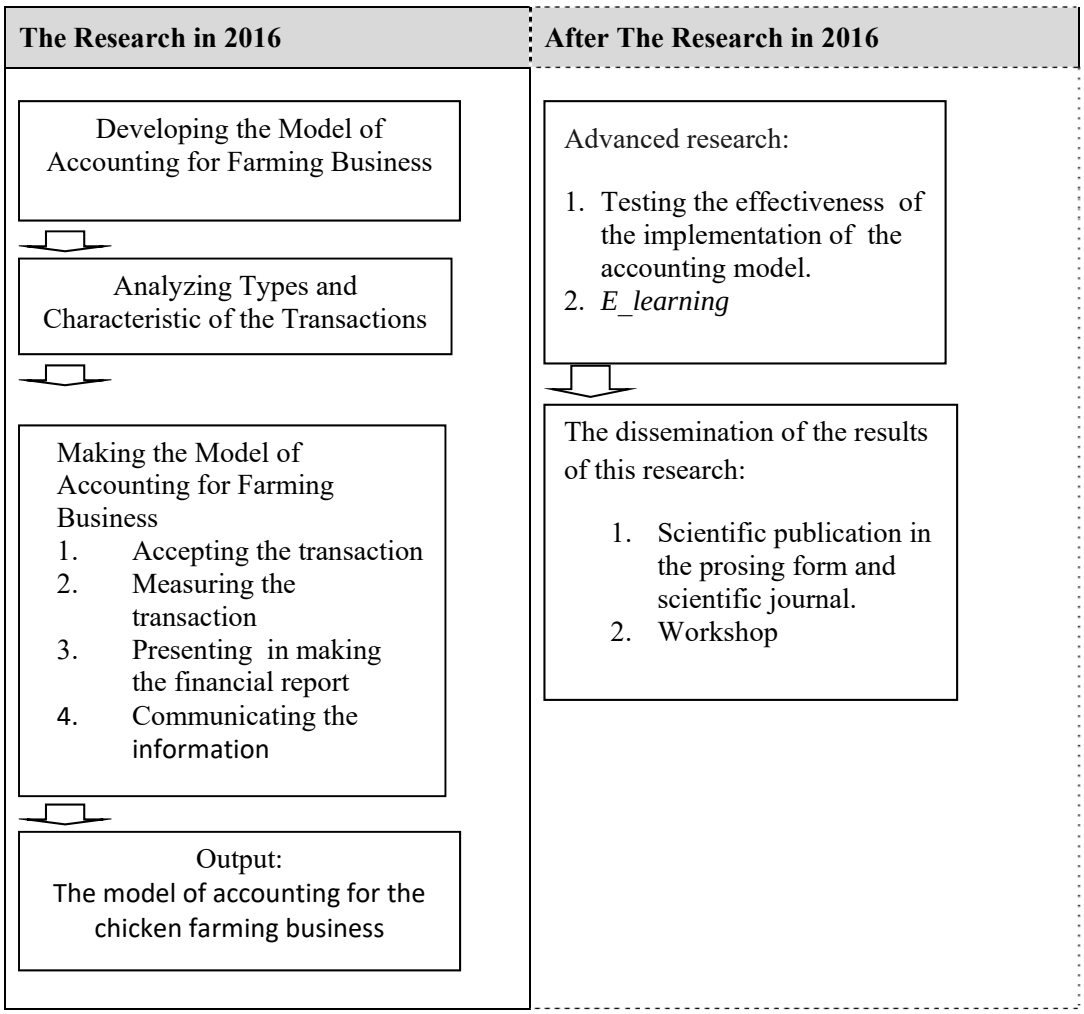


Figure 2.2
***Road Map* of this Research**

3. Research methodology

3.1 Research Model

The research methods that be used in this research is research and development model. This scheme below explains the procedures in developing model.

ISBN : 978-602-99806-3-9

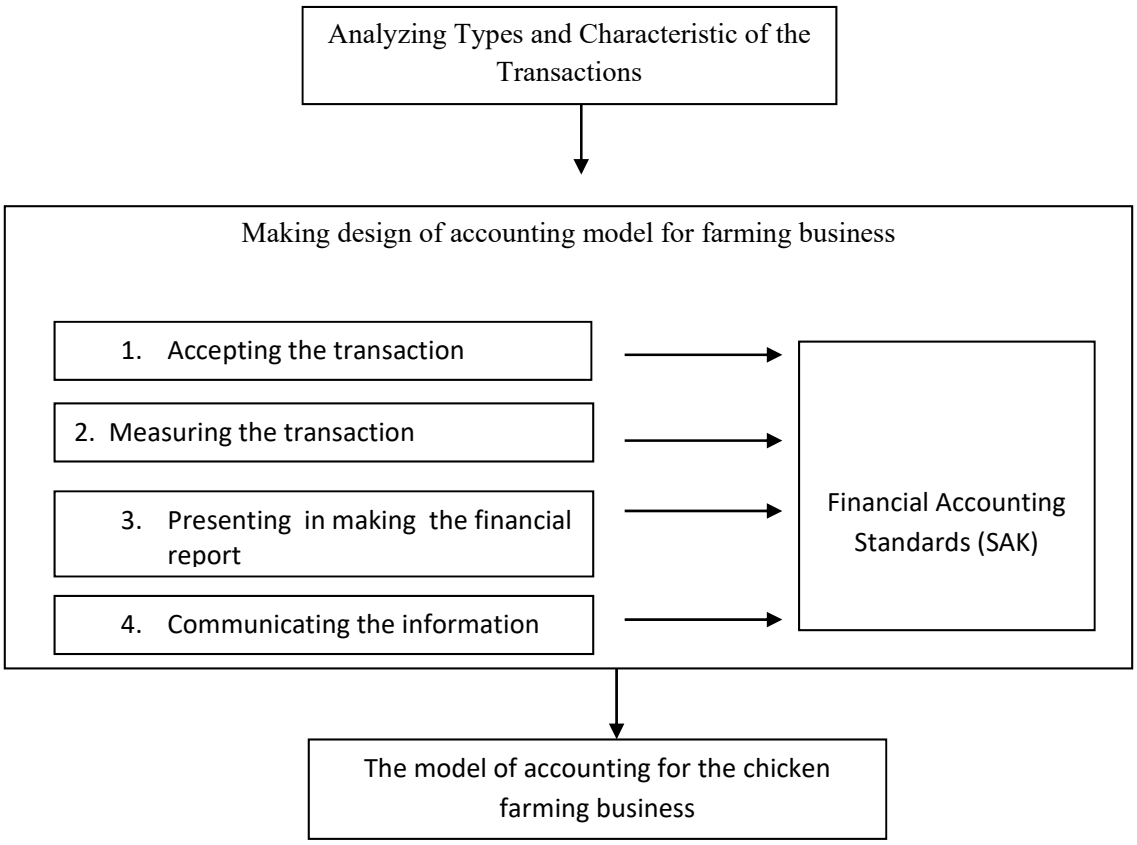


Figure 3.1
Procedures of Developing Accounting Model

3.2 Object and Research Location

The object of this research is the accounting model that be used for chicken farming business in Penebel Village, Tabanan District.

3.3 Sampling technique

Sampling technique that be used is linear snowball sampling. Sample

3.4 Data Analysis Technique

The method that be used is the method of descriptive analysis with a qualitative approach (Sugiyono, 2013: 3) . Descriptive qualitative analyisis will be conducted by describing the operational activities, the analysis results of type and characteristic transactions, and determine the treatment of accounting that is in accordance to the accounting standard (SAK).

ISBN : 978-602-99806-3-9

References

Budiman, Erwin. S. Pangemanan. S. Tangkuman. 2012. 2014. Analisis Perlakuan Akuntansi Aktiva Tetap pada PT. Hasjrat Multifinance Manado. *Jurnal EMBA* Vol.2 No.1

Cahyani, Ranny Catary dan Vita Aprilina. 2014. Evaluasi Penerapan SAK ETAP dalam Pelaporan Aset Biologis pada Peternakan Unggul Farm Bogor.*JRAK*. Vol. 5 No. 1 Hal.14 - 37

Hendrich, Mahdi. 2013. Analisis Perhitungan Harga Pokok Produksi pada Usaha Peternakan Lele Pak Jay Di Sukabangun II Palembang. *ILMIAH*Volume V No.I1I

Ikatan Akuntan Indonesia. 2009. *Standar Akuntansi Keuangan Entitas Tanpa Akuntabilitas Publik*. Jakarta: Salemba Empat.

Ikatan Akuntan Indonesia (IAI). 2015. Standar Akuntansi Keuangan. Jakarta: Ikatan Akuntan Indonesia (IAI)

Kartikahadi, Hans, dkk.. 2012. *Akuntansi Keuangan Berdasarkan SAK berbasis IFRS*. Jakarta: Penerbit Salemba Empat.

Kieso, Donal E. Weygant, Jerry J. dan Warfield, Terry D. 2014. *Intermediate Accounting*. IFRS Edition. Jhon Wiley and Sons.

Martani, Dwi, dkk.. 2016. *Akuntansi Keuangan Menengah Berbasis PSAK*. Jakarta: Penerbit Salemba.

Pasaribu, Christina Natalia.2014. Penerapan Akuntansi Aset Biologis pada PT Maiska Bhumi Semesta (Tinjauan Teoritis IAS 41). Jurnal Kajian Ilmiah Akuntansi Fakultas Ekonomi UNTAN (KIAFE). Vol 3, No. 1

Samryn. 2012. *Pengantar Akuntansi, Mudah Membuat Jurnal dengan Pendekatan Siklus*. Jakarta: PT Raja Grafindo Persada.

Sugiyono, 2013. Metode Penelitian Kuantitatif dan Kualitatif (R&D). Cetakan Ke-19. Alfabeta CV. Bandung

Suwardjono, 2014. Teori Akuntansi Perekayasaan Pelaporan Keuangan Edisi Ketiga. Cetakan Ke-8. BPFE. Yogyakarta

ISBN : 978-602-99806-3-9

Spreadsheet-based accounting application with transaction cycle approach for manufacturing company

Ni Luh Nyoman Ayu Suda Susilawati[1], Ni Ketut Sukasih, I Made Ariana
Accounting Department, Politeknik Negeri Bali
Jalan Kampus Bukit Jimbaran, Kuta Selatan, Badung 80364, Bali, Indonesia

Email[1] : ayu_ssila@yahoo.com

Abstract. Spreadsheet-based applications are widely used by companies to process accounting data. Therefore, the development of spreadsheet-based accounting applications with transaction cycle approach is important for the company. The purpose of this study is to develop the spreadsheets – based accounting application with transaction cycle approach for manufacturing company. The study model used was adapted from Borg & Gall's research and development model. The activities undertaken are conducting needs analysis, developing the spreadsheets – based accounting application with transaction cycle approach for manufacturing company, and test its feasibility. Data obtained consisted of quantitative and qualitative data. Qualitative data include of the comments and suggestions contained in the questionnaire. Instruments used in this evaluation is the expert perception questionnaire with 4 Likert scale, from 1 (very poor) to 4 (excellent). The feasibility of application includes the technical and operational aspects. The technical aspects measure the ability of hardware and operating system to respond the spreadsheets – based accounting application, simplicity and ease of use. Operational aspects relates the ability of users using the spreadsheets – based accounting application, the ability of the spreadsheets – based accounting application to produce information, and control applications of the spreadsheets – based accounting application.The qualitative data were have analyzed descriptively, and quantitative data were analyzed by using percentage analysis. The conclusions of study are: 1) the spreadsheets – based accounting application with transaction cycle approach for manufacturing company consists of purchase cycle, sales cycle, material use cycle, and cash cycle; 2) the spreadsheets - accounting application is feasible from the technical and operational aspects.

Keywords: accounting, transaction cycles, manufacturing, spreadsheet

1. Introduction

Companies need to have effective and efficient data processing methods. The data processing methods chosen by the company can vary from simple to complex. This option is adjusted to the volume of data processed, the complexity of data operations, data processing time constraints, and others. When the volume of data is processed more and more, the more complicated the operational data, and time constraints in generating information, then the use of software (software) computer becomes more important. Computer-based accounting applications used by companies to process data into information required by users. Companies can use off the selft accounting software or developing Accounting Applications. From off the selft accounting software produced by suppliers and sold to users. The developed accounting applications are developed independently in accordance with the operations of each company (Rama and Jones, 2006: 8).

ISBN : 978-602-99806-3-9

Spreadsheet-based applications are widely used by companies to process accounting data. Given the importance of the role of spreadsheet-based applications in the company, the students of Accounting Department of Bali State Polytechnic need to be equipped with the ability to design and use spreadsheet-based accounting applications. Therefore, students are not only given accounting practices manually but must also be given computer-based accounting practices.

The cost accounting labrary is one of the practice courses in Accounting Department of the Bali State Polytechnic. The cost accounting labrary module used is still manual. Spreadsheet-based spreadsheet cost accounting module with transaction cycle approach has not been used because based on the survey result (shop / library) it is known that there is not yet a cost accounting lab module that suits the needs of Accounting Department. Therefore, it is necessary to develop application of spreadsheet-based manufacturing accounting cycle with transaction cycle approach as the basis for preparing the cost accounting labrary module.

The purpose of this res earch is to produce model of spreadsheet-based manufacturing accounting cycle application with transaction cycle approach, and produce cost accounting labrary module in Accounting Department of the Bali State Polytechnic.

The use of spreadsheet-based manufacturing accounting cycle application with transaction cycle approach in accounting learning can improve the understanding and mastery of teaching materials. Nurcholisah et al. (2011) examines the use of excel programs to improve the teaching and learning process in the introductory course of accounting. Masruroh (2015), examines the development of accounting module based on scientific approach on cost accounting subjects. Novianti (2015), examines the development of fixed asset based scientific approaches to support the implementation of K-13. Each of these studies examined only a small portion of the cost accounting material. The development of spreadsheet-based practice module with transaction cycle approach is expected to improve student competence. According Sugiarta (2008), the use of computer-based introduction laboratory computer module can improve the implementation of learning programs, learning activities, and learning outcomes. According Triandi and Stephanie (2010), computerized by using Microsoft Excel can produce accurate information more quickly. According to Ariana (2016), the use of basic computer-based accounting practice module with transaction cycle approach can improve student competency achievement. Transaction processing system consists of three cycles, namely purchasing cycle, income cycle, and conversion cycle (Rama dan Jones, 2006: 8). The transaction cycle approach makes it easy in accounting learning (Samryn, 2012).

The module is a form of instruction-based instructional material designed for self-study. Teaching materials are materials or lecture materials systematically arranged by lecturers and students in lecturing process (Unpad, 2011), Kemdikbud (2011), Daryanto (2013). Several researches on the development of teaching materials have been done, among them by Thelbic Lasut (2015), Yani Ramdani (2012), and Triananingsih (2007).

The purpose of module writing by Directorate of Higher Education (2014) and Unibraw (2010) is to clarify and simplify the presentation of messages so as not to be verbal, to overcome the limitations of time, space, and the sensory power of learners and learning resources, can be used appropriately and varied. According to Daryanto (2013: 9) and Schomsin Widodo and Jasmadi (2008), a module can be said to be good and interesting and improves learning motivation if there are self instructional, self contained, stand alone, adaptive and user friendly characteristics.

2. Research methods

In this research used research and development model (Research & Development) Borg & Gall. This approach is often used in research development of teaching materials. Modifications to this approach are tailored to the development undertaken (Pujiati: 2007).

This research is designed to take place in two years where the research and development procedure is carried out in seven stages, the 1st year is: 1) needs analysis, 2) development of spreadsheet-based accounting cycle application with transaction cycle approach, 3) testing of spreadsheet-based accounting cycle application with cycle approach transactions, 2nd year, namely: 4) determination of costing laboratory module model module, 5) development of cost accounting module draft, and 6)

ISBN : 978-602-99806-3-9

testing of cost accounting lab module. Data collection methods required in the development of the first year of the survey and interviews and instruments of data collection by questioner

3. Result and discussion

3.1 *Spreadsheet application draft*

The application of manufacturing accounting cycles with a transaction approach is designed to be used in completing the manufacturing company's accounting cycle. The application sections of this accounting cycle are as follows:

3.1.1 *Company information*

Company information contains company information, accounting information, authorization information, and language options. Company information includes the company name, address and city where the company is located. Accounting information includes; Information on the dates, and periods covered in the financial statements, and the VAT rates. Authorization information includes the names of officials and positions authorized to authorize. The choice of language contains language options for use in print reports and financial reports (Indonesian or English). Automation is only done on account data. The account data will be automated in such a way as to optimize the use of the IF () function and the VLOOKUP () function by taking into account the language options in the enterprise information section.

3.1.2 *Account*

The account consists of two parts: a full account and an account. The full account contains information about a relatively more complete account. While the contents of the account tailored to the choice of language, if Indonesia is selected then the name of the account in the Indonesian language that appears, if not selected then the English language that appears is the account name in English.

3.1.3 *Costs*

The fee contains information about the serial number, cost name, cost number, sub charge, H / D, beginning balance, and final balance.

3.1.4 *Vendor*

Vendors contain information about the serial number, vendor name, vendor number, address, city, phone, terminal, and beginning balance of payable on each vendor.

3.1.5 *Customers*

The customer contains information about the serial number, customer name, customer ID, address, city, phone, customer details and outstanding balance

3.1.6 *Inventory*

The inventory contains information about the serial number, item name, item number, unit, purchase price, selling price, initial amount, and inventory value.

3.2 *Transaction Cycle*:

3.2.1 *Purchase cycle*

The purchase cycle form is used to enter transactions related to the buying, purchasing, repurchase, and debt repayment cycle arising from purchases made on credit. This section will be automated in such a way by optimizing the use of the appropriate IF () and VLOOKUP () functions and formulas.

3.2.2 *Sales cycle*

The sales cycle form is used to include transactions related to the sales cycle, ie sales, sales proceeds, and receivables arising from sales made on credit. This section will be automated in such a way by optimizing the use of the appropriate IF () and VLOOKUP () functions and formulas.

3.2.3 *Cash cycle*

Cash cycle form is used to enter transaction related to cash cycle that is cash transaction not from debt payment transaction arising from purchase, not from transaction of cash receipt from revenue from sale. This section will be automated in such a way as to maximize the use of the appropriate IF () and VLOOKUP () functions and formulas. Cycle of material use

ISBN : 978-602-99806-3-9

The form of material use cycle is used to enter data relating to the use of materials for the production process. This section will be automated in such a way as to maximize the use of the appropriate IF () and VLOOKUP () functions and formulas.

3.2.3.1 *Purchase journal*

The form of a purchase journal is an output containing the date, invoice, description, ref, debit (purchase, VAT input, transportation cost), credit (debt). Automation is done by maximizing the use of IF (), SUMIF (), and VLOOKUP () functions, as well as the appropriate formulas.

3.2.3.2 .*Sales journal*

The form of sales journal is output containing date, invoice, description, ref, debit (receivable), credit (sales, VAT proceeds, catch income). Automation is done by optimizing the use of the functions IF (), SUMIF (), and VLOOKUP (), as well as the appropriate Cash Adjustment formula.

The form of cash receipts is output that contains date, no deck, description ref, debit (cash, deduction), credit (receivable, income, penalty, etc.). Automation is done by optimizing the use of IF (), SUMIF (), and VLOOKUP () functions, as well as the appropriate formulas. Journal liquidation of cash

The form of cash dispensing journal contains date, check, description, ref, debit (debt, fin charges, etc), Credit (purchase, cash). Automation is done by optimizing the use of IF (), SUMIF (), and VLOOKUP () functions, as well as the appropriate formulas.

3.2.3.3 *Journal of materials Use*

General journal forms include general journals to record material use transactions. General journal form contains date, no BPPB, description, no account, account name, amount, debit, and credit). Automation is done by optimizing the use of IF (), SUMIF (), and VLOOKUP () functions, as well as the appropriate formulas. General ledger

General journal forms include general journals to record transactions that can not be recorded in special journals, journal adjustments and journal closures. General journal form contains date, no proof, account name, no account, debit, and credit). Automation is done by optimizing the use of the functions IF (), SUMIF (), and VLOOKUP (), as well as the appropriate formula

3.3 *Ledgers and subsidiary ledgers*

3.3.1. *Ledgers*

The ledger form contains the account name, account number, date, description, ref, debit, credit, and balance (debit, credit). Automated ledgers by optimizing the use of IF (), SUMIF (), and VLOOKUP () functions, as well as the appropriate formulas.

Debt help book

The Debt Relief Form contains vendor names, vendors, addresses, cities, dates, descriptions, debits, credits, and balances. Automated debt help book by optimizing the use of IF (), SUMIF (), and VLOOKUP () functions, as well as the appropriate formulas.

3.3.2.*Subsidiary ledgers*

3.3.2.1 *Additional trade receivables*

The forms of accounts receivable of a child consist of customer name, no customer, address, city, date, description, debit, credit, and balance. Automatic accounts receivable ledgers by optimizing the use of IF (), SUMIF (), and VLOOKUP () functions, as well as the appropriate formulas

3.3.2.2 *Inventory of books*

The helper auxiliary form contains the name of the goods, no goods, units, beginning balance, date, description, debit, credit, amount. Auxiliary authors book by optimizing the use of IF (), SUMIF (), and VLOOKUP () functions, as well as the appropriate formulas.

3.3.2.3 *Additional book costs*

Additional fee form contains date, description, debit, credit, amount. Automated cost help book by optimizing the use of IF (), SUMIF (), and VLOOKUP () functions, as well as the appropriate formulas.

3.4 *Trial balance, and worksheet*

3.4.1. *Trial balance*

ISBN : 978-602-99806-3-9

The trial balance form contains account names, account numbers, debits and credits.

3.4.2. *Worksheet*

The worksheet form contains no account. account name, trial balance (debit/ credit , adjustment (debit / credit), adjusted trial balance (debit / credit), profit &loss (debit/credit), financial position (debit / credit).

Trial balance, and worksheet data are outputs in the manufacturing accounting cycle application with a transaction cycle approach. Trial balance, and work sheet are performed automatically by optimizing the use of IF (), SUMIF (), and VLOOKUP () functions, as well as the appropriate formulas.

3.5 *Financial statements*

3.5.1 *Income statement and other co mprehensive income*

This form contains the components of the income statement and other comprehensive income as defined in IFRSs.

3.5.2 *Statement of financial position*

This form contains the components of the statement of financial position as set forth in IFRSs.

3.5.3 *Statement of changes in equity*

This form contains the components of the statement of change in equity as stipulated in IFRSs..

3.5.4 *Statements of cash flows*

This form contains the components of the cash flow statement as defined in IFRSs.

3.5.5 *Notes to the financial statements*

This form is the place to fill the notes to the financial statements as contained in IFRSs

Financial statement data in addition to notes on financial statements is the output in the application of manufacturing accounting cycles with a transaction cycle approach. The financial statements (income statement and other comprehensive statements of income, statement of financial position, statement of changes in equity, and cash flow statement) are performed automatically by optimizing the use of the appropriate IF (), SUMIF (), and VLOOKUP () functions and formulas. More Reports

In addition to the financial statements, this application can also generate other reports such as cost reports (cost recapitulation, cost allocation, and production costs), list of accounts payable, and list of accounts receivable.

3.6 *Ending balance*

The trial balance form includes account name, account number, debit and credit. The closing balance sheet data is the output in the accounting cycle application with the transaction cycle approach. The balance of the balance is closed automatically by optimizing the use of the functions IF (), SUMIF (), and VLOOKUP ()

3.7 *Application controls*

Application controls which is used to improve the application control of the accounting cycle among others; password file, protect workbook, protect sheet, locked, data validation, and conditional formatting.

3.8 *Application menu*

The application menu is used to set the dialog between the inside of the application. This menu is designed by considering the process in accounting.

3.9 *Spreadsheet application tests*

Testing spreadsheet application draft I

The first draft test of the accounting cycle (I) is carried out by providing a questionnaire to accounting experts and computer experts to assess the feasibility of applying the accounting cycle

ISBN : 978-602-99806-3-9

from a technical and operational point of view. Technical aspects include; hardware and operating systems support the implementation of the accounting cycle, simplicity and ease of use of accounting cycle applications, while the operational aspects include; the ability of users to use the accounting cycle application, the ability of the accounting cycle application to generate the necessary information, and the control of applications owned by the accounting cycle application.
. Based on the results of draft test I accounting cycle from the technical point of view, it can be seen that 40% agreed, and 60% strongly agree that the hardware and operating system can support the implementation of the accounting cycle. 12.5% disagree, 77.5%, agree, and 10% strongly agree on the simplicity and ease of use of the accounting cycle application. Thus it can be said that the application of the accounting cycle has met the technical aspects of computer-based applications
And from the operational aspect it can be seen that 25% of respondents stated disagree, 70% agreed, and 5% stated strongly agree that users can use the accounting cycle application. 15% of reviewers stated disagreed, 47.5% agreed, and 37.5% stated strongly agree that the accounting cycle application can produce the necessary information. 43.3% of examiners stated that they did not agree, 50% agreed, and 6.7% stated strongly agree that the application of the accounting cycle has adequate application control. Thus it can be said that financial accounting applications have met the operational aspects of computer-based applications. Suggestions submitted by experts for the improvement of this application have been implemented. The suggestion is:
1) The column headings of a particular form can be used to record transactions with higher complexity.
2) Need to make the link easier to move between the inside of a sheet of paper.
3) Marking the parts on the worksheet that has been filled with functions and formulas to facilitate its use.
4) Utilize the use of protection to secure the division of functions and formulas made on the application

4.Conclusions and recommendations

4.1.*Conclusion*
Based on the discussion can be summarized as follows:
1). Students judge that manual lab manual module is good. Students expect spreadsheet modules cost-effective as needed.
2). The concept of applying a spreadsheet-based manufacturing accounting cycle with a transaction cycle approach using multiple transaction cycles, namely the buying cycle, sales cycle, material use cycle, and cash cycle.
3). Experts judge that the design of a spreadsheet-based manufacturing accounting cycle with a transaction cycle approach meets the technical and operational requirements of computer-based applications.
4.2 *Suggestion*
Based on the conclusions that can be suggested to the Accounting Department of Bali State Polytechnic must provide spreadsheet-based cost accounting lab module in accordance with the need to increase its influence.

5. Acknowledgments
We wish to thank for the financial support of the Directorate Research and Devotion of Society Directorate General Reiforcement Research & Development of the Ministry Research, Technology and higher education in Indonesia, technical staff and all those who have been assisted in conducting this research.

References

ISBN : 978-602-99806-3-9

[1] Ariana . 2016. *Pengembangan Aplikasi Siklus Akuntansi dengan Microsoft Excel Dengan Pendekatan Siklus Transaksi.* Jurnal Valid.Vol.13 No.2

[2] Daryanto . 2013. *Menyusun Modul Bahan Ajar untuk Persiapan Guru Dalam Mengajar*.Yogyakarta : Penerbit Gaya Media.

[3] Dikti . 2014. *Pengembangan Bahan Ajar*.www.http://dikti .go.id/files/atur/KTSP. Kemdikbud. 2011.*Penilaian Buku Teks Pelajaran*. Jakarta: Balitbang kemdikbud.

[3] Lasut, Thelbic.2015. *Analisis Biaya Produksi Dalam Rangka Penentuan Harga Jual Makanan pada Rumah Makan Ragey Poppy di Tomohon*. Jurnal EMBA Volume 3.

[4] Masruroh . 2015. *Pengembangan Modul Akuntansi Piutang Berbasis scientific Approach Pada Mata Pelajaran akuntansi Biaya.* Jurnal Pendidikan Volume 3.

[5] Novianti . 2015. *Pengembangan Modul Aset Tetap Berbasis Pendekatan Saintifik sebagai Pendukung Implementasi K-13.* Jurnal Pendidikan.volume 3

[6] Nurcholisah dkk..2011. *Penggunaan Program Exel untukMeningkatkan Proses Belajar Mengajar pada Mata Kuliah Pengantar Akuntansi.* Prosedding SNAV

[7] Pujiati . 2007. *Bahan Ajar Praktikum Pengantar Akuntansi untuk Mahasiswa Jurusan Akuntansi* . Jurnal Ekonomi & Pendidikan.Volume 4 No.2

[8] Rama, Dasarata V.dan Jones Frederick L. 2006.*Accounting InformationSystems*. Thomson South-Western.

[9] Ramdani, Yani . 2012. *Pengembangn Instrumen dan Bahan Ajar untuk Meningkatkan Kemampuan Komunikasi,Penalaan dan Koneksi Matematis dalam Konsep Integal.* Jurnal Penelitian Volume 13

[10] Samryn. 2012.*Pengantar Akuntansi , Mudah Membuat Jurnal dengan Pendekatan Siklus.* Jakarta: PT.Raja Grafindo Persada.

[11] Sugiarta, I Komang . 2008. *Metode Pembelajaran Laboatorium Pengantar Akuntansi Menggunakan Microsoft Excel , pada Jurusan Akuntansi di Politeknik Negeri Bali.* Jurnal Pendidikan dan Pengajaran Undiksa No.2

[12] Sugiono. 2012. *Metode Penelitian Bisnis.* Bandung : CV.Alfabeta

[13] Triananingsih. 2007. Pengembangan Bahan Ajar untuk Meningkatkan Materi Mata Kuliah Demografi Teknik. *Jurnal Ekonomi dan Pendidikan*. Volume 4.

[14] Triandi dan Stephanie, Thresia. 2010. Penerapan Proses Akuntansi Menggunakan Microsoft Excel pada Perusahaan Sinar Harapan. *Jurnal Ilmiah Ranggagading*. Volume 10 no 2. 113-120

[15] Universitas Brawijaya . 2010. *Pedoman Umum Penulisan Bahan Ajar.* Malang: Pascasarjana Unibra.

[16] Widodo, S Chomsin dan Jasmadi . 2008. *Panduan Penyusunan Bahan Ajar Berbasis aplikasi Kompetensi*. Jakarta: PT Elex Media Komputindo.

ISBN : 978-602-99806-3-9

The Analysis of Operation and Maintenance Costs of Retention Basin in Besakih Based on the Characteristics of River and Local Social Cultural Religeous Condition

Ida Bagus Putu Bintana, I Made Suardana Kader
Politeknik Negeri Bali
gusbint@yahoo.com, imadesuardanakader@gmail.com

Abstract :- Karangasem is one of the regencies in Bali with the highest percentage of critical land condition. With this condition, during the dry season people in the area have difficulty to get clean water for both every day or livestock purposes. In 2009, the government has built Retention Basin in Banjar Temukus, Besakih Village, Rendang, Karangasem to fulfill the needs of water in the dry season for the people around the area. The problem is that the Government has not yet calculated the operating and maintenance costs required to operate the retention basin. Worth to be noted thatits function depends on the operating system and maintenance supported by one of them by operating and maintenance cost.
This research tried to conduct a detailed technical study to determine the cost of operation and maintenance (O&M) both for routine O&M and for periodic O&M.
This study found that the routine operational costs is Rp 27.939.000, -, routine maintenance costs is Rp. 92,374,000, while the requirement of periodic operational cost which emphasized on investment to improve the complementary building condition and maintenance which aim to maintain the function of the building is Rp. 563,892,000,-.

1. Introduction

Retention Basin in Besakih aimed to hold water, and is an alternative solution to overcome the water shortage during the dry season. To support the sustainable function of retention basin,the analysis of the amount of operation and maintenance costs is urgently needed so that its function can be maintained well.

For that reason, knowing what kind of buildings that are located in Retention basin of Besakih and how much is the cost of O&M needed to maintain the function of Besakih retention basin are important. This needs to be done considering that retention basin inBesakih, which has the most semi-dry area in Bali,depends a lot on water reservoirs to help people overcoming water supply problems during the dry season.

Assessment of the retention basin performance is done to determine the functional percentage of the building. This is done because it is closely related to the operation and maintenance activities later. The building condition terminology can be classified according to the degree of damage [5].

The estimation of the cost and funding needs for the retention basin operation is done by calculating the real need costs of its operation and maintenance. Their unit cost is determined based on the type and frequency of O&M activities [6] where it can be divided into 3:annual, periodical, and special activities.

Annual / routine O&M activities are scheduled routinely in duration of less than one year or with a certain frequency such as daily, weekly or monthly. Annual O&M activities include the following activities: drafting the annual operation plan of retention basin, equipment operation, office operations;conducting maintenance activities including maintenance of water reservoir dam, cutting

ISBN : 978-602-99806-3-9

grass, dredging sediment controlling dam, pipe maintenance, etc., painting, monitoring, inspecting and evaluating activities including visual inspection, equipment operation test. This activityis done periodically in more than 1 year. These activitiesmay be done periodically or dependon the needs in the field. The special activities include the costs for the emergency repair and rehabilitation as a result of urgent condition or just for back up fund.

The arrangement of unit price for O&M of retention basin is based on PU Regulation No 11 of 2013 about the Analysis of Unit Costs in Public Works Sector especially section 2, AHSP on Water Resources [9].

The purpose of this study is to map the existing buildings and determine the cost of retention basin O&M in Besakih. Meanwhile this study hopefully could be beneficial in providing an overview or a reference in order to determine the cost requirements of Operation and Maintenance of Besakih retention basin, making it easier for the Government in planning the budget.

2. Method of Research

The research is conducted in the form of information gathering (primary and secondary data collection), field survey, problem analysis, and the formulation of O&M costs.

A preliminary study was conducted to see the early data on Besakih retention basins. Direct observation and field observation showed that retention basins in Temukus, Besakih village, Rendang , Karangasem was built in 2009 and used by 66 families, having dimensions of 100 meters x 40 meters x 5 meters, with total water reservedis 16,750 m3. Type of Construction: landfill, geo-membrane, geogrid, geotextile with the type of collecting-water dam consisting of fixed dam with masonry construction completed with guard house type 36 and 2 field officers in which 1 person is paid by the Karangasem Government and 1 person is paid by *Balai Wilayah Sungai Bali Penida* (Department of River Area in Bali and Penida).

The scope of this study is the O&M Cost Calculation routinely, periodically or in special time. This was analyzed based on the basic unit price analysis issued by the Government of Karangasem and Bali Province

Instruments required in this research included earth map for Rendang district, documentation of O & M field activity, basic map of Glogor River flow system and the result of the soil characteristicstest.

Analysis of data was conducted to determine the type of building and current condition of the building. Unit price analysis was used to determine the unit price for each item, as well as socio-cultural and economic analysis that was taken into account to consider the additional costs to the O& M related with socio-cultural conditions of society.

3. Result and Discussion of the Study

Retention Basin of Besakih is located in Temukus, Besakih Village, Rendang, Karangasem Regency. This retention basin has a very strategic role as a provider of water, especially in the dry season for the surrounding community. It also helps the activities of religious ceremonies in Besakih Temple. Technical data of Besakih Retention Basin can be seen in Table 3.1 below:

Table 3.1 Technical data of Besakih Retention Basin

NO.	NAMA EMBUNG	LOKASI	TAHUN DIBANGUN	SUMBER DANA	JUMLAH BIAYA	LAYANAN	TUBUH EMBUNG					RUMAH JAGA	KRAN UMUM	PIPA	PENJAGA EMBUNG	KETERANGAN
							DIMENSI (M)			VOLUME TAMPUNGAN	KONSTRUKSI			DISTRIBUSI		
					(RP)	(KK)	P	L	T	(M3)			(UNIT)	(M')		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	BESAKIH	DSN. TEMUKUS	2009	APBN	11,899,546,000.00	66	100.00	40.00	5.00	16,750.00	TIMB. TANAH	ADA	10	5,584	I NGH. DANII	PETUGAS DARI BWS BALI PENIDA
		DS. BESAKIH			(TOTAL)						GEOTEXTILE					
		KEC. RENDANG			6,000,000,000.00						GEOGRID				I NENGAH MUDANA	PETUGAS DARI DINAS PU. KAB.

Source : *Balai Wilayah Sungai Bali Penida* (Department of River Area in Bali and Penida)

ISBN : 978-602-99806-3-9

The main river where the water is caught in Besakih retention basin is Glogor River. It is located in the north of Besakih retention basin. The river in general is an intermittent volcanic river with the riverbed consists of the rock material from Mount Agung with a very steep incline. The average width of the river is between 3-6 m. Dense vegetation is observed on the upstream of water reservoir dam that potentially brings the sediment after the rainy season ends. Upstream area is a state forest area located on the southern slopes of Mount Agung.

Figure 3.1 The Condition of Watershed in Glogor River

The water reservoir dam at Besakih retention basin is constructedwith pairs of stone and has been completed with a water-draining building with an intake and its filter. At the time of the visit, it can be observed that this dam is very well-maintained. To get to this dam, there are an800 m - foodpath whose width is 0.5-1 m.Thus, some parts of the waycan be taken by motorcycle.

Figure 3.2 The Condition of Upstream of Dam on Besakih Retention basin.

Besakih Retention basin has been completed with water supply pipes and reservoirs as a mud container before the water goes into the retention basin. Data ofwater reservoir damon Besakih retention basincan be seen in Table 3.2 below:

ISBN : 978-602-99806-3-9

Table 3.2 Building Inventory of Water reservoir dam on Besakih Retention basin

NO.	NAMA BANGUNAN	JENIS	DIMENSI				KONDISI				FOTO
			PANJANG (M)	LEBAR (M)	TINGGI (M)	DIAMETER Cm	BAIK	RUSAK			
								RUSAK RINGAN	RUSAK SEDANG	RUSAK BERAT	
1	Pelimpah	Pasangan Batu		6	1,5		Baik				
2	Sayap Hulu (Kanan Kiri)	Pasangan Batu	16	0,5	3,5		Baik				
3	Sayap Hilir (Kanan Kiri)	Pasangan Batu	20	0,5	3		Baik				
4	Pintu Penguras	Pintu Baja Stang Tunggal		0,8	2		Baik				
5	Pintu Intake Kiri	Pintu Baja Stang Tunggal		0,6	1,5		Baik				
6	Pipa Intake	Pipa PVC dengan lubang	4			20	Baik				
6	Kantong Lumpur (1 Buah)	Beton	6	3	2,5			Penutup Hole Berkarat			
7	Pipa Pembawa (2 buah pipa)	HDPE	1700			25	Baik				

Source : Result of Survey, 2017

Besakih retention basin has been equipped with body pool, geomembrane, retaining wall in the north, wire fence around the pool, parking lot, guard house and barbed wire fence and gate in the south. The complete building ofwater reservoir damcan be seen on the Table 3.3 below:

Table 3.3 Building Inventory of Besakih Retention basin

NO.	NAMA BANGUNAN	JENIS	DIMENSI			KONDISI				FOTO
			PANJANG (M)	LEBAR (M)	Tinggi (M)	BAIK	RUSAK			
							RUSAK RINGAN	RUSAK SEDANG	RUSAK BERAT	
1	Tubuh Bendungan	Timbunan Tanah Geogrid Geotextile Geomembran	100	40	5	Baik				
2	Tangga OP	Tidak ada								
3	Peilschal	Baja			5	Baik				
4	Pipa Inlet 3 buah Diameter 10 inch	Baja				Baik				
5	Geomembran		100	40	5	Baik				

NO.	NAMA BANGUNAN	JENIS	DIMENSI			KONDISI				FOTO
			PANJANG (M)	LEBAR (M)	Tinggi (M)	BAIK	RUSAK			
							RUSAK RINGAN	RUSAK SEDANG	RUSAK BERAT	
6	Reservoir (3 buah)	Beton	4	4	2	Baik				
7	Jalan Akses	Beton	1600	3		Baik				
8	Rumah Jaga (Tanpa listrik)	Type 36	6	6		Baik				
9	Pagar	Baja	280		4	baik				
10	Taman Parkir	Paving	40	10		baik				
11	Pagar Kawat Pondasi pasangan batu	Kawat Berduri	250		4	baik				

Source : (Survey 2017)

ISBN : 978-602-99806-3-9

The assessment of the retention basin performance is done to know the functional percentage of the building. This is done because it is closely related to the operation and maintenance activities later.

The results of the assessment of the building condition of Besakih retention basin can be seen in Table 3.4 and Table 3.5 as follows:

Table 3.4 The Assessment of Water Reservoir Dam in Besakih Retention Basin

NO.	NAMA BANGUNAN	JENIS	DIMENSI				KONDISI				Kinerja (%)	FOTO
			PANJANG (M)	LEBAR (M)	TINGGI (M)	DIAMETER Cm	BAIK	RUSAK				
								RUSAK RINGAN	RUSAK SEDANG	RUSAK BERAT		
1	Pelimpah	Pasangan Batu		6	1,5		Baik				95	
2	Sayap Hulu (Kanan Kiri)	Pasangan Batu	16	0,5	3,5		Baik				95	
3	Sayap Hilir (Kanan Kiri)	Pasangan Batu	20	0,5	3		Baik				95	
4	Pintu Penguras	Pintu Baja Stang Tunggal		0,8	2		Baik				95	
5	Pintu Intake Kiri	Pintu Baja Stang Tunggal		0,6	1,5		Baik				95	
6	Pipa Intake	Pipa PVC dengan lubang	4			20	Baik				95	
6	Kantong Lumpur (1 Buah)	Beton	6	3	2,5			Penutup Hole Berkarat			95	
7	Pipa Pembawa (2 buah pipa)	HDPE	1700			25	Baik				95	

Source : Analysis Result

Table 3.5 The Assessment of Besakih Retention Basin Building Performance

NO.	NAMA BANGUNAN	JENIS	DIMENSI			KONDISI				Kinerja %	FOTO
			PANJANG (M)	LEBAR (M)	Tinggi (M)	BAIK	RUSAK				
							RUSAK RINGAN	RUSAK SEDANG	RUSAK BERAT		
6	Reservoir (3 buah)	Beton	4	4	2	Baik				95	
7	Jalan Akses	Beton	1600	3		Baik				95	
8	Rumah Jaga (Tanpa listrik)	Type 36	6	6		Baik				95	
9	Pagar	Baja	280		4	baik				95	
10	Taman Parkir	Paving	40	10		baik				95	
11	Pagar Kawat Pondasi pasangan batu	Kawat Berduri	250		4	baik				95	

Source : Analysis Result

After several field visits and deep observations, some problems found in Besakih retention basin can be stated as follows:

1. The water reservoir dam requires a door house, 2 x 2 m in size, with the intention of reducing the rusting potential of the door

ISBN : 978-602-99806-3-9

2. Electricity is required on the guard house, for night lighting and supports the activities of the officer.
3. The dam needs a gazebo on which can be used as a resting place for officer in the dam
4. The road with width of 1 m as far as 1800 m to access the dam needs to be repaired. Currently, the road is a very slippery especially after raining or in the morning.
5. A concrete road which costs 150 m with width 4 m needs to be built for an easy access for the people around the retention basin.

The society around retention basin is mostly farmers and cowbreeder as well as sellers in Besakih temple. The farmers usually plant flower especially *Kenikir* flower and *Kasna* flower for offerings in Bali. Besides, there are also tomatoes, oranges, chili and clove. The marketing of the agriculture is done through the collectors who come to the location or sell directly to the market in Klungkung regency.

Local people believe that retention basin has function as water source for all needs include for religious purposes. Therefore, people have responsibility to keep retention basin. It can be shown by the result of survey and direct observation in the field in which retention basin is used as a place for begging holy water.

Historically, *Tri Hita Karana* concept is an ancient Balinese concept of which emphasize on living harmony with the natural environment, society, and to God. It is also as a balance concept between fulfilling material or individual needed and social spiritual needed.

The term of *Tri Hita Karana* concept means three causes of prosperity, wealth, and happiness in human life (Sudarma, 1971; Kaler, 1983). Those three causes of happiness can be done through creating a peaceful living between human and God, among human beings, and between human and environment. The implementation of *Tri Hita Karana* also relates with Balinese activities that live near the river.

a. Parahyangan
   Parahyangan is one of the three concepts which relates to the God. For Balinese people who live near the river, this concept is implemented through *Taman Beji* temple which is located near the river.
b. Palemahan
   Palemahan is the concept of life which represents a harmonic relationship between human and environment. The implementation of this concept is showed by cleaning the river to keep the environment balance.
c. Pawongan
   Pawongan is the concept of living in harmony among the society. For Balinese people who live near the river, this concept is implemented by showing tolerance among the society.

The concept of *Sad Kertih* comes from the word *Sad* which means six. *Kertih* means a positive result. This concept reflects that in order to keep living in harmony and balance, there are six things to do such as *Atma Kertih; Samudra Kertih; Wana Kertih; Danu Kertih; Jagat Kertih* dan*; Jana Kertih*. The concept of *Sad Kertih* can be found in Lontar Purana Bali (I Ketut Wiana, 1999 – paghe 48; 2007 – page 14). On six pages which are talked about *Danu Kertih*, it is stated that some efforts are needed to maintain water source such as spring, lake, river, etc. So, this concept shows that the society who live besides the river have important role to keep the river well functioned for the future.

In *Manawa Dharmasastra* IV.56 stated that it is forbidden to spit, pee and defecate to the river. Moreover, the people are also banned to speak rude words or throw poisonous things to the river. This policy wants to persuade the society not to allow polluting the water source, river, lake and also retention basin in any forms to keep the environment holy, clean and sustainable.

Based on the research, it can be described the existence of retention basin for the surrounding society, so it is needed Operation and Maintenance cost to keep the sustainability of retention basin.

The estimation cost for conducting O&M activities can be done through the calculation of Real Need Operation number and Maintenance of retention basin or known as AKNOP which is analyzed based on the type and the frequency of its activities.

The number of real need O&M can be showed in table 3.6 and table 3.7 as follows:

ISBN : 978-602-99806-3-9

Table 3.6 Real Need Operation number of Retention Basin in Besakih

NO.	URAIAN	SATUAN	JUMLAH	HARGA SATUAN	TOTAL PERTAHUN
1	Tenaga Operasi (12 bulan)	Orang/bulan	1	1,800,000	21,600,000
2	Service Sepeda motor + ganti oli dan spare part (12 kali)	kali	1	120,000	1,440,000
3	Biaya listrik	bulan	1	200,000	2,400,000
3	Biaya samsat sepeda motor	kali	1	220,000	220,000
4	Biaya pulsa (perbulan)	Ls	1	100,000	1,200,000
5	Buku laporan bulanan	Ls	1	30,000	360,000
6	Pulpen	buah/bulan	2	6,000	72,000
7	Penghapus white board	buah/bulan	2	12,000	288,000
8	Spidol	buah/bulan	2	6,000	144,000
9	Jas Hujan	buah/tahun	1	100,000	100,000
10	Sepatu boat	pasang/tahun	1	65,000	65,000
11	Senter	buah/tahun	1	50,000	50,000
				Jumlah	27,939,000

Source : result of analysis

Table 3.7 Real Maintenance number of Retention Basin in Besakih

ANGKA KEBUTUHAN PEMELIHARAAN RUTIN EMBUNG BESAKIH

NO.	URAIAN	SATUAN	JUMLAH	HARGA SATUAN	TOTAL PERTAHUN
1	Pemeliharaan bangunan kantor dan fasilitasnya, di luar pengecatan (misal perbaikan genteng, pintu, kran air, dll)	Ls	1	7.500.000	7.500.000
2	Pemeliharaan peralatan eletrikal (misal penggantian lampu, AC, lampu jalan, kabel, baterai, dll)	Ls	1	3.500.000	3.500.000
3	Pembersihan rumput di jalur bendung penangkap (3 bulan sekali)	m2	750	2.553	7.659.000
4	Pembersihan rumput di areal kolam (3 bulan sekali)	m2	1500	2.553	15.318.000
5	Pengecatan pipa (setahun sekali)	m2	200	28.158	5.631.600
6	Pengerukan sedimen di bendung penangkap (6 bulan sekali)	m3	18	63.204	2.275.344
7	pengerukan sedimen di bak kantong lumpur (6 bulan sekali)	m3	2,88	63.204	364.055
8	pengerukan sedimen di kolam embung (6 bulan sekali)	m3	120	63.204	15.168.960
9	Pengecatan pintu intake dan penguras (setahun sekali)	m2	4	28.158	112.632
10	Pemeliharaan pintu	Ls		924.110	1.848.220
11	Pengecatan kawat BRC	m2	160	28.158	4.505.280
12	Penambalan kerusakan geomembran	Ls	1	3.500.000	3.500.000
13	Pwebaikan dan penggantian seal sambungan pipa	Ls	1	3.500.000	3.500.000
14	Biaya Upakara sehari-hari	Bln	12	500.000	6.000.000
15	Biaya Upakara Piodalan	keg	2	7.500.000	15.000.000
14	Pengadaan alat pemeliharaan				
	Sabit	buah	2	50.000	100.000
	Skop	buah	2	65.000	130.000
	Tali plastik	m	20	8.000	160.000
	Penyaring sampah panjang	buah	2	50.000	100.000
				Jumlah	92.373.091

Source : Result of analysis

O&M is emphasized on maintenance which is done regularly. The aim is keeping the function of its building. For further explanation can be seen on table 3.8 as follows:

Table 3.8 Real Need number maintenance Retention basin in Besakih

NO.	URAIAN	SATUAN	JUMLAH	HARGA SATUAN	TOTAL
1	Sepeda motor	buah	1	16,000,000	16,000,000
2	Pengadaan listrik 1300 VA	Ls	1	3,500,000	3,500,000
3	Papan OP	buah	1	350,000	350,000
4	Papan plat penunjuk arah	buah	3	600,000	1,800,000
5	Papan nama	buah	1	600,000	600,000
6	Rumah pintu (2 x 2)	buah	1	12,000,000	12,000,000
7	Bale bengong untuk pelinggih di bendung	buah	1	12,000,000	12,000,000
8	Jalan beton dari jalan utama menuju embung	m3	27	2,184,143	58,971,861
	lebar 6 m, panjang 30 m				-
9	Jalan beton dari embung ke bendung penangkap	m3	210	2,184,143	458,670,030
	lebar 1,5 m, panjang 700 m				
				Jumlah	563,891,891

Source : Result of analysis

ISBN : 978-602-99806-3-9

4. Conclusions and Suggestions

From the result of the analysis and field observation through technical field investigation, the conclusion can be stated as follows:

1. There are 2 main building of retention basin in Besakih such as:
   1) Water collecting
   2) Main building of retention basin
2. Retention basin in Besakih is well functioned. It can be proven by having index technical performance above 90%
3. Besakih retention basin is really needed by the society for water needed such as ceremonial purposes, bath, and farms.
4. The needs of operational cost of retention basin in Besakih is Rp. 27.939.000,-
5. The needs of maintenance routine cost of retention basin in Besakih is Rp. 92.374.000,-
6. The needs of maintenance regularly cost of retention basin in Besakih is Rp. 563.892.000,-

Looking at the importance of retention basin in Besakih for the society, it can be suggested that it should be provided operational and maintenance cost so that retention basin in Besakih will be well function accordance with the plan for the society. Balinese people also can preserve the existence of retention basin in Besakih by inserting the status of retention basin to the regulation or *perarem subak* as a duty to keep and preserve it.

References

[1] Agus Maryono, 2003. *Pembangunan Sungai Dampak Dan Restorasi Sungai*. Yogyakarta : Universitas Gajah Mada Press.
[2] Balai Penelitian dan Pengembangan Pengairan.2000, *Standar Nasional Indonesia : Perhitungan Banjir Rancangan.* Jakarta : Departemen Pekerjaan Umum, Bidang Sumber Daya Air.
[3] BPS Kabupaten Karangasem,2012. *Karangasem Dalam Angka 2012*. Amlapura, Pemerintah Daerah Kabupaten Karangasem.
[4] CD. Sumarto, 1985. *Hidrologi Teknik.* Surabaya : Usaha Nasional
[5] Kodoatie, Robert dan Sjarief, Rustam, 2005.*Pengelolaan Sumber Daya Air Terpadu* . Yogyakarta: Andi
[6] Linsley, R.K dan Franzini, Josep B. 1995.*Teknik Sumber Daya Air.* An Jakarta: Erlangga
[7] Santoso, Gempur. 2005. *Fundamental Metodologi Penelitian Kuantitatif dan Kualitatif.* Jakarta: Prestasi Pustaka
[8] Sharin, 1990. *Statistical Of Hidrology*. Mc.Graw Hill
[9] ri Harto.1993. *Analisa Hidrologi.* Jakarta : PT. Gramedia Pustaka Utama
[10] Suyono Sosrodarsono dkk. 1993. *Hidrologi Untuk Pengairan*. Jakarta : Pradnya Paramita
[11] Ven Te Chow, 1987. *Hidrolika Saluran Terbuka*. Jakarta : Erlangga

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

Cash flow optimal analysis on NPV risk based on break event point of various types of housing in housing development projects

I Gusti Agung Istri Mas Pertiwi[1], I Wayan Suasira[1], Wayan Sri Kristinayanti[1], Evin Yudhi Setyono[1], Ketut Wiwin Andayani[1]

[1]*Bali State of Polytechnic, Civil Engineering Departement PO Box 1064*
E-mail : maspertiwi72@yahoo.co.id

Abstract : Community's need for simple type of house is a problem for the government in order to improve the quality of life of the community. The developers or residential developers attempt to offer homes by making various types of homes that are of interest to the public is of high value, artistic as well as the acquisition of adequate benefits. On the other hand, the construction project is one of the temporary projects with a relatively high degree of uncertainty of risks compared to projects in the non-construction sector. The risk of time and cost risks on construction projects will ultimately lead to reduced profits, due to inaccurate regulation of cash flow optimally. The impact of the inaccuracy of the cash flow arrangement to housing investment has an effect on the very low profit gain so that it affects the quality of the house produced. This study aims to determine the optimal cash flow that can be planned in order to obtain optimum profit by taking into account the break-even point of sale of various types of homes in housing development in Denpasar so that obtained housing with adequate quality and affordable by the community. The research method begins with cost planning analysis, determining the cash flow scenario and break-even point analysis with the concept of cash flow to find the optimum profit. The results of the interim research resulted in the Break Event Point (BEP) cutoff point at the five alternative points at maximum capacity with the minimum Present Worth Cost (PWC) value in alternative 4 with the house type ratio of 1: 6: 3. This indicates the construction of housing with the number of luxury type house types larger than the middle house and the modest house resulting in a high PWC value. While the composition of the comparatively low and medium-sized homes larger than the luxury homes yields a relatively lower PWC value. Based on the feasibility indicator analysis, the Net Present Value (NPV) shows that the number of housing units and the combination of types of houses offered, as well as the local land market price, is very influential in the cash flow planning to obtain the optimal cash flow that yields the maximum NPV value. And from the result of project sensitivity analysis to the value of change of key variable, the project obtained is very sensitive to the type of housing with the number of housing units and the relatively small land price and the variables that are very influential on the sensitivity of the project feasibility value is the construction cost reaches 89.6% and first-year earnings reached 69.4%

Keywords : cash flow, benefit, break even point

INTRODUCTION

The development of settlements today is increasing. This is in line with the development of housing projects with the aim of meeting the needs of the community will be beautiful and comfortable dwelling. But in the implementation of the investor or the developer need to know the certainty of investments

ISBN : 978-602-99806-3-9

invested in a large amount of funds, as an illustration and reference for investors in analyzing the feasibility of investment in further development projects.

Property investments include capital-intensive investments or require substantial capital. The inappropriateness of cash flow arrangements leads to a non-optimal profit gain. It takes a more careful financial calculation by taking into account some cash in or cash out alternatives in cash flow. Based on the results of research from Martho F.Tolangi [1], Optimal Cash Flow Analysis on the Contractor of Housing Development Project concluded that the flow of funds or cash flow is affected by the length of payment and the amount of the down payment. It is important to consider the addition of the advance amount on each payment. This means one of the alternative cash flow arrangements that can be applied to cash flow planning.

The high cost of property development also affects the selling price of the house, causing the decrease of profit obtained by the housing developer. Housing developers are usually more interested in developing a luxury house type (for the middle to upper class) because it is more profitable in terms of benefits than if developing a simple home type. But on the other hand more people need a simple type of house according to their ability. The high community need for simple type of house is a problem for the government in order to improve the quality of life of the community. The developers or residential developers will attempt to offer homes by making various types of homes of interest by people of high value, attractive looks and predicted market aspects. Thus the developer can get the desired profit cost. Based on the results of the study Wahyu Ramadan [2], Cost Analysis Developer Benefits From Price Selling Different Types of Houses in Building Housing states that the biggest advantage is obtained from the sale of luxury type houses with fewer units of the type of simple house.

The break-even point is a useful management tool in the planning process because it provides a relatively quick and easy way to estimate the sales volume needed to cover operating costs and fixed costs. But when using calculations in forecasting, the provisions that must be made in the calculations for improvements in operating efficiency are the likely impact of inflation. [3] Based on the results of the study Dimi Ofileanu mentioned that the breakeven point is an important analytical instrument to measure the effects generated by the selling price, with variable unit costs, and with fixed costs to be achieved before the entity to obtain an optimum profit. [4] The results of Marek Potkan's research also concluded that the priority of the absolute contribution indicator of higher value products has a positive impact on improving economic outcomes, but on the fixed form of total revenues required to achieve the BEP provides the same level of contribution of relative margins of this product [5]

METHODOLOGY

The types and sources of data used in this study are as follows:
a. Primary data
Primary data, ie data source research obtained directly from the original source in the form of interviews, polls from individuals or groups (people) as well as observations of an object, event or test results (objects).
b. Secondary Data
Secondary Data is the source of research data obtained through intermediate media or indirectly in the form of books, records, existing evidence, or archives whether published or not published in general.

The Data Collection Method used in this study are:
1) Library Studies

ISBN : 978-602-99806-3-9

Namely research conducted by reading literature such as reading books, scientific magazines, both from college and obtained from libraries, internet and other sources. Data obtained from this manner is additional data as a support or often referred to as secondary data.

2) Field Research
That is research conducted directly to the relevant sources to obtain data about the state of the field and the price of local units.

The research stages are as follows:
1. Determining the object of research is the housing that in the planning and implementation phase with a combination of several types of houses type luxury house type, middle type and simple home type.
2. Survey of the field to determine the condition eksisiting as data calculation budget project cost.
3. Plan several cash flow scenarios with a combination of selling several types of houses to find out break even point.
4. Develop a cash flow scenario to analyze the optimum cash flow on the NPV @ Risk value with the CrystalBall software program.
5. Financial Feasibility Analysis with data input on cash flow in the form of distributed data so that the results of the calculation of these numbers are scattered in a distribution that has been arranged in the program into a distribution of the results of these calculations.

RESULT AND DISCUSSION

Object of Research

The object of research is housing in the area of Denpasar city. Housing used as research object consists of 3 (three) housing, that is housing with variable number of units (32 units, 75 units, 100 units) hereinafter called housing type 1, housing type 2 and housing type 3.

Analysis of Housing Investment Costs

Cost component is a very important component in an investment. Therefore it is necessary to get serious attention, especially in determining the comparison between cost as own capital, investor capital cost and capital cost as a loan from financial institution. In this analysis the cost component component structure is 40% loan capital and 60% investor capital. The consequences of using a loan as one of the funding in investing, then arise interest on the loan as a component of financing. Interest rates are based on the development of investment credit interest rate between 2007 and 2017, obtained interest rate of at least 5,75%, the most frequent interest rate is 7.50% and the maximum interest rate is 9,50%. Secondly, the interest rates of banks supporting the project are BNI (9,95% -12,5%), BRI (8,75% - 13%), BCA (9,75% - 10,5%) and BPD (10.31% -12,34 %). So the loan interest rate used is 12% for bank loan capital with a loan term of 10 years.

Housing costs include:

Housing Investment Cost

ISBN : 978-602-99806-3-9

The calculation of investment cost is calculated based on data from Housing project and other supporting data. The components of investment costs consist of: land procurement, legality and licensing, infrastructure and facilities costs, and construction cost of the building.

1) Land Procurement Cost

Land for this housing consists of the cost of purchasing land. The price of land to build this housing ranges from Rp 400,000.000,00 to Rp 700.000.000,00 per acre. By knowing the land area of each housing location then calculated the cost incurred for the procurement of land / land.

2) Legality and Licensing Fee

Types of legality and permits on housing to become ready-to-build stocks that must be met by the company in the implementation of housing projects consist of Land Use Permit and Land Use (IPPT) issued by the National Land Agency (BPN), License Determination Location (IPL) issued by the Regional Planning and Development Agency (Bappeda), Public Works (PU) and District Government (Pemkab), Site Plan Approval and Permit, and Building Permit (IMB), which includes the incorporation and splitting of land certificates. Estimated cost of legality and licensing 10% of total construction cost.

3) Infrastructure and Facilities Costs

The cost of infrastructure in this housing includes the infrastructure of the park, the gate that includes the guard post, landfills, roads, channels, PJU lights, the procurement of PLN electricity network as well as PDAM water supply network. Based on the results of research Abdul Adhim in the Cost Analysis Analysis Infrastructure Housing obtained percentage of infrastructure and facilities costs ranged from 5% to 6% of the cost of construction.

4) Building Construction Cost

The cost of building construction in this housing includes the construction of various types of houses in each housing in accordance with the number of units planned. The cost of building construction is obtained by multiplying the Budget Plan (RAB) type of house with the number of housing units to be created.

5) Total Investment Cost

Total investment cost is derived from the sum of land procurement costs, legality and licensing, infrastructure and facility costs, and construction cost of the building. After the total total investment cost is obtained.

6) Operation and Maintenance

Expenses for residential operations Housing costs consist of electricity, water, telephone, employee salaries, marketing expenses, and estate management costs. Estimated operating expenses are assumed to be 10% of the cost of construction.

The cost of building construction changed according to the combination of house type comparison, with 5 comparison alternatives.

ISBN : 978-602-99806-3-9

Housing Benefits Analysis

The projected income from each Housing is obtained from the sale of housing units based on field data which is then assumed based on the sales trend. Housing units offered on each housing are calculated according to the type of house. The price of housing units includes SHGB (Surat Hak Guna Bangun), IMB (Building Permit), electrical installation, water, and landscape.

The calculation of the housing benefit is obtained by combining house type comparisons with 1: 3: 6 residential concept, ie one luxury house, three medium houses and one simple house by combining the comparison so as to obtain some cash flow alternatives and then analyzed by simulation of monte carlo to obtain cash flow optimum.

Break Even Point Analysis

Housing construction can actually be done by making a comparison of house type plans to minimize the cost of building construction and supporting costs. Housing development by maximizing the type of luxury homes, may be done along with the actual needs of consumers. Where the actual needs of consumers will usually follow the behavior of market growth (product life cycle). Initially the actual needs are still relatively small which will then increase gradually until it finds the maximum needs. If the maximum increase in actual demand will be achieved in a relatively short period of time, the option to build a luxury type house in maximum capacity (full capacity) becomes the best option. But if the reverse event, the need for maximum capacity is still long enough, consider the development with various combinations of house type comparisons can be one of the rational considerations. This can certainly increase the productivity of the investment itself, and will reduce the amount of investment that must be inculcated from the beginning of the activity, reduced operating costs and maintenance of facilities and other non-productive costs.

To find out the conditions on how to construct various combination of house type that produces an optimal and productive investment, it is done break even point analysis to find the optimum condition. An investment cash flow is not always obtained completely, which consists of cash in and cash out, but can be measured directly cost aspects or benefits only. Cash Flows whose benefits are taken into account are called Present Worth of Benefit (PWB) whereas if only the cost is called Present Worth of Cost (PWC).

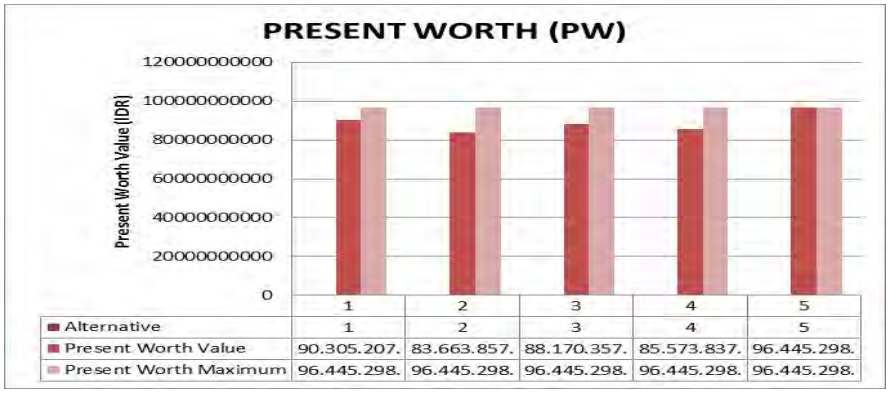


Figure -1 BEP Chart of Housing Type 1

ISBN : 978-602-99806-3-9

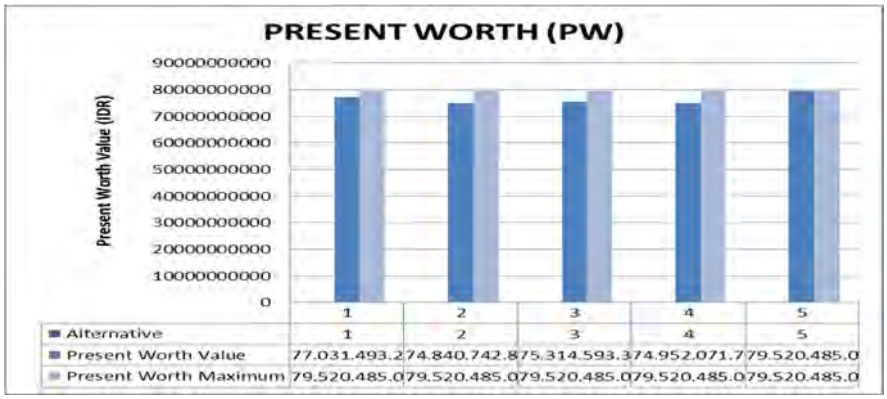


Figure - 2 BEP Chart of Housing Type 2

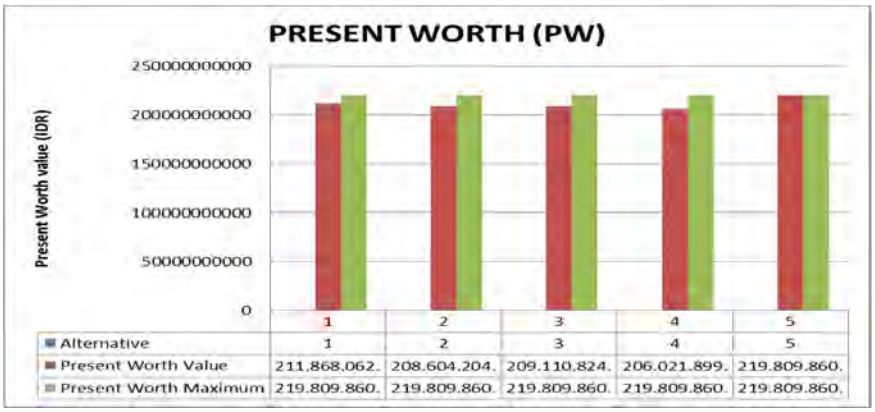


Figure - 3 BEP Chart of Housing Type 3

Based on the BEP analysis various alternative house-type comparisons with three samples of housing with different land and type of house produce BEP cutoff point at alternate point five that is at maximum capacity with minimum PWC value on alternative 4 with house type ratio 1: 6: 3. This shows the construction of housing with the number of comparison types of luxury homes larger than middle houses and simple homes generate high PWC value. While the composition of the comparatively low and medium-sized homes larger than the luxury homes yields a relatively lower PWC value.

Optimal Cash Flow Analysis

Once a number of alternatives are selected and the planning horizon is established then the estimated cash flow will be possible. The estimated cash flow is made by considering the prediction of future conditions as well as considering trends depicted by past data. Cash flow in this case considers the maximum costs incurred from a combination of house type comparisons. The optimum cash flow is obtained by comparing the financial feasibility indicator (NPV) and sensitivity analysis using CrystalBall software.

To find out the optimal cash flow from the five alternatives in each housing, the analysis is continued with Net Present Value (NPV) and Benefit Cost Ratio (BCR) method which yields the NPV> 0 and BCR> 1 values as a feasibility indicator. And based on the analysis of these two indicators is done by

ISBN : 978-602-99806-3-9

comparing the ratio of NPV and BCR maximum resulting from the five cash flow alternatives analyzed. NPV analysis of three types of housing in Denpasar area can be seen in the following graph:

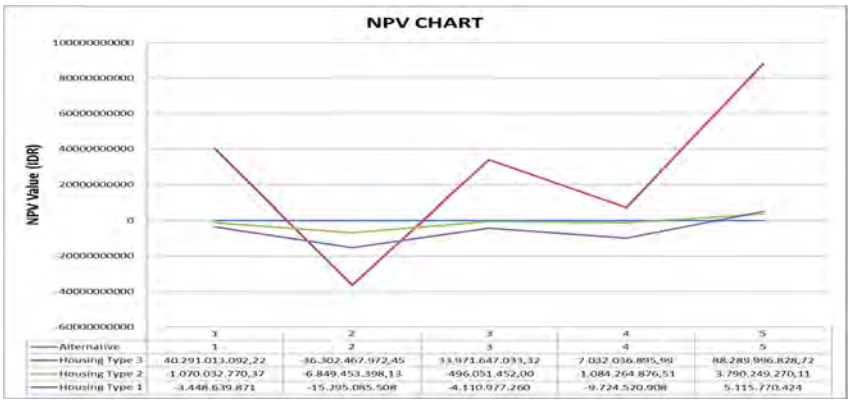


Figure - 4 Recapitulation of NPV Value

Based on the above NPV chart, it can be seen from 5 alternative types of house combination that the value of NPV is positive (decent) in housing type 3 (except alternative 3) with maximum NPV value occurring in alternative 5 with combination of whole luxury house type and second place is alternative 1 with a combination of house type 1: 3: 6 according to existing housing and settlement regulations and requirements. While for housing type 2 and type of housing 1 obtained a positive NPV value (feasible) only on the alternative combination of type 5 home by making one type of house type with luxury house category. Based on the analysis of the above feasibility indicator, the optimal cash flow is obtained from alternative 5 on housing type 3. The result shows that the number of housing units and the combination of the type of house offered and the local land market price significantly influence the cash flow planning to obtain the optimal cash flow that produces maximum NPV and BCR values.

Analysis of NPV @ Risk with Monte Carlo Simulation

The costs and benefits generated on each alternative will be the input of uniform distributed data that includes the lowest and highest values of all alternatives in each housing. With the help of CrystalBall program is a program to calculate numbers that have the value of uncertainty scattered or distributed among a certain value. These distributed numbers are calculated randomly introduced by Monte Carlo. Furthermore, it is enhanced by structured random calculation with certain simulation structure. The results of these numbers are scattered in a distribution that has been arranged in the program into a distribution of the results of these calculations. With the value of such distribution as mentioned above, then performed simulation with CrystalBall software. The results obtained for each type of housing are as follows:

ISBN : 978-602-99806-3-9

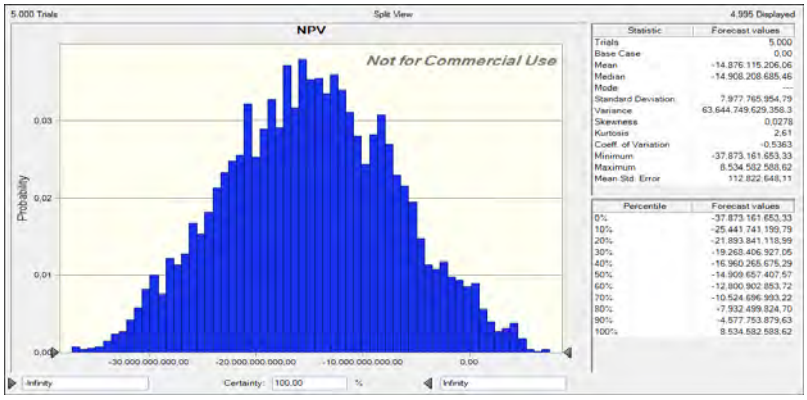


Figure - 5 Sensitivity NPV of Housing Type 1

Retrieved NPV profile with NPV possibility ≤ Rp -14.909.657.407,57 of 50% with minimum NPV value Rp -37.873.161.653,33 and maximum Rp 8,534,582,588,62. Based on the simulation result, it is said that the risk of this project is below 50% and NPV is negative with 90% probability which means that the project is not feasible because the value of NPV is negative.

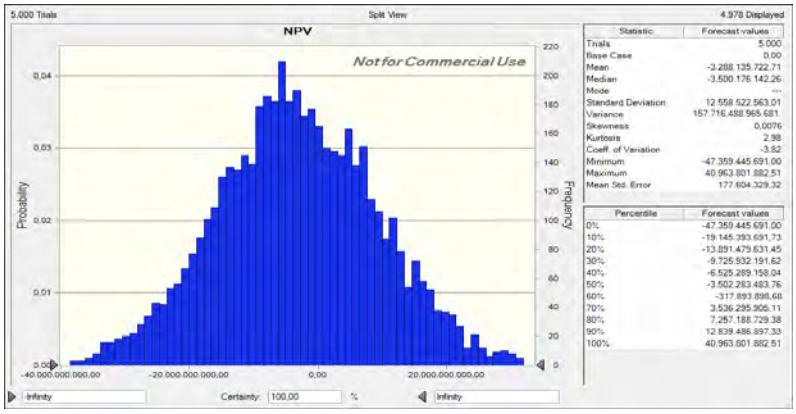
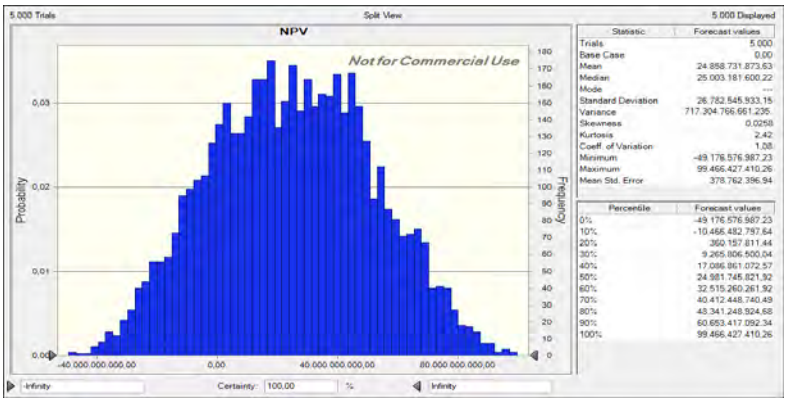


Figure - 6 Sensitivity NPV of Housing Type 2

Based on figure 5.11, the value of NPV with the possibility of NPV ≤ Rp -3.502.283.483,76 of 50% with minimum NPV value of Rp -47.359.445.691,00 and maximum Rp 40,963,801,882,51. Based on the results of the simulation said the risk of this project is below the average value is 50% and NPV is negative with a probability of 60% which means that the project is considered feasible with a 40% probability level.



ISBN : 978-602-99806-3-9

Figure - 7 Sensitivity NPV of Housing Type 3

From the simulation result, the average value of NPV is Rp 24.858.731.873,63 with the probability that the NPV value is above the average value of 50%. While a positive result (feasible) with a minimum NPV value of Rp 360,157,811.44 and minimum negative NPV value Rp 49.176.987,23

CONCLUSION

Based on the results of the above analysis we can conclude several things as follows:

1. Based on the BEP analysis various alternative house-type comparisons with three housing samples yield BEP cutoff point at alternative point five ie at maximum capacity with minimum PWC value on alternative 4 with house type 1: 6: 3 ratio. This shows the construction of housing with the amount of comparison of types of luxury homes larger than middle houses and simple homes generate high PWC value. While the composition of the comparatively low and medium-sized homes larger than the luxury homes yields a relatively lower PWC value.

2. Based on the analysis of both the feasibility indicators, namely NPV and BCR, the optimal cash flow is obtained in alternative 5 with the type of housing Type 3. The results indicate that the number of housing units and the combination of the type of houses offered, as well as the local land market price greatly affect the cash flow planning to obtain the optimal cash flow that yields the NPV and BCR values of maximum

3. From the results of project sensitivity analysis to the value of changes in key variables obtained the project is very sensitive on the type of housing type 1 with the number of housing units and the relatively small land prices variables that greatly affect the sensitivity of the feasibility of the project is the cost of construction reaches 89, 6% and the value of benefits reached 69.4%

ACKNOWLEDGMENTS

This research was supported by [Bali State of Polytechnic, Institutional Grant 2017]. We thank our colleagues from Civil Engineering Departement who provided insight and expertise that greatly assited the research.

We thank to the research team [Kristinayanti,ST.,MT, Suasira,ST.,MT, Evin Yudhi Setyono, SPd.,M.Si] who help analyze the researh and to our students [Adi Alit, Ola Wulandari, Mertasari] who help conduct surveys and collect data.

We would also like to show our gratitude to three developers in Denpasar [Citraland Denpasar, Nuansa Irawadi, Nuansa Balian] who gives us data location and characteristic of the project which we use as case studies

REFERENCES

[1] Martho F.Tolangi. 2014. *Analisis Cash Flow Optimum pada Kontraktor Proyek Pembangunan Perumahan*. Jurnal Sipil Statik Vol.1 No.1

[2] Wahyu Ramadan. 2012. *Analisis Biaya Keuntungan Developer Dari Harga Jual Berbagai Tipe Rumah pada Bangunan Perumahan*. Jurnal Rekayasa Sipil Vol.10 No.2

ISBN : 978-602-99806-3-9

[3] John D.Lesure. 2003. *Break Even Analisys – a Useful Management Tool Lodging Industry*. Research and Development Division, Laventhol & Horwath, Cranes Roost, 123 Whooping Loop, Altamonte Springs, FL 32701 USA.
[4] Dimi Ofileanu. 2014. *The Analysis of the Factors Which Influence the Change The Break Even Point*. Procedia Economic Finance 16 (2014) 256-267. Romania
[5] Marek Potkany. 2015. *Quantification of the Volume of Products to Achieve the Break Even Point Desired Profit in Non-Homogeneous Production*. Procedia Economics Finance. 26 (2015) 194 – 201. Slovakia
[6] Suparno. 2006. *Perencanaan dan Pengembangan Perumahan, Sebuah Konsep, Pedoman, dan Strategi Perencanaan dan Pengembangan Perumahan*. Yogyakarta : Andi.
[7] Pujawan, I N. (1995). *Ekonomi Teknik*, Penerbit PT. Guna Widya, Jakarta
[8] http/www.*sistem-akuntansi1000.blogspot.com/2012/09/pengertian-arus-kas-cash-flow.html*. 13-03-2017. 23:15
[9] http/www.*sulistyo-widodo.blogspot.com* . 13-03-2017. 23:30
[10] M. Giatman. 2006. *Ekonomi Teknik*. Jakarta : PT Raja Grafindo Persada.

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

The Influence of the Growth of Earning Assets, Third Party Funds, Loan to Deposit Ratio, and Non Performing Loan to Rentability of Rural Bank

Ni Putu Rita Sintadevi[1], I Ketut Sudiartha[2] and I Made Wijana[3]

[1,2,3]Accounting Department, Politeknik Negeri Bali
Bukit Jimbaran Kuta Selatan, Badung, Bali, Indonesia

*Email: putu.ritasintadevi@gmail.com

Abstract. This study aimed to determine the influence of the growth of earning assets, third-party funds, loan to deposit ratio (LDR), and non performing loan (NPL) to rentability of rural bank in Badung Regency. The population of this study was all rural banks (BPR) in Badung regency which registered in Otoritas Jasa Keuangan (OJK), and published its financial statements in period 2013 - 2016. There were 208 samples data base on the population of 52 banks. Sample was determined by the purposive sampling to obtain 170 samples. The data in this study was a secondary data. Data was analyzed by simple linear regression and multiple linear regression using SPSS. The results of this study showed that (1) the growth of earning assets has significant influence on rentability, (2) the growth of third-party funds has significant influence on rentability, (3) loan to deposit ratio (LDR) has significant influence on rentability, (4) non performing loan (NPL) has significant influence on rentability ,and (5) the growth of earning assets, third-party funds, loan to deposit ratio (LDR), and non performing loan (NPL) simultaneously has significant influence on rentability.

1. Introduction

Bank has a significant roles in country economic development. Rural bank (commonly reffered to Bank Perkreditan Rakyat) is one of the bank types which the operational activities intended to serve small and medium enterpreneur in the rural areas [1]. Banks are required to maintain public trust to perform its function as a financial intermediary. One of the ways to keep the public trust is keep maintain the bank's health level. Bank's health level showed the bank performance in managing assets and owned capital. Eficiency in bank performance can be known through the increased of rentability ratio.

The ammount of profit were not the absolute size to measure the bank's efficiency on the operational activity. Rentability is more important than profit for banks [2]. Efficiency can be determined by comparing the profit obtained with the capital used to generate the profit. Therefore, banks should pay more attention on how to increase the level of profitability rather than increase profits [2].

Management of BPR should always pay attention to the performance of its business as its importance role of rural banks for the economy of society, especially for the lower middle class. Rentability is an indicator that shows the company's management capability in generating profits. Rentability is usually

ISBN : 978-602-99806-3-9

measured by return on assets (ROA) and BOPO ratio. Previous studies have identified growth in earning assets, growth in third party funds, loan to deposit ratio (LDR) and non-performing loan (NPL) as variables that affecting rentability. The growth of credit (earning asset) has negatively insignificant effect on profitability [3]. Other studies have shown a positive influence between the growth of earning assets and profitability [4], [5] and [6]. According to [4] showed that partially there is a positive and significant influence on the growth of savings on profitability. There is also a positive influence between third party funds and profitability [3] and [6]. Other studies show that the growth of third party funds has negatively effect on profitability [7]. According to [8], loan to deposit ratio (LDR) has a significant positive effect on rentability (ROA) of BPR in Blora Regency, while [2] showed that LDR has no significan effect on rentability. Then the results of researchers [2] and [8] showed non-performing loan (NPL) were not affect the profitability (ROA). Research conducted by [9] showed that NPL have a significant negative effect on ROA on banking companies listed on the Indonesia Stock Exchange.

Based on the results of previous research, the growth of earning assets, growth of third party funds, capital adequacy ratio (CAR), non performing loan (NPL), loan to deposit ratio (LDR), and operational efficiency (BOPO) were mentioned as the factors that influencing the bank's rentability. Based on the level of significance, then variable growth of earning assets, growth of third party funds, loan to deposit ratio (LDR), and non performing loan (NPL) were selected as the independent variable in this research. In addition, there were still differences in research results as the factors that influencing the rentability. This is the underlying researcher to conduct further analysis on the variables affecting rentability in Rural Bank under the title "The Influence of The Growth of Earning Assets, Third Party Funds, Loan to Deposit Ratio, and Non Performing Loan to Rentability of Rural Bank".

2. Methodology

This research uses the quantitative and secondary data which are taken from the financial reports of rural bank in Badung Regency year 2013 – 2016. The financial report of rural bank in Badung Regency can be downloaded from www.ojk.go.id. The sampling technique is purposive samping, based on criteria set by the researchers. The criteria are as follows: 1) Rural banks which are registed and have a main office in Badung Regency, 2) Submitted the financial statement from 2013 – 2016. Based on the criteria, there are 171 samples.

The method of analysis used in this research are simple regression analysis and multiple regression analysis. In a specific form, the regression model used for simple analysis was:

$$Y = a_1 + b_1X_1 \quad \text{.....} \quad (1)$$
$$Y = a_2 + b_2X_2 \quad \text{.....} \quad (2)$$
$$Y = a_3 + b_3X_3 \quad \text{.....} \quad (3)$$
$$Y = a_4 + b_4X_4 \quad \text{.....} \quad (4)$$

The regression model used for multiple analysis was:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 \quad \text{.....} \quad (5)$$

Dependent variable of this study is rentability which measured by return on assets (ROA). Explanation of dependent and independent variables along with their proxies are specified in Table 1.

ISBN : 978-602-99806-3-9

Table 1. Dependent and independent variables

Symbol	Variables	Equation
Y	Return on Assets Ratio	Profit Before Tax / Total Assets x 100%
X_1	Growth of Earning Assets	Earning Assets $_{(t)}$ – Earning Assets $_{(t-1)}$ / Earning Assets $_{(t-1)}$ x 100%
X_2	Growth of Third Party Funds	Third Party Funds $_{(t)}$ – Third Party Funds $_{(t-1)}$ / Third Party Funds $_{(t-1)}$ x 100%
X_3	Loan to Deposit Ratio	Total Loans / Total Deposits x 100%
X_4	Non Performing Loan	Non Performing Loans / Total Loans x 100%

The hypothesis on this study are as below:

H_1 : There is a significant relation between The Growth of Earning Assets and Rentability
H_2 : There is a significant relation between The Growth of Third Party Funds and Rentability
H_3 : There is a significant relation between Loan to Deposit Ratio and Rentability
H_4 : There is a significant relation between Non Performing Loan and Rentability
H_5 : There is a significant relation simultaneously between The Growth of Earning Assets, Third Party Funds, Loan to Deposit Ratio, Non Performing Loan and Rentability

3. Result and Discussion

Testing hypothesis by using regression test have passed the test of normality, multicolinearity, autocorrelation and heteroskedasticity. While the result of the regression test for rural banks can be seen on Tabel 2 and 3:

3.1 Simple Regression Analysis

The t-test findings of rural banks in Badung Regency show that the significant value of growth of earning assets is 0,010, and it is lower than alpha (α = 0,05). Thus, H_1 is acceptable. It indicates that growth of earning assets has positive significant influence towards the dependent variable of return on assets (ROA). It means the higher the growth of earning assets is, the bigger the rentability of banks will be. It is accordance with the research conducted by [4] and [6]. Meanwhile, this result is inversely proportional to the research conducted by [3] stating that growth of earning assets has negative influence and insignificant towards the dependent variable of return on assets (ROA).

The t-test findings of rural banks in Badung Regency show that the significant value of growth of third party funds is 0,018, and it is lower than alpha (α = 0,05). Thus, H_2 is acceptable. It indicates that third party funds has positive significant influence towards return on assets (ROA). It means the higher third party funds is, the bigger the rentability of banks will be. It is accordance with the research conducted by [4] and [10]. Meanwhile, this result is inversely proportional to the research conducted by [7] stating that third party funds has insignificant influence towards return on assets (ROA).

The t-test findings of rural banks in Badung Regency show that the significant value of loan to deposit ratio is 0,011, and it is lower than alpha (α = 0,05). Thus, H_3 is acceptable. It indicates that loan to deposit ratio has positive significant influence towards return on assets (ROA). It means the higher loan to deposit ratio is, the bigger the rentability bank will be. It is accordance with the research conducted by [8] and [11]. Meanwhile, this result is inversely proportional to the research conducted by [12] stating that loan to deposit ratio has insignificant influence towards return on assets (ROA).

Whereas the t-test findings of rural banks in Badung Regency show that the significant value of non performing loan is 0,003, and it is lower than alpha (α = 0,05). Thus, H_4 is acceptable. It indicates that non performing loan has negative significant influence towards return on assets (ROA). It means the lower non performing loan is, the bigger the rentability bank will be. It is accordance with the research conducted by [9]. Meanwhile, this result is inversely proportional to the research conducted by [8] and [11] stating that non performing loan has insignificant influence towards return on assets (ROA).

ISBN : 978-602-99806-3-9

Table 2. The Summary of Simple Regression Analysis

Variable	R	R Square	t	Sig
Growth in Earning Assets	0,203	0,041	2,603	0,010
Growth in Third Party Funds	0,186	0,035	2,380	0,018
Loan to Deposit Ratio	0,200	0,040	2,572	0,011
Non Performing Loan	0,235	0,055	-3,040	0,003

3.2 Multiple Regression Analysis

The F-test findings of rural banks in Badung Regency show that the significant value of growth of earning assets, growth of third party funds, loan to deposit ratio, and non performing loan simultaneously is 0,000, and it is lower than alpha (α = 0,05). Thus, H_5 is acceptable. It indicates that growth of earning assets, growth of third party funds, loan to deposit ratio, and non performing loan simultaneously has significant positive influence towards the dependent variable of return on assets (ROA). The R square of 0,098 shows that 9,8% of the variability of the bank rentability measured through the ROA can be explained through the variance of the independent variables, and the rest of 90,2% was explained through the other causes. Based on the factore disclosed, then the four independent variables are supporting factors that influence the rentability. The weak simultaneous influence of 9.80% conceptually due to the independent variables has significant influence rentability yet partially a weak influence on rentability.

Table 3. The Result of Multiple Regression Analysis

Variable	B	T	Sig
(Constant)	0,725	0,603	0,547
Growth in Earning Assets	0,934	1,397	0,164
Growth in Third Party Funds	0,483	1,453	0,148
Loan to Deposit Ratio	0,035	2,521	0,013
Non Performing Loan	-0,067	-1,943	0,054
R	0,348		
R Square	0,121		
Adjusted R Square	0,098		
F Statistic	0,000		

4. Conclusion

From the result above, we can conclude that in partially and simultaneously, The growth of earning assets, the growth of third party funds, loan to deposit ratio, and non performing loan are the factors that influencing the rural bank profitability. Therefore, the management of rural bank in Badung Regency need to pay attention to the growth of earning assets, the growth of third party fund, loan to deposit ratio, and non performing loan as the factors that influencing the rural bank rentability. The research concludes that the influence between independent variables and dependent variable is low. The independent variable gives 9,80% contribution to rentability, and the rest of 90,20% could be determined by the other variables that were not included in this research. Thus because, the other variables have to get attention in manage the rentability of rural bank.

5. Acknowledgement

Authors would like to show our gratitude to lecturers, and colleagues for sharing their wisdom with us during the research. The authors also would like to thank all leaders of Bali State Polytechnic, organizing committee of IJCST seminar which has provided facility support for the smoothness of Institutional Research. For further research, it is suggested to use other independent variables that can influence the rentability of bank and increasing the number of observations.

ISBN : 978-602-99806-3-9

6. References

[1] Iskandar, S. 2013. *Bank dan Lembaga Keuangan Lainnya Edisi 2*. Jakarta: IN MEDIA.

[2] Musyarofatun, L. 2013. Analisis Faktor-Faktor yang Mempengaruhi Rentabilitas Bank Perkreditan Rakyat di Kabupaten Magelang. *Skripsi*. Semarang: Universitas Negeri Semarang.

[3] Sukmawati, N., and Purbawangsa, I. 2016. Pengaruh Pertumbuhan Dana Pihak Ketiga, Pertumbuhan Kredit, Risiko Kredit, Likuiditas, dan Kondisi Ekonomi Terhadap Profitabilitas. *E-Jurnal Manajemen Unud*, 5(9). Accessed from https://ojs.unud.ac.id/index.php/ Manajemen/article/view/19539

[4] Sastrawan, G., Cipta, W., and Yudiaatmaja, F. 2014. Pengaruh Pertumbuhan Tabungan dan Kredit Terhadap Profitabilitas Pada Lembaga Perkreditan Desa. *E-Journal Bisma Universitas Pendidikan Ganesha Jurusan Manajemen*, *2*. Accessed from https://download.portalgaruda.org/ article.php?article=145830&val=1350

[5] Suputra, Cipta, W., and Yulianthini, N. 2014. Pengaruh Dana Pihak Ketiga (DPK), Penyaluran Kredit, dan Kredit Bermasalah Terhadap Profitabilitas Pada Lembaga Perkreditan Desa Kecamatan Karangasem. *Jurnal Jurusan Manajemen Universitas Pendidikan Ganesha*, *2*. Accessed from http://download.portalgaruda.org/article.php

[6] Mukarromah, L., and Badjra, I. 2015. Pengaruh Pertumbuhan Tabungan, Deposito, dan Kredit Terhadap Pertumbuhan Profitabilitas PT BPR Partakencana Tohpati Denpasar. *E-Jurnal Manajemen Universitas Udayana, 4*(8). Accessed from https://ojs.unud.ac.id/ index.php/Manajemen/ article/view/12828

[7] Sukma, Y. 2013. Pengaruh Dana Pihak Ketiga, Kecukupan Modal dan Resiko Kredit terhadap Profitabilitas : Studi Pada Perusahaan Perbankan yang Terdaftar di BEI. *Jurnal Universitas Negeri Padang, 1(2).*

[8] Artarina, O., and Masdjojo, G. 2013. Faktor-Faktor yang Mempengaruhi Rentabilitas Pada BPR di Kabupaten Blora. *Dinamika Akuntansi, Keuangan dan Perbankan* 2(1): p: 44 – 51.

[9] Agustiningrum, R. (2013). Analisis Pengaruh CAR, NPL, dan LDR Terhadap Profitabilitas pada Perusahaan Perbankan. *E-Jurnal Manajemen Universitas Udayana, 2*(8). Accessed from https://ojs.unud.ac.id/index.php/ Manajemen/ article/view/5461

[10] Nurwahyuni, N., Sinarwati, N., and Wahyuni, M. 2016. Pengaruh Pertumbuhan Aktiva Produktif, Dana Pihak Ketiga dan Umur terhadap Kinerja Operasional Lembaga Perkreditan Desa (LPD) di Kecamatan Banjar Tahun 2012-2014. *e-Journal S1 Akuntansi Universitas Pendidikan Ganesha. 6(3).* Accessed from https://ejournal.undiksha.ac.id/index.php/ S1ak/article/viewFile/9307/5986

[11] Alifah, Y. (2014). Analisis Pengaruh CAR, NPL, BOPO, dan LDR terhadap Profitabilitas Perbankan Pada Perusahaan Perbankan yang Terdaftar di Bursa Efek Indonesia Periode 2009-2012. Skripsi. Yogyakarta: Universitas Negeri Yogyakarta. Accessed from https://eprints.uny.ac.id/17244/

[12] Putri, C. (2015). Pengaruh NPL, LDR, CAR Terhadap Profitabilitas Bank Swasta Nasionl Devisa. *Jurnal Ilmu dan Riset Manajemen Sekolah Tinggi Ilmu Ekonomi Indonesia Surabaya, 4(4).*

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

Flood handling system of Pucak Terate Bang Temple

IGAG Surya Negara [1], I Wayan Wiraga, I Wayan Arya
Department of Civil Engineering Politeknik Negeri Bali
Bali. Indonesia PHONE +62361 701981
[1]E-mail:suryadwipars@yahoo.com

Abstract. Pucak Terate Bang temple is one of main in Bali located in Banjar Catu, Candikuning Village, Baturiti District, Tabanan Regency, precisely in Eka Karya Bedugul Botanical Garden area. This temple lies at an altitude of about 700 above sea level with the surrounding conditions still a natural forest. This temple is located under Lake Buyan and Lake Tamblingan which became the tip of Sungi river which eventually leads to Penet river in Cemagi Beach Badung regency. With the very high intensity at the end of 2016 until early 2017 precisely in January 2017 has caused the occurrence terrible floods and landslide in the area of Pucak Terate Bang and surrounding areas. These floods and landslides have caused severe damage to the temple and other areas of the Eka Karya Botanical Garden and other areas through which the upstream of Sungi river flows at the downstream.
The method of this research is descriptive quantitative and qualitative by conducting observation and direct measurement in the field done by hydrological analysis and hydraulic analysis and river capacity to get the formulation of flood handling required in accordance with Sungi river upstream characteristic in Terate Bang temple and surrounding area.
The results of the design rain analysis are as follows: R2 = 85.46 mm, R5 = 94.63 mm, R10 = 99.25 mm, R20 = 102.36 mm and R25 = 103.80 mm. Flood calculations show Q2 = 16.55 m3 / dt, Q5 = 18.32 m3 / dt, Q10 = 19.99 m3 / s, Q20 = 19.74 m3 / s and Q25 = 20.02 m3 / s. If this is related to the current channel capacity of Q25 of 20.02 m3 / st then the flood discharge is much larger with the capacity that can be accommodated by the channel. In addition to the small channel capacity another cause of flooding is the existence of a building built on the river channel. The recommended solution of this research is the making of 3 plunge buildings with an average width of 3 m with varied heights ranging from 2-3 m, channels with pre cast material in several variations, making a bridge with box culvert model with dimensions 2 x 2 m and making three variations of retaining wall

Keywords: Pura Pate Terate Bang, Flood, Technical Review

I. INTRODUCTION

The existence of Terate Bang Temple as main temple in Bali has significance for the people of Bali because it is one of the place of Hindu people in doing prayer. This temple is built on an area with a height of about 700 m right under Lake Buyan and Lake Tamblingan with the position of the temple is in the upstream Tukad river. Temple Location in Banjar Catu Candikuning Village, Baturiti District, Tabanan Regency is located within Eka Karya Botanical Gardens with the original condition of the hills (Galang Bali, 2016)

From the side of the arrangement, as generally temple in Bali, Terate Bang temple consists of Tri Mandala namely the main mandala (innards), madya mandala (middle) and Kanista Mandala or jaba side. Main mandala is a very sacred area and only related to spiritual and sacred ceremony (Galang Bali, 2016) There are four sacred buildings namely Pelinggih Gedong as a place of worship of Sang Hyang Brahma or Agni, Padmasana, Piyasan and Bale Penegtegan. To the west of the innards is Pelinggih Siwa

ISBN : 978-602-99806-3-9

(Ida Ratu Lingsir). And the Pelinggih Saka Pat Sari and genya toya Panca Maha Merta Mancawarna. To the northeast of the innards is Pelinggih Beji and other pelinggih. Pelinggih Shiva and Pura Beji are still directly related to Pura Luhur Pucak Terate Bang. The holy water for the tirta is taken from beji located in the northeastern part of this temple. While in the northwest there beji with water sulfur as many as five places called Maha Mertha Mancawarna. Below the place of the Tirta, there is Pelinggih Padmasana where worshiping Shiva. Water sulfur tirta that is usually requested by the people, especially the practitioners of medicine as medicine. The existence of this tirta seems very popular for the people of Bedugul. Not only that, people from various places in Bali often taking a holy water (tirta) in this place. (Galang Bali, 2016

Long droughts in 2015 and followed by long rains in 2016 have caused landslides in several cliffs including those in the upper area of Eka Karya botanical garden. With a very high rainfall intensity in January 2017 reaching over 215 mm / day (BMKG, 2017) has caused flooding and landslides from hills in Bukit Tapak on top of Pura continues to decline inland into the temple area. The condition of Pura Beji that is right in the river channel becomes the starting point of the waterlogging downstream and this creates a blockage so that the devastating flood that accompanied the flow of mud has overflowed and filled all parts of the temple and washed away some parts of the temple like Pura Beji, Bale Pesamuan, Penyengker, Apit Lawang and many other buildings. As a result of flooding not only affect the region of temple but resulted in the Eka Karya Botanical Gardens in the northwestern part of the breaking condition and erosion of some settlements residents in the west entrance of Eka Karya Botanical garden which is a groove upstream Sungi river.

Seeing the floods and the severe impacts it is necessary to do a comprehensive and strategic technical review so that similar problems do not occur in the future.

Departing from the background and problems can be formulated some things as follows:

A. What is the cause of flooding in Pucak Terate Bang temple ?
B. What is the magnitude of the design rain and the flood of 25-year rework plans in the upstream Sungi river groove?
C. How the concept of technical handling flood Pura Pate Terate Bang?

The purpose of this study is to obtain answers to the problems presented are:

A. Invented and mapped the cause of the flood at Pura Pate Terate Bang
B. Determine the amount of rain draft and flood design when re-25 years
C. Compiled the concept of handling of the flood that is comprehensive in Pura Terate Bang and surrounding areas

II. METHODOLOGY

Implementation of the research is conducted in the form of collecting information (primary and secondary data collection), field survey, problem analysis, and formulation of flood handling system.

- Surveys, field observations and data collection

Conducting a field survey to determine the current state of the river, including among others:

A. Map data collection, river length, watershed area, vegetation conditions within the watershed, topographic and geological conditions
B. Data flow system collection
C. Maximum daily rainfall data collection in Candikuning and surrounding areas with minimum data range in the last 10 years (BMKG, 2016)

ISBN : 978-602-99806-3-9

D. Data collection at Eka Karya Botanical Garden, public work office and from Central government
E. Conducting interviews with the community around the temple , the affected communities around the west of the Candikuning mosque and the manager of Eka Karya botanical garden.
F. Information gathering on the flood event that occurred

➢ Time and Location Research

The research time for the preparation of technical studies of flood handling Terate Bang temple for 6 months with the location of Terate Bang temple banjar Catu Village Candikunig Baturiti District Tabanan regency.

➢ Scope of Research

The scope of this study is as follows:
A. The study was conducted on the area of Pucak Terate Bang temple and surrounding
B. The flood discharges used are flood discharge with a 25 year re-birthday (Q25)
C. River flow is calculated based on steady flow uniform flow

➢ Data Sources Determination

The existence and source of the data would be a very important part in relation to the validity. With regard to data to be taken then the data source to be referred is as follows:
A. The maximum annual rainfall data for Singaraja statsiun is obtained from the Bali Meteorology, Climatology and Geophysics Agency III on Tuban Highway. Rainfall data series taken at least the last 10 years with the proposed proposed station is Candikuning rain station
B. River data obtained from Bali Penida river council Office of Public Works Complex Road Cok Agusng Tresna, Denpasar

Research Instruments

Instrument is completeness in doing research which very influence to result of a research Instruments required in this research include:
A. GPS
Function: determines the coordinate position
B. Baseline Map of the river system
Fungi: Determine flow system, length of watershed and broad watershed
C. Land use map
Function: determines the coefficient of the drainage region in the hydrological analysis
D. Theodolite
Function: to measure topography to get long and cross section
E. Land type map
Function: This map is used to find out about the type of soil in the study area
F. Meter
Function: for dimension measurement

➢ Data Analysis

Data analysis conducted in this research is as follows:
A. Hydrological analysis
This analysis serves to obtain rainfall design, flood design and rain intensity in the study area (Sharin, 1990, Chow, 1987)

ISBN : 978-602-99806-3-9

B. Capacity and hydraulics analysis
This analysis serves to determine the capacity of the river
C. Socio-cultural and economic analysis
D. Analysis of flood handling system

➢ Preliminary Research

Preliminary research was done some time after the devastating flood in Terate Bang Temple. Based on the results of interviews and river flow tracking and based on preliminary analysis obtained an early reference that is the occurrence of a very severe floods accompanied by landslides preceded by the occurrence of lumbering that occurred above the temple is in Bukit Tapak. Avalanches carrying mud and logs are carried downstream and clogging the narrow river passage in the Beji temple area. This condition causes water, mud and tree trunks to enter the temple area and cause floods with large mudflow spilling into the south.

III. RESULT AND DISCUSSION

➢ Hydrological Analysis

Hydrological analysis is conducted to know the amount of rain draft and flood design that occurred in the area Terate Bang Temple or Bedugul area. In this hydrological analysis, the required annual maximum rainfall data from the nearest rain stations in the rain tank area in the area of Pucak Terate Bang temple. (Gao 2003, Liu 2003, Linsley 1995)

➢ Design Rain

The design rain analysis is an analysis to determine which rain occurs in a given period with a certain probability of occurrence. The data of rainfall is data of rain station Bedugul with 24 series of observation data from 1993 until 2016 (Central Research,2000) Saharin 1990)

Rainfall design

No.	Period (year)	G	Rainfall Design (mm)
1	2	0.0954	85.46
2	5	0.8753	94.63
3	10	1.2406	99.25
4	20	1.4695	102.26
5	25	1.5839	103.8
6	50	1.7664	106.3
7	100	1.9284	108.58
8	200	2.0608	110.47
9	1000	2.323	114.32

Source : analysisis

Design Flood

ISBN : 978-602-99806-3-9

The design flood calculation can be done using two approaches that is with the rational formula for the catchment area around 450 Ha and with the Nakayasu approach if more than the area. In this case the design flood calculation is done by the method of Nakayasu because the area of the catching area reaches 600 Ha. (Chow 1987)

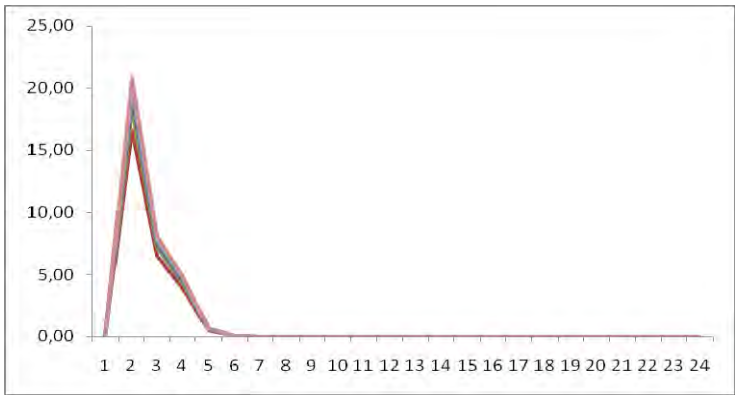


Fig 1 Flood Desingn

Capacity Analysis
Capacity analysis is carried out to determine the capacity or capacity of the existing channel or river. (Sharin 1990, Chow, 1987)
Q = A V
Q: channel capacity (m3/sec)
A: wet cross-sectional area (m2)
V: speed (m /sec)
From observations and measurements in the field obtained:
Average river width = 1.2 m
Average channel height = 0.6-0.8 m
Average slope = 0.02
The basic roughness and walls of the natural river (0.035)
Maximum capacity of water that can be missed is: 2.5 m3 /sec
B = 1.2
H = 0.8
A = 0.96
P = 2.8
R = 0.342857
S = 0.035
V = 2.609107
Q = 2.504742

From the calculation results show that the existing flood discharge is much greater than the existing tamping power

- Upper Sungi river Streaming System

ISBN : 978-602-99806-3-9

Location Terate Bang temple is located in the upper watershed of Sungi river which tops its watershed in the hills above the temple as far as 600 to the north. Temple location flaved by two tributaries in the east and west. The problem is that the location of Pura is located at the confluence of the river.

➢ Flood Management System Terate Bang temple

Floods that occur in Terate Bang temple occurred at the beginning of 2017 precisely in January 2017 due to the existence of a very large overflow water accompanied by sediment pour into the river flow around beji temple. This condition is still added with water and avalanche that flows that occurred in the western part around Tirta Pingit temple. Very large water discharge accompanied by sediment material resulted in the capacity of existing river / channel can not accommodate the existing discharge. From the result of hydrological calculation, it is found that the discharge occured with 25 yearly (Q25) is 20.02 m3 / s while the maximum capacity of river or channel is 2.5 m3 /s. With this condition, the overflowing water overflows everywhere. Beji temple along with all the penyengker, Bale Bengong and Penyengker existing in Central Jaba carried away by the flood. Floods continue to flow downstream swept away the bridge crossing in the area of the Botanical Garden. Flood plains continue to flow downstream and erode buildings of several buildings and houses located west of the corn statue of Candikuning Village. As a result of this scour some homes have been scoured and drifted with water and two bridges are scoured.

➢ Flooding of Terate Bang Temple

Flooding of Terate Bang Temple is done by checking the current flow system. From the existing flow system is known that the flow of upstream Penet river on the east is very potential to cause flooding because the plot is right next to Beji temple. With the condition of the river located at a fairly steep elevation area (0.03) then the handling techniques carried out are as follows:

1. Waterfall Building

   The plunge structure is a structure made of stone pairs made at high differences between contours with other contours. Placement of the plunge building is prioritized on the elevation area around Beji temple. The number of plunge buildings required by 1 piece. The plunge building is made with a height of 3 m and its width is 1.2 x the width of the river.

2. Check Dam

   Check dam is a structure made of stone pairs mounted across the river in the Lower Beji teple and in the upper Beji temple.. The checkdam building is 3 meters high and 1.2 x wide by river.

3. Precast Channel (U-Ditch)

   Pre cast channels are created in multiple places with different dimensions to fit the discharge requirements.

4. Box culvert

   Box culvert made with dimensions of width 2 m and height 2 m placed on the junction of the drainage of coal

IV. CONCLUSION

From the discussion conducted related to flood handling system that occurred in Pura Terate Bang Pura Region can be concluded several things:

A. Floods that occur due to the extreme weather of rain in early 2016 that exceeds 100 mm / hour which triggers the occurrence of cliffs in the upstream that flows and meet the channels below. Other conditions that cause the occurrence of flooding is the existence of a Beji temple building built right in the river

ISBN : 978-602-99806-3-9

B. The design rain analysis showed 2 year (R2) of 85.46 mm, R5 = 94.63 mm, R10 = 99.25 mm, R20 = 102.36 mm and R25 = 103.80 mm. The design flood analysis shows 2-year design floods (Q2) = 16.55 m3 /s, Q5 = 18.32 m3 /s, Q10 = 19,19 m3 / s, Q20 = 19,74 m3/s and Q25 = 20,02 m3 / s. Hydraulic analysis and channel capacity shows the capacity of existing channels with an average capacity of 2.5 m3 / s. This shows the capacity that is far below the design flood discharge that occurred.

C. Recommendations in bannjir handling that can be delivered are as follows:

- The plunge structure is a structure made of stone pairs made at high differences between contours with other contours. Placement of the plunge building is prioritized on the elevation area around Beji temple. The number of plunge buildings required by 1 piece. The plunge building is made with a height of 3 m and its width is 1.2 x the width of the river.
- Making Dam check
  Check dam is a structure made of stone pairs mounted across the river in the Lower Beji temple and in the upper Beji temple. The checkdam building is 3 meters high and 1.2 x wide by river.
- Precast Channel (U-Ditch)
  Pre cast channels are created in multiple places with different dimensions to fit the discharge requirements. U-ditch channels are made in type:
  Width of 2 m and height of 1.5 m with a length of 946 m
  Width 0.6 m and height 0.6 m with length 99 m
  Box culvert

Box culvert made with dimensions of width 2 m and height 3 m with width of 10.8 m placed on the junction of westward flow.

- Land retaining wall
  Retaining wall height 2 m with length 54,6 m
  Retaining wall height 3 m with length 336 m
  Retaining wall height 6 m two sides with length 130 m
  Retaining wall height 3 m two sides with length 500 m

V. ACKNOWLEDGMENT

On this occasion the authors thank to all parties who have helped this research so that it can be completed.

VI. REFERENCES

[1] Galang Bali, 2016. History Of Pucak Terate Bang Temple. Denpasar : Galang Bali Foundation
[2] BMKG Bali,2017. Maximum Daily Yearly Rainfaal . Denpasar : Meteorological dan gheophysical Institutions Bali.
[3] Central Research And Develoment Of Water Resources Engineering,2000. Indonesians Standart : Flood Calculation. Jakarta : Public Work Department Of Republic Indonesia
[4] Linsley, R.K dan Franzini, Josep B. 1995. Water resources Engineering. Mic Graw Hill
[5] Gao.B.2002 Model And Application Of Near Natural Stream Control. Journal of Soil And Water Conservation
[6] Liu.S 2003. River Ecological Restoration. Haiehe Water Resources

[7] Sharin, 1990. Statistical Of Hidrology. Mc.Graw Hill
[8] Ven Te Chow, 1987. Open Channel . Mc. Graw Hill

ISBN : 978-602-99806-3-9

ISBN : 978-602-99806-3-9

Sustainable management of Mati River

I Gst. Lanang Made Parwita[1], I Gede Sastra Wibawa
Department of Civil Engineering Politeknik Negeri Bali
Bali. Indonesia +62361 701981
[1]E-mail: lanangdauh1971@gmail.com,

Abstract. Mati river located in Denpasar City with the length of main river ± 13 km and wide of watershed ± 32,5 Km^2 is typical of urban river because from the upstream in Kapal Village area until estuary part in mangrove forest area Teluk Bay Benoa Forest Park its area of flow has experienced very rapid changes to urban areas. Changes into urban streams cause higher pressure on rivers such as reduced border areas, garbage disposal and waste into rivers, limited access to inspection roads on the riverbanks and law enforcement linked to river border has not maximally reduced the pressure. The analysis shows that at some point especially on the bridge construction there is a narrowing of the width of the river. This condition triggers the occurrence of floods and puddles

This research uses qualitative and quantitative method with data collection both secondary and tertiary obtained from several related institutions.

The results indicate that the existing river management has not been well coordinated. Management still emphasizes the authority of each related institution (Public Works Department of Denpasar City, Public work Department Of Badung Regency and Department River Region of Bali Penida in their respective region). In terms of budgeting, it is directed more towards financing in terms of periodic maintenance such as landslide errors, and construction of stream alignment at the estuary. While budgeting for new routine maintenance is at the stage of study made by Department River Region Of Bali Penida. The management of Eco hydraulic based management is continuously divided into three stages: short term (0-5 years) in the form of widening Resimuka bridge, Buana Raya bridge, widening West Teuku Umar bridge, spreading Umadwi weir, widening Nakula road bridge, widening Lavender hotel bridge as well as sedimentation dredging in the umadwi-estuary segment. Medium term in the form of law enforcement, planting bamboo vegetation in the upstream river channel and making the settlement in Gatot Subroto to the upstream. Long term form of local law concerning the border, construction of river inspection road, settlement arrangement along river and recommendation of making of retarding basin at downstream of Mati river around Padangsambian with wide of 15 Ha.

Keywords: Mati river, Authority of River Management, River Management

I. INTRODUCTION

River management in Indonesia has been more emphasized on river management based on administrative boundaries of regency/provincial governments in each region. So the resulting solution has not been comprehensive as a unity one river one management. With this condition, the management of the river will be highly dependent on local government financial policies and capabilities. In the case of the management of Mati river the management of the river is divided into three major groups namely Denpasar City Government through the Public Works Department, Badung Regency Order through the Department of Highways and irrigation as well as the Central Government through Bali Penida river department.

So far, the management has not been coordinated with the maximum effect of the policy and ability of each agency. However, there should still be a breakthrough business that is well formulated so that the management can run well. Sustainable management of sustainable hydro-eco-based rivers requires the participation of all elements and is not limited to constructive improvements but also other activities that contribute positively to ecology.

ISBN : 978-602-99806-3-9

Because it is very necessary to do a more comprehensive research so that the management of the Mati river can be done with the maximum range. From the background that can be formulated problems in Mati river as follows:
a. What is the condition of buildings along the Mati river?
b. What is the current management system
Meanwhile, the purpose of this study is to obtain answers to the problems presented are:
a. Mapping the condition of buildings along the river is dead at this time
b. Mapping of the current Dead River management system

II METHODOLOGY

2.1 Components of River Operation Costs (Public Work Department, 2016)
The scope of River Operation activities consists of 7 activities, namely:
1. Provision and allocation of water.
2. Control of the use of river water.
3. Management of river water quality.
4. Control of river space utilization.
5. Flood control (high water).
6. Control of the use of space in floodplains.
7. Forecast and early warning of flood hazard.

2.2 The concept of eco-hydraulics

The development of the waters, especially rivers in the world today, mostly still use the partial approach of civil engineering of hydro engineering so that the result of this engineering is very very impressed and sometimes even contrary to the interests of ecological or environmental sustainability. The pure hydraulic engineering pattern means that in solving the problems in the waters area, especially the river is based solely on the hydraulic function alone, without considering the negative impact and its relation to the existing ecological component. For example, the function of a river according to the pure hydraulic concept is only seen as a hydraulic channel discharging excess water into the sea at the estuary. So with this concept all the rivers should be straightened and on the wall with the hope that the water flows to the quickly downstream. With a partial concept like this the ecological stream will automatically be totally destroyed (Arthington,2002, Linsley,1995)

The concept of eco hydraulic is an integral approach in river basin development that incorporates synergistic elements and hydrolic and ecological considerations. This concept can actually produce synergistic mutualism to produce engineering that beneficial both hydraulic and environmental ecology. In the river eco-hydraulic concept is no longer only defined as a flow in the earth that is flowed by water and sediment, but the river is defined as a unity of open water ecosystems between upstream and downstream that have biotic and abiotic components interconnected with each other. Abiotic components are characteristic of river morphology, water flow and sediment along with fluctuations in quality and quantity. While the biotic component is a component of plant and animal as well as people living along the watershed. Based on this concept, every activity in the basin should pay attention to all components of the existing river ecosystem. (Barrow, 1998, Cui,1999)

The concept of eco hydraulic directs flood handling by taking into account the ecology around the watershed. In this concept, the river is directed to a condition as natural as possible so that the river has a sloping cross section on its right side with biodiversity interacting with each other. The existence of vegetation on the groove and river banks will have resistance when the flood occurs so that the flood speed can be reduced. With this condition the overflow of water will overflows on the banks of the river and will provide a dynamic inundation with the natural duration of vegetation along the river. Likewise, the lower water velocity and abundance on the riverbed will contribute to the increase of the downward recharge which becomes a positive value for groundwater filling. The concept of eco-hydraulics is in harmony with environmentally sustainable development that is a concept based on

ISBN : 978-602-99806-3-9

conscious and planned efforts that integrate the environment, including resources into the development process to ensure the capability, welfare and quality of life of present generation with future generations (Cui,2003)

2.3 River Functions As Main Drainage In Urban

The development of urban areas has brought about the effect of the greater land conversion from agricultural land to other uses such as housing, offices and other designations. This condition puts greater pressure on the river's natural state of reduced capacity, decreased water quality, recharge and soil conservation of thinning water which in total gives a bad effect on the function of the river as a whole.(Linsley 1995, Liu S,1999, Nillsson 1991)

2.4 Analysis

- Hydrological Analysis

Hydrological analysis is an analysis that aims to calculate the potential of existing water in certain regions / regions, to be utilized, developed and controlled water potential for the benefit of the people around the area (Sharin,1990, Central research,2000, Chow,1987, BMKG, 2016)

Rainfall Design.

1. Gumbel Method
2. Pearson Log Method

To calculate the design rainfall by the Log Pearson type III method, the data must first be converted into a logarithmic form, then calculate the statistical

Log Ri = Log R- K. S

Where :

R: average rain

K: frequency factor

S: standard deviation

- Design Flood

Flood design is needed to calculate the magnitude of the flood that passes through the river

Method of Hydrograph of Nakayasu Method

$$QP = \frac{C \times A \times Ro}{3.6\,(0.3\,Tp + T\,0.3)}$$

Where :

Qp = flood peak discharge (m s)

Ro = rain unit (mm)

Tp = the grace period from the beginning of the rain to the peak of the flood (hour)

T0,3 = The time required by the peak discharge decrease to 30% of peak discharge

- River Capacity Analysis

This analysis is conducted to determine the capacity of each river or channel associated with the existing flood discharge. Analsis in channel capacity uses the Manning equation (Sukarno, 2009; Chow, 1987) as follows:

$Q = A\,V$

$V = R^{2/3}\,S^{1/2}/n$

With:

A = square (m^2)

V = velocity (m/s)

n = roughness of the channel

R = hydraulic radius

ISBN : 978-602-99806-3-9

S = slope of the channel
n = number of roughness of the wall of the channel

III. RESULT AND DISCUSSION

3.1 Current River Management

From some results of observations made in the field as well as auditing with related agencies can be in the management of the current River Mati is as follows:

1. Public Works Office of Denpasar has management authority on:
a. Lange weir
b. Dadas weir
c. Free Intake Mergaya
d. Tebad Channel

2. Public work office of Badung has the authority to:
a. Trash rack road Sun Set road
b. Automatic water level recorder behind the trash rack sun set road
c. Estuary area
d. Blambangan Flood Pump
e. Dewi Sri flood pump

3. Central government has the authority:
a. Flood embankment (Segment Patas sari-trash rack)
b. Flood embankment (Trash rack segment - Umadwi weir)
c. Flood embankment (Umadwi-bendung Dadas dam)
d. Flood dike (Dadas- Bendung Lange Dam Square)
e. Flood embankment (Bendung Lange-Gatot Subroto)
f. River channel (Gatot Subroto - upriver river area)

3.2 River Management Issues

The problem of river management that often arises is in some cases still need to increase the coordination of the existing agencies in budgeting operating and maintenance costs. What happens nowadays in some budget Operation and maintenance costs are not all agencies budgeted. Operation and maintenance activities include:

a. Planning
In the case of planning still occurs some obstacles such as planning is not done simultaneously in all related agencies is caused by the ability of budgeting is not the same among all agencies.
b. Implementation
In terms of coordination implementation also still needs to be improved
c. Supervision

3.3 Waste Management

Until now there is no clear scheme associated with waste management in the river, although in general the waste in Mati river is not too large. Anticipation is done by performing regular monitoring and routine to building of filter of garbage (trash rack) that exist in Mati river that is in Legian area.

3.4 Organization Management

The Mati river management organization is a collaboration between the Government, the private and community institutions. This can be proven from several conditions that exist in the field are:

1. In terms of financing construction, construction is more emphasized to the government element

ISBN : 978-602-99806-3-9

2. The maintenance side of the river, especially in the case of the ban on garbage disposal into the river is strongly supported by the Denpasar City Government Regulation and the institutional rules of the community through the rules (*awig-awig*) that exist in each adat village
3. Private participates in spontaneity activities in the form of net program activities financed by private companies.

3.5 Cost Analysis of Real Need Task Force Operation and Maintenance of Mati River

An analysis of operating and maintenance costs is needed to find out how much it costs to keep the river functioning properly. The need for river operating and maintenance costs is closely linked to the type of river that is the natural river, the river develops and the urban river. The more natural the river the cost of operation in terms of inspection becomes more expensive compared to urban streams that already have access. From result of analysis of operation cost and maintenance cost to Tukad Mnati is Rp. 66.198.000

In addition to the cost requirements for routine inspections, other operating and maintenance costs required in the river is Rp. 3.224.839.000

3.6 The Concept of Handling Mati River Based on Sustainable Eco-Hydraulic

In the case of Mati river handling with sustainable eco-hydraulic concept, it is necessary to do work continuously by involving all elements. The concept of handling can be divided into three stages of handling that is short-term, medium and long term.

- Short term concept (0-5 years)

This short term concept is closely related to the Mati river flood handling which can rapidly lower the flood waters.

1. Widening of several bridges in the middle and downstream of the river. From the results of the research phase 1, it can be concluded that some bridges in the middle of the river need widening, more bridges need to be widened: *Resimuka* bridge, *Buana Raya* Bridge, *Teuku Umar Barat* Bridge and *Umadwi* dam, *Nakula* S bridge and Lavender Hotel Bridge downstream section of the Mati river. The proposed new width of the bridge to be able to overcome the flood in Mati river is the width of the *Resimuka* Bridge proposed 10 to 15 m wide. *Buana* bridge from the width of 11 m to 15 m, *Teuku Umar* West bridge height from 1.5 m to 2.5 m, *Umadwi* weir from 18 m width to 24 m, *Nakula* r bridge from 13 m to 18 m and the Lavender hotel bridge from 13 meters to 20 m

   a. The current condition of the bridge Resimuka case is shown in the picture that the width is only 10 meters. When compared with the Gatot Subroto bridge that is in the upstream it will be very visible if the bridge on this bridge occurs narrowing (bottle neck). This segment becomes the first segment of the flood point that is difficult to overcome in the Munang-Maning area. If the current 10 meters can be spread to 15 meters it will contribute significantly to eliminate flooding in the Munang-Maning and surrounding areas. The problem with the widening of this bridge is that the right and left rivers are full of settlements which result in land acquisition becoming very difficult to do

ISBN : 978-602-99806-3-9

Fig 1 *Resimuka* Bridge

b. Condition of Buana R Bridge

Condition of Buana Raya road bridge its position is behind the Bridge Resimuka. In addition to the narrow bridge width the position of Jalan *Buana Raya* bridge is located in the bend area so that it implies the decrease of water speed. With a width of only 11 meters and is located in the bend area then this position becomes a contributor to the flood point in Mati river. The suggestion that can be submitted is the widening of the bridge from the width of all 11 meters to a width of 15 meters. Problems in the widening of this bridge is constrained by the surrounding land is already full of buildings and surrounding temples stand. With conditions like this then the land acquisition becomes difficult to do.

Fig 2 *Buana Raya* bridge

c. *Teuku Umar Barat* Bridge

This bridge is located in the upper reaches of Dadas dam with a crossover position on Teuku Umar Barat street. The width of the existing bridge is actually quite adequate with a width of 23 m. But the problem arises because the height (clearence) that there is very limited that is 1.5 m. In this area there is a very high sedimentation due to the dam at the downstream of the bridge. With this limited height this segment can not immediately drain the water in case of flooding. Floods in this area will soak the existing settlement area on the road *Pura Demak*. Clearence required at this point is 2-2.5 meters

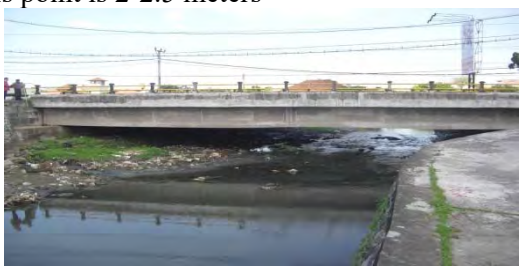


Fig 3 *Teuku Umar Barat* bridge

ISBN : 978-602-99806-3-9

d. Umadwi Dam

Currently Umadwi dam have a width of 18 meters and is a weir motion of the previous is a fixed dam with the construction of stone pairs. With the construction of a weir of motion, it gives more flexibility in the water regulation especially when there is a large discharge that requires rapid elevation. From the observation and analysis done then the ideal width required for umadwi weir is about 24 meters.

Fig 4 Umadwi dam

e. Nakula Road Bridge

Nakula street bridge is located in the area of *Legian* located in the international tourism area of Kuta. This bridge became a contributor to the flood and puddles that flooded the region. The current width of the *Nakula* bridge is 13 m. The location of this bridge is in the downstream part of the Mati river so it has a very flat slope so that the water speed becomes low. Low water speed coupled with a short bridge width then the rainy season when this section becomes one of the flood points that exist in Mati river.

Fig 6 Nakula bridge

f. Bridge Hotel Lavender

The bridge that is around the hotel Lavender width 18 m with the position of the bridge is already close to the estuary. The analysis shows that the width of the existing bridge should be widened from the current 13 meters to 20 meters.

ISBN : 978-602-99806-3-9

Fig 7 Lavender bridge

2. Sediment dredging is an effort to increase river capacity in accordance with river design. From the observation downstream section of the river toll segment starting from the Umadwi dam to the estuary has a very flat slope of the river (0.002-004), causing this area to be a very high place of sedimentation flow. The average sedimentation that occurs has reached 0.3 meters in the middle of the groove up to 0.6 meters on the left side and right side of the existing river channel. If dredging regularly every year can be done then the opportunity to reduce the flood to be very significant can reduce the flooding that occurred.

Fig 8 Sedimentation

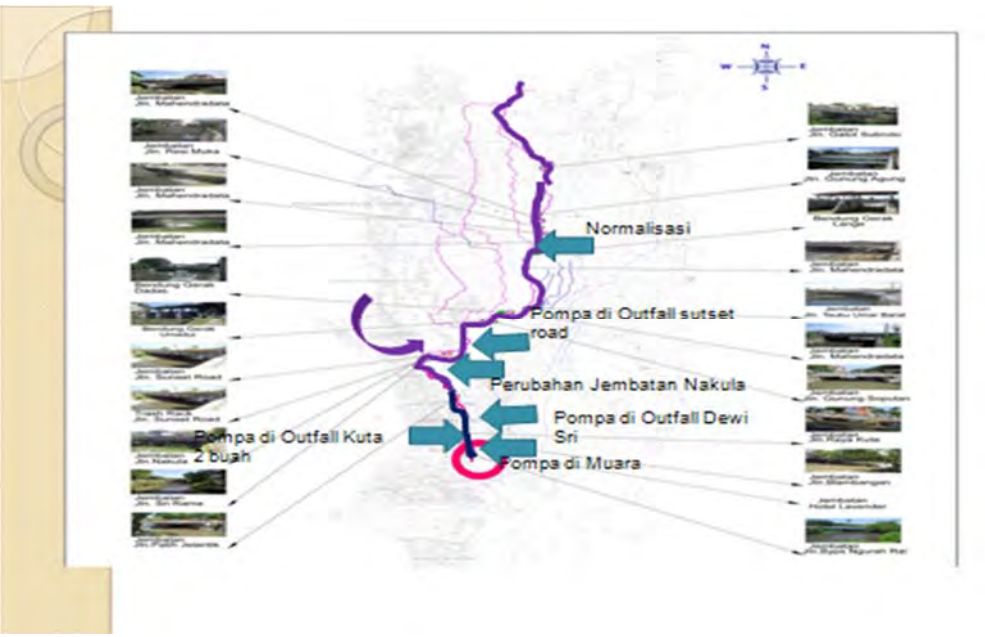


Fig 9 Short Term Concept

➢ Medium-term handling (5-10 Years)

In this medium term handling there are several things that need to be done both in construction and non construction. More things to do are as follows;

a. Enforcement of rules which will serve as a guideline for areas that may be built and areas that should not be built. During this time often violations of some areas should not be awakened utilized for other purposes

ISBN : 978-602-99806-3-9

b. Cultivation of bamboo vegetation along the river bank in the Upper (around *Sempidi* and surrounding areas). The existence of bamboo trees can withstand the landslide of the cliff and maintain the safety of the river slopes from the Gatot Subroto to the upstream to *Sempidi*.
c. Construction of temporary water reservoir building. This building is built in a river with a height of about 3 m and width following the width of the river. The existence of this building will be able to reduce the peak flood in the middle and downstream Mati river.

➢ Long Term Handling (over 10 years)

In the long-term handling of this need to be done several things to keep the condition of Mati river remain ideal can accommodate the flow of water is as follows:

a. Enforcement of regulation governing river border.
On several occasions many Mati river have no borders. The absence of river borders causes excess water during the rainy season to easily enter the surrounding settlements.
b. Inspection road construction along the river
Inspection road construction along the river is necessary for the operation and maintenance of the river. Especially when it will bring the material for the improvement of the river. In the absence of this inspection road, the value of the river improvement project will increase due to difficulties in working methods.
c. Settlement along the river
Settlements along the river is necessary to make the river as a water rod that gives beauty to the surrounding environment. There are still many houses built back to the river. This condition makes the river become on clean and dirty because not a few of these settlements throw drainage into the river. Not only drainage of some garbage appears to be disposed of by the people to the river body. This condition causes the river is not good scenery and potentially reduce the capacity of the river.
d. Making a temporary flood reservoir (retarding basin)
Making basin retarding is an innovation step that can be done to reduce the amount of flood peak discharge that occurred in the area of *Dewi Sri* road until downstream. Hydrolic and hydrological analysis indicates that the presence of retarding basin will be able to reduce the peak discharge of the Mati river flood to 20%. This will certainly be very profitable seen from the desire to free the area of Kuta and surrounding areas free from flooding. From the results of field surveillance and observation of several possible places is the area that lies to the west of Dadas dam. Current land condition is paddy field with area reach 15 Ha. If simulated area of 15 Ha with a depth of 4 m then the retarding basin is able to accommodate water as much as 600 m3.

V Conclusion

From the analysis conducted on the technical study of the management of Mati river based on eco-hydraulic can be concluded several things, namely:

1. The existing Mati river management is still partial in the sense that in one river segment is managed by several agencies namely the Public Works Department of Denpasar, the Public Works Department of Badung Regency and Central government.. In the case of budgeting for operation and maintenance is also very minimal budget allocated by each agency. During this time the budget is more directed to the periodic financing. More detailed description of Mati river management tasks by each agency can be mentioned as follows;

a. Public Works Department of Denpasar in charge of managing buildings along the Mati river in the city of Denpasar such as Lange dam, Umadwi dam and Bendung Dadas
b. Public work of Badung are in charge of managing waste filter building (trashrack in road of sun set road) and building at estuary of Mati river
c. Central government is responsible for managing all river wall buildings along the Mati river line to the Patas Sri area.

ISBN : 978-602-99806-3-9

2. The Concept of Mati river Management should be integrated by involving all agencies supported by the surrounding community so that. All made a real contribution to the improvement and maintenance of the river. In more detail the concept of rivers handling as follows:

Short term concept (0-5 years)

This short-term concept is closely related to the Mati river flood handling which can rapidly lower the flood waters.

Widening of several bridges in the middle and downstream of the river. From the research result of stage 1, it can be concluded that several bridges in the middle of the river need to be widened, more bridges need to be widened, namely: Resimuka bridge , Bauana Raya Bridge, Teuku Umar Barat Bridge, Umadwi Dam, Nakula bridge and Lavender Bridge. Besides, a very important thing to do regularly is the dredging of sedimentation on the Umadwi weir to the Levender bridge.

Medium-term handling (5-10 Years)

In this medium term handling there are several things that need to be done both in construction and non construction. More things to do are as follows;

a. Enforcement of rules which will serve as a guideline for areas that may be built and areas that should not be built. During this time often violations of some areas should not be awakened utilized for other purposes
b. Cultivation of bamboo vegetation along the river bank in the Upper (around Sempidi and surrounding areas). The existence of bamboo trees can withstand the landslide of the cliff and maintain the safety of the river slopes from the Gatot Subroto to the upstream to *sempidi.*
c. Construction of temporary water reservoir building. This building is built in a river with a height of about 3 m and width following the width of the river. The existence of this building will be able to reduce the peak flood in the middle and downstream Tukad Ma

Long Term Handling (above 15 thun)

In the long-term handling of this need to be done several things to keep the condition of Mati river remain ideal can accommodate the flow of water is as follows:

a. Enforcement of regulation governing river border.

On several occasions many Mati river have no borders. The absence of river borders causes excess water during the rainy season to easily enter the surrounding settlements.

b. Inspection road construction along the river

Inspection road construction along the river is necessary for the operation and maintenance of the river. Especially when it will bring the material for the improvement of the river. In the absence of this inspection road, the value of the river improvement project will increase due to difficulties in working methods.

c. Settlement o along the river

Settlements along the river is necessary to make the river as a water rod that provides aesthetics for the environment around it. There are still many houses built back to the river. This condition makes the river become less clear and dirty because not a few of these settlements throw garbage into the river. This condition causes the environmental condition of the river is not good and potentially reduce the capacity of the river.

d. Making a temporary flood reservoir (retarding basin)

Making basin retarding is an innovation step that can be done to reduce the amount of flood peak discharge that occurred in the area of Dewi Sri road up to downstream. Hydrolic and hydrological analysis indicates that the presence of retarding basin will be able to reduce the peak discharge of the Mati river flood to 20%. This will certainly be very profitable seen from the desire to free the area of Kuta and surrounding areas free from flooding. From the results of field visits and observations in several locations, places that allow utuk development of retarding basin is the area that lies to the west

ISBN : 978-602-99806-3-9

of Dadas dam. Current land condition is paddy field with area reach 15 Ha. If simulated area of 15 Ha with a depth of 4 m then the retarding basin is able to accommodate water as much as 600 m3.

Aknowledgment

On this occasion the authors thank to all parties who have helped this research so that it can be completed.

References

[1] Arthington, A. 2012. **Enviromental Flows, Saving Rivers in The Third Millenium.** USA ; University Of California Press.

[2] Barrow CJ., 1998. **River Basin Develovment Palnning And Management** ; **Critical Review** USA ; World Dev.

[3] Central Research And Develoment Of Water Resources Engineering,2000. **Indonesians Standart : Flood Calculation**. Jakarta : Public Work Department Of Republic Indonesia

[4] Cui, Bs, 1999. **Evaluation The ecological Ferformance Of Wetland Restoration In The Yellow River Delta.** China : Ecol Eng

[5] Cui.W,2003. **Eco-Engineering Methods For River In Japan And Experience**. Pearl River

[6] Linsley, R.K dan Franzini, Josep B. 1995. **Water Resources Engineering**. Mc Graw Hill

[7] Liu.S. 1999. **Develovment Of China River Conservancy In The 21 st Century**. Chna : Chuna Water Resources.

[8] Nilsson,1991. **Long Term Effects Of River Regulation On River Margin Vegetation**. Journal Of Applied Ecology

[9] Public Work Department, 2016. Operation And maintenance Of River. Jakarta : Ministry Of Public work, Indonesia.

[10]Sharin, 1990. **Statistical Of Hidrology**. Mc.Graw Hill

[11]Ven Te Chow, 1987. **Open Channel** . Mc. Graw Hill

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

Foreign language interference in science writing of Politeknik Negeri Bali students

I N Mandia[1] and I B A Adnyana[2]
[1]Accounting Department – Bali State Polytechnic
[2]Business Administration Department – Bali State Polytechnic
Bukit Jimbaran, PO BOX 1064 Tuban, Badung, Bali, Indonesia

[1]E-mail: nyomanmandia@pnb.ac.id

Abstract. This study has the purpose to know the interference, especially foreign language interference of scientific writing of Politeknik Negeri Bali Students. This research is important to be carried out because the students are more proud to use foreign vocabularies and idioms than Indonesian term. Through this research, the Indonesian teachers can develop clearer teaching strategy and be expected by the students are in using the vocabularies and idioms more proud to use own language. Which the students in the end are able to use the Indonesian scientific variety in creating scientific writing. Foreign terms ciphers for scientific writing of the Politeknik Negeri Bali students have been inevitable, because there are some foreign terms which have not been able to be Indonesian. In addition, students have also felt in using foreign terms have been more global than Indonesian terms. The interference of students foreign terms have been higher than the use of foreign vocabularies, which have reached average 1,32% , the interference of average foreign vocabularies have reached 0,2%,, while the foreign term and vocabularies have inserted average 1,57%.

1. Introduction

Indonesian on the one hand has got very rapidly development, but on the other hand it has got changes accordance with science development. In addition, the changes have happened because there has been social change, economic, and culture. Language development has been quite rapid occurred in the field of science and technology. Contacts in the field of political, economic, science and other fields may cause a language to be affected by other languages. The process of interplay between one language and another is inevitable.

Language as an integral part of culture can not be separated from the above problems. Mutual inter language influences must occur, for instance, language vocabularies concerned, to remember that vocabularies which have an open nature. According to Chaer (1995 : 159) language contact is used two languages by the same speaker in turn. From the language contact has been occurred to transfer or transfer one language element into another which has covered all levels. As a consequence , the process of borrowings and influencing other elements of language can not be avoided.

Today, the societies have started mixing Indonesian with foreign languages in the use of daily language. In the contexts of non formal conversation or slang, it does not become a significant issue. However, if the use of this mixed language is brought into formal forum, such as lectures, or language in newspapers, then this phenomenon becomes a quite serious problem.

The main cause of this phenomenon occurred is the habit of Indonesian societies that glorify all things that smelled International, overseas, or it can be said such as western society. In other words,

ISBN : 978-602-99806-3-9

roughly the Indonesian nation is less proud of its language and its own culture. The use of foreign language and culture is considered cooler and acceptable in the association. If it is used in the context of social intercourse, in this case it does not become a serious problem, but the unfortunate thing is if this happens at the scientific forum, mass media, lectures, seminars, and other formal forums.

Indonesian lesson for Politeknik Negeri Bali Students are given in the first semester, which is concentrated on language skills, including spelling, absorbing guidelines, paragraphs, and discussions. The characteristics of interference from students have been done since the first and second weeks of recovery, both of oral and written. Verbal interference was observed when they gave greeting their fiends who were chocked on morning, breakfast, please and so on. The inserting written interference was seen in writing lesson, even inserting foreign element was more dominant than the interference verbally.

Based on this background, the problem formulation in this research is as follows:

1. What is the interference of foreign terms in the scientific papers of the Bali Politeknik Negeri students?
2. What is the interference of foreign language vocabulary in the scientific papers of the Bali Politeknik Negeri students?

2. Research methodology

The approach used is qualitative approach. It is said qualitative because this research is in accordance with some qualitative design features: (1) natural setting, (2) human being as instrument (instrument), (3) qualitative method, (4) inductive data analysis, (5) and (6) descriptive (Moeleong, 1996: 4-6). Research conducted by qualitative approach reveals information about the object under study thoroughly and in accordance with the context through the collection of data from the natural setting by using researcher self as a key instrument (Dwiloka and Riana, 2005: 65). Based on the characteristics possessed, qualitative research can be regarded as research conducted in a reasonable situation or in a natural setting (natural seeting). The role of researchers is as observers who directly observe as well as interact with the object problems in the environment, trying to understand, and interpret it. In this study, the implementation of qualitative approach is seen, in addition to the objective formulation, also on the type of data to be collected, ie data in the form of speech, sentence, or words.

This research uses observation method and record technique. Thus, the research observed in the research of foreign language interference in the scientific paper of the students of Politeknik Negeri Bali in 2016 is a thesis or final assignment of students in the Library of Politeknik Negeri Bali. The population of this research is all the writings of scientific students of Politeknik Negeri Bali in 2016 is 926 papers, while taken as a sample of three papers each study program of 13 existing courses. Thus, the sample size of this study is 3 x13 = 39 papers. The nature of this population is considered homogeneous. Homogeneous populations are a set of objects with almost similar values and characteristics and are considered to have no significant differences between one another, so there is no need to question quantitatively.

3. Results and discussions

3.1 Interference of Foreign Terms Data of incoming foreign terms come from 13 courses from six majors in Bali

State Polytechnic, namely data of accountancy, managerial accounting, travel business, hotel management, tourism business management, commercial administration, international business management, mechanical engineering, air system or referrals, electricity, and information systems. Samples taken in this study were 3 samples per study program.

3.1.1Foreign affairs interference in Accounting Department.

Quantitatively, from six samples of scholarly work of accounting and managerial accounting students, there are number of terms and percentages: Ak1 term 264 and percentage 2,27, Ak2 term 257 and

ISBN : 978-602-99806-3-9

percentage 2,25, Ak3 term 53, percentage 0.47, AM1 term 338 and percentages 1.80, AM2 terms 28 and percentages 0.20, AM3 terms 72 and 0.51 percentages.

3.1.2 Foreign affairs interpretation Works on the Department of Tourism.
Summary of foreign term interference data for the Department of Tourism is as follows: UPW1 number of terms 195 and percentage 1.80, UPW2 terms 287 and percentage 1.43, UPW3 terms 61 and percentages 0.67, HTL1 terms 485 and percentage 4.47, HTL2 terms 632 and percentages 5.68, HTL3 terms 80 and 0.66 percentage, MBP1 terms 159 and percentage 1.03, MBP2 terms 109 and terms 0.82, MBP3 terms 87 and terms 0.57.

3.1.3 Foreign language interference in the Department of Business Administration.
Terms that fall into this field are related to business, administration and office terms. Here are the entry data for commercial administration: AN1, AN2, AN3, MB1, MBI2, MBI3, each entering the foreign terms 181, 196, 74, 215, 63, and 74 and 1.66, respectively, 2.40, 0.69, 1.33, 0.57, and 0.42.

3.1.4 Interpretation foreign affairs student scientific work Department of Civil Engineering.
The total terms recorded in the data card are 469 with the details: SPL1, SPL2, SPLE, MPK1, MPK2, MPK3, with terms 89, 47, 15, 470, 87, and 140 with a percentage of each: 0.71, 0, 43, 0.07, 2.61, 0.93, 0.85, 0.90.

3.1.5 Interpretation Foreign Language Scientific Work of Students Department of Mechanical Engineering
Department of Mechanical Engineering PNB has two concentrations of study program, namely Mechanical Engineering Study Program and Study Program of Air Conditioning and Aircraft Engineering, interference of student's writing of this study program can be presented in the following discussion.

The number of foreign terms for the Department of Mechanical Engineering is not much different from the foreign term with the Department of Civil Engineering. The following is the number and percentage of the Department of Mechanical Engineering: MSN1, MSN2, MSN3, TPTU1, TPTU2, TPTU3 each of which implements foreign terms 104, 180, 49, 82, 79, and 32, respectively percentage: 0 , 96, 2.28, 0.48, 0.72, 1.28, and 0.50.

3.1.6 Interpretation of Foreign Terms of Scientific Work of Students of the Department of Electrical Engineering
The final assignment of the students of both programs takes foreign and foreign vocabulary, which is not much different from other majors. The following are the interference data of each study: LTR1, LTR2, LTR3, MSI1, MSI2, and MSI3 by entering foreign terms: 115, 49, 49, 264, 111, and 237, respectively. For the sixth percentage of this sample each 0 , 85, 047, 0.38, 2.05, 1.65, and 2.43.

The result of the interference of foreign terms in each department is shown in figure1.

ISBN : 978-602-99806-3-9

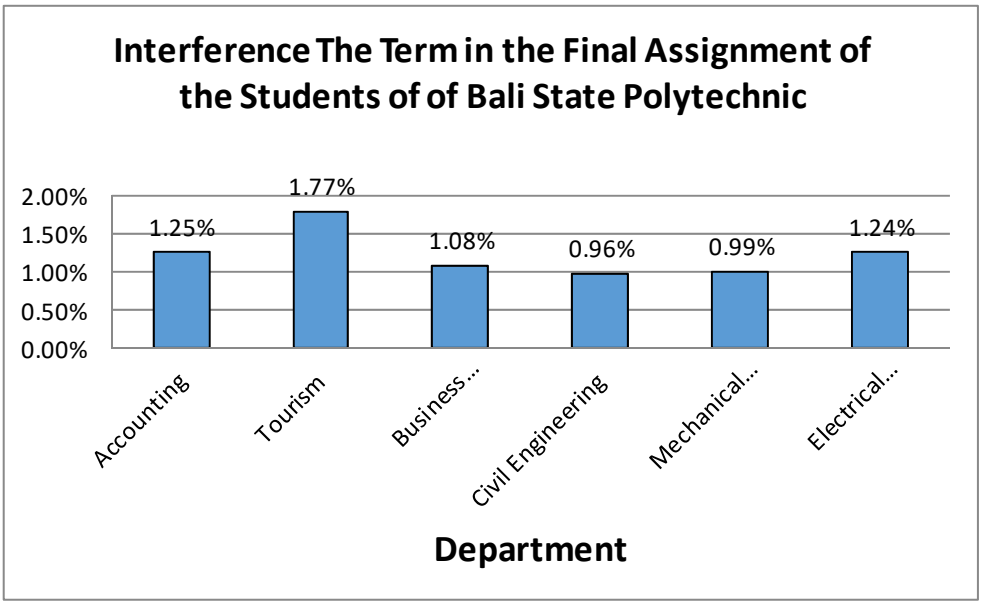


Figure 1. Foreign term interference chart on final project and student thesis PNB

3.2 Interference foreign vocabulary

From the explanation, it can be seen that the term can also be a word. The difference between words and terms is a word used in different areas of life, whereas the term is used only in certain areas of life. Words have meanings that tend to be uncertain, depending on the context the word is used, while the term tends to have a definite meaning, independent of the context.

3.2.1 Vocabulary interference Accounting Department.

The variance interference in student literature tends to be smaller when compared to the interference of foreign terms. The following is the interference of foreign vocabulary Accounting Department which only reaches an average of 03. Details: Ak1, Ak2, Ak3, AM1, AM2, and AM3, each of which has a percentage of 0.12, 1.4, 0.0, 0 , 0.0, and 0.0.

3.2.2 Interpretation vocabulary scientific work Department of Tourism.

The average of vocabulary interference for Pariwata is the same as Accounting Department which is 0.3. Here is the percentage of vocabulary interference in each study: UPW1: 0.1, UPW2: 0.2, UPW3: 01, HTL1: 1,0. HTL2: 0.2, HTL3: 0.0, MBP1: 0.1, MBP2: 0.7, MBP3: 0.1, while the vocabulary numbers of each study are: 15, 38, 8, 106, 19, 6 , 18, 98, adan 12.

3.2.3 Interference vocabulary scientific work Department of Commerce Administration.

The writings of the students of the Business Administration Study Program also slip in common words in the final task. It's just that in the data entered on the card there are 2 foreign words on one of the final task, namely section and copy.

The word service still dominates in vocabulary interference. The word service above is not in accordance with the rules of the Indonesian language is also the way of writing is not appropriate because it does not use italics. The following data are available on each of these studies: AN1, AN2, AN3, MBI1, MBI2, and MBI3 with 0.3, 0.0, 0.0,0,0, 0.2, and 0, 0.

3.2.4 Vocabulary interference scientific work Department of Civil Engineering.

The average percentage gain on foreign vocabulary interference on scientific work of Civil Engineering students reaches 0.1. Three study programs received a score of 0.0, ie SPL2, SPL3, and MPK3, while other courses, SPL1, MPK1, and MPK2 each gained 0.2, 0.3, and 0.3.

ISBN : 978-602-99806-3-9

3.2.5 Interpretation vocabulary scientific work Department of Mechanical Engineering.
There is only one foreign word tucked into a sample of scientific papers written by the students of the Aircraft Engineering and Aircraft Engineering Program, namely the system. Writing will become standard when written with 'system'. The accumulation of foreign words from the Mechanical Engineering and Electrical Engineering and Aircraft Engineering Study Program can be detailed in each study program: MSN1, MSN2, MSN3, TPTU1, TPTU2, and TPTU3 with percentage details: 0.2, 0.5, 0.1, 0.4,0,0. Similarly, in entering the foreign vocabulary respectively: 20. 36, 3, 17, 23, and 0.

3.2.6 Interpretation of vocabulary scientific works of the Department of Electrical.
Foreign language vocabulary in the paper of Department of Electrical Engineering more than other majors. The number of vocabulary and percentage of writing each of these studies are: LTR1, LTR2, LTR3, MSI1, MSI2, and MSI3 each got a cosmetic score of 85.2, 7, 188, 40, and16, with a percentage of 0.6.0 , 0, 0.1, 1.5, 0.6, and 0.2.

f foreign vocabulary interference on the scientific paper of the Bali Politeknik Negeri students.

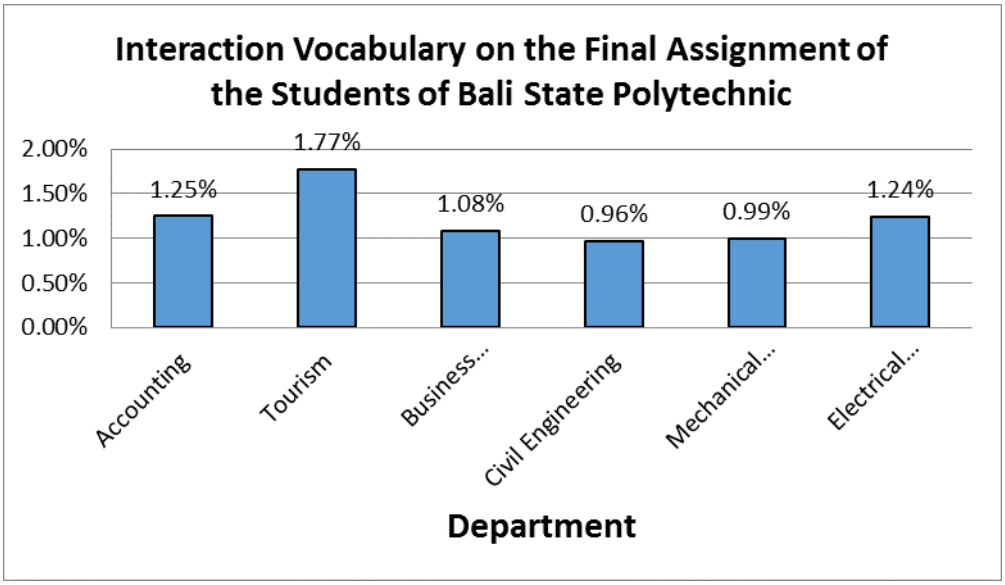


Figure 2. below shows the result of foreign vocabulary interference on the scientific paper of the Bali Politeknik Negeri students.

From the result of interference of foreign terms and foreign language vocabulary described above, the result of foreign terms and foreign vocabulary are respectively: accounting for 1.51, tourism 2.18, commercial administration 1.3, civil 1.1, 1.2 and 1.8. For more details can be seen in the following graph.

ISBN : 978-602-99806-3-9

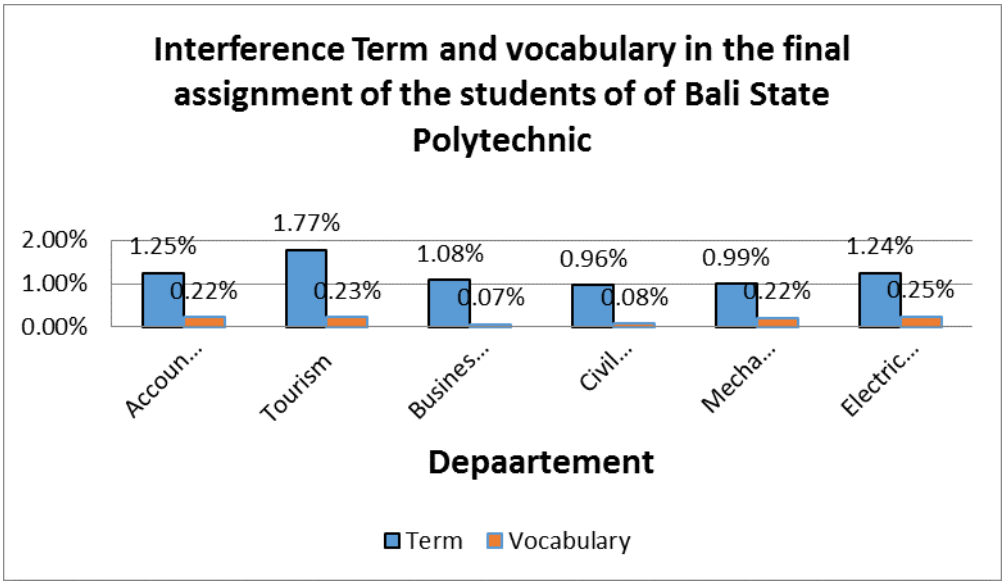


Figure 3. Interpretation and foreign vocabulary graphs on final project and student PNB Thesis

4. Conclusions

Based on the previous description, it can be concluded the things as follows.

The terms written in foreign languages are actually equivalent in the Indonesian language. However, the foreign term tucked away in the scientific papers of the students of Politeknik Negeri Bali is still encountered, because there are some foreign terms that can not be diindonesiakan. In addition, the writing of foreign terms is considered more commonly used than the Indonesian term. Interference of foreign terms of students is higher than the use of foreign vocabulary, which reached an average of 1.32%. The use of foreign terms of each department in scientific papers of PNB students can be detailed: Accounting Department 1.25, Tourism Department 1.90, Department of Business Administration 1.2, Civil Engineering 0.90, Department of Mechanical Engineering 1.0, and Department Electrical Engineering.

The foreign vocabulary interaction of Balinese Politeknik Negeri students is lower when compared with the interference of foreign terms, which only reaches 0.2. When viewed from the average of the majors, the highest Electrical Department, which is 0.5, followed by tourism and accounting each 0.3, 0.2 machines and the administration of commerce and civil engineering each 0.1.

Taking into account the results of the use of foreign terms and vocabulary in scientific papers of the students of Bali State Polytechnic, that for the use of foreign terms and the highest vocabulary is the Department of Tourism with a score of 2.18% and the lowest is the Department of Civil Engineering with a score of 0.12%.

Ackowledgments

The realization of this research is supported by the assistance and cooperation of the Director of the Bali State Politic and the funding support from the Directorate General of Higher Education of the Ministry of Research, Technology and Higher Education of the Republic of Indonesia.

REFERENCES

[1] Chaer A 1994 *General Linguistics* (Jakarta: Rineka Cipta)
[2] _____ 2009 *Introduction to Indonesian Semantics* (Jakarta: PT Rineka Cipta)
[3] Chaer and Agustina 2010 *Speaking politeness* (Jakarta: Rineka Cipta)
[4] Moeleong 1996 *Qualitative Research Methods* (Bandung: Teenage Rosta Karya)
[5] Dwiloka B and Riana R 2005 *Technical Writing of Scientific Works* (Jakarta: Rineka Cipta)

ISBN : 978-602-99806-3-9

[6] Sofyan A 2016 Interference Indonesian People of Sunda Ancestry of the City of Tanjung Pinang. Thesis (unpublished) Indonesian Language and Literature Education Department, Faculty of Teacher Training and Education, Raja Ali Haji University, Tanjung Pinang.
[7] Arikunto S 2010 *Research Procedure: A Practice Approach (Revised Edition)* (Jakarta: Renika Cipta)
[8] Alwasilah A C 1985 *Language Sociology* (Bandung: Space)
[9] Dwiloka B and Riana R 2009 *Technical Writing of Scientific Works* (Jakarta: Rineka Cipta)
[10] Budiarsa 2006 "The Use of Language in the Tourism Sector of Some Hotels in Bali." Thesis (Unpublished) Master Program, PPS Linguistics Study Program Udayana University. Denpasar: Udayana University.
[11] Department of Education and Culture 1990 *Big Indonesian Dictionary* (Jakarta: Balai Pustaka)
[12] Khotimah K 2009 "Interference of Javanese Language into Indonesian On Student's Narrative Writing Class I MTS Yasin Nglangak, Kwangen, Gemolong, Sragen.Tesis (unpublished) Faculty of Teacher Training and Education Universitas Muhammadyah Surakarta.
[13] Hamzah K 2015 "Phonological Interference of Java-Sunda Society of Kedungreja Cilacap in Arabic Language". Thesis (unpublished) Faculty of Languages and Arts Arabic Education, Semarang State University.
[14] Nababan 1993 *Sociolinguistics An Introduction* (Jakarta: PT Gramedia)
[15] Pujiono 2006 "Grammatical Interference and Indonesian Lexical on Japanese Language" USU Graduate School Thesis.

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

Investigation of solar collector for developping dewvaporation system in Bali

[1] IDG Agustriputra*, [2] K Bangse

[1,2] Departement of Mechanical Engineering, Bali State Polythecnic
Kampus Politeknik Negeri Bali
Bukit Jimbaran, Kuta Selatan, Badung - Bali
PO BOX 1064 Tuban
e-mail: dev_ajuss@yahoo.com

Abstract. Solar thermal energy source in the tropical zone have an availability more than the others zones in the world. Utilization of this source energy in indonesia is lower than another sources of energy even though domestic or indutrial processes. Indonesia have large maritime region and many archipelago, so desalination become main issues in remote and seaboard area. Dewvaporation system is one of methods for desalination process of sea water. This method use energy thermal and carrier gas for separation salts component in sea water. Evaporation chamber of dewvaporation system need thermal energy source for gain temperature of carrier gas. In this project, vacuum tube solar collector technology has been investigated for integration on dewvaporation system. Thermal energy that is collected from solar radiation and it is utilized to gained energy in evaporation chamber of dewvaporation system. Active direct water flow system of the solar collector been measured their capability for collected of solar thermal energy. After 5 days of testing, rate of water temperature output is 56°C and rate of thermal energy outputs is 456 watts/m^2 **.**Water flows in the tube of solar collector is 1,4 bar. This project results meets requirements for integration solar collector in the dewvaporation system.

Keywords: solar, thermal, energy, dewvaporation

INTRODUCTION

Sea water desalination process grows rapidly to increase energy efficiency and capacity for pure water production. Utilization of solar thermal energy also increase for gain their efisiencies . The prospect of developing the salt industry in production of brine solution is another factor that will have economic impacts. The method for development of sea water purification is dewvaporation. Dewvaporation is one method of evaporation of sea water which uses air flowing to the surface of the ocean water that flows so as to bring steam that is formed. Dewvaporation technology will consist of two chambers: evaporation chamber and condensation chamber. The evaporation chamber will produce residual evaporation or sea water with higher salt content (brine), while the condensation will produce destilate or fresh water. Application of solar collector technology is used as additional energy so it increased evaporation process. The rate of the evaporation and condensation processes presented as model thermal energy and also production capacity can be oftimized. Furthermore, it will be integrated with the performance solar collector. Utilization of solar thermal energy provides energy-efficient, an environmentally friendly and renewable energy. Tropical regions can provide benefits in the application of solar thermal energy but its characteristics still need to be investigated so that it can be integrated with dewvaporation system in the process of purification of seawater.

ISBN : 978-602-99806-3-9

Desalination technologies have been used increasingly throughout the world to produce the drinking water from the brackish ground and sea water for the past few decades. Among the commercially available desalination technologies, reverse osmosis (RO) and multi-stage flash distillation are the most widely used technologies globally. However, these technologies are difficult to be directly integrated with green energies without converting them to electricity. Dewvaporation, a desalination process, uses saturated steam as a carrier-gas to evaporate water from saline feeds and form pure condensate. It has the major technical benefit of reusing energy, released from vapor condensation, multiple times.

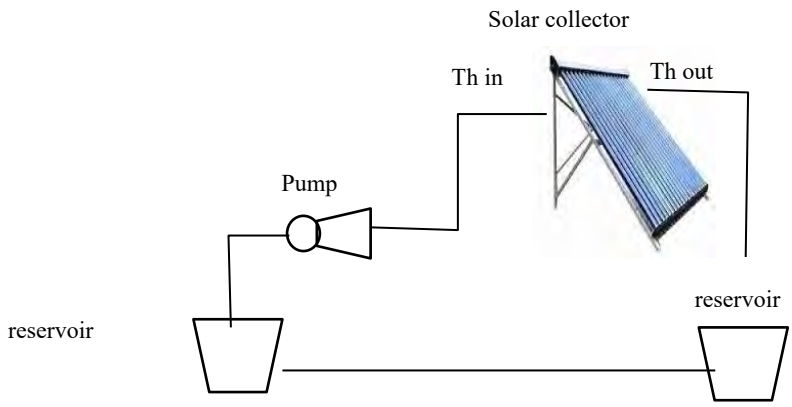
The operation of the Dewvaporation system would not be affected by the mode of heating the process water. The differences expected, on using solar energy, were in attaining steady state. Also the system would be affected due to the irregularity of the solar power. These could be caused by a number of reasons such as clouds obstructing the sunlight or the position of the sun in the sky. Sudden loss of sunlight during operation would affect operating conditions and hence the distillate production

METHODOLOGY

A simple solar collector consists of an absorber material, sometimes having a selective surface, to capture radiation from the sun and transfers this thermal energy to air via conduction heat transfer. This heated air is then ducted to the building space or to the process area where the heated air is used for space heating or process heating needs. Functioning in a similar manner as a conventional forced air furnace, solar-thermal-air systems provide heat by circulating air over an energy collecting surface, absorbing the sun's thermal energy, and ducting air coming in contact with it. Simple and effective collectors can be made for a variety of air conditioning and process applications.

There are basically two types of solar collectors:nonconcentrating or stationary and concentrating. A nonconcentrating collector has the same area for intercepting and for absorbing solar radiation, whereas a sun-tracking concentrating solar collector usually has concave reflecting surfaces to intercept and focus the sun's beam radiation to a smaller receiving area, thereby increasing the radiation flux. A large number of solar collectors are available in the market.

In this project active direct solar collector has developped for integrated to the dewvaporation system. Testing method of the solar collector can be showed in the figure 1.



The test of this solar collector is to know the amount of energy transferred to the fluid flow which is set at a discharge of 10-20 liters / min. The water temperature change measurement tool is using K type thermocouple. The data will be taken in an interval of 30 minutes from 8:00 to 16:00 hours.

Application of solar collector may be necessary to change the location, tilt angle or orientation because of shading, aesthetic reasons, lack of available space, complex roof profile or lack of structural support from the building. However, testing of solar collector will be taken orientation 10° to the north, because of bali islands located in 10° south latitude.

ISBN : 978-602-99806-3-9

RESULT AND DISCUSSION

Result of testing solar collector will be known the inlet (Th in) and outlet (Th out) temperature of recirculation of water. Active direct flow models in aplication of solar collector can be evaluated for increased of thermal energy of water after circulation in the solar collector. Then, calculation of data will be known number of thermal energy per metre square area of collector.

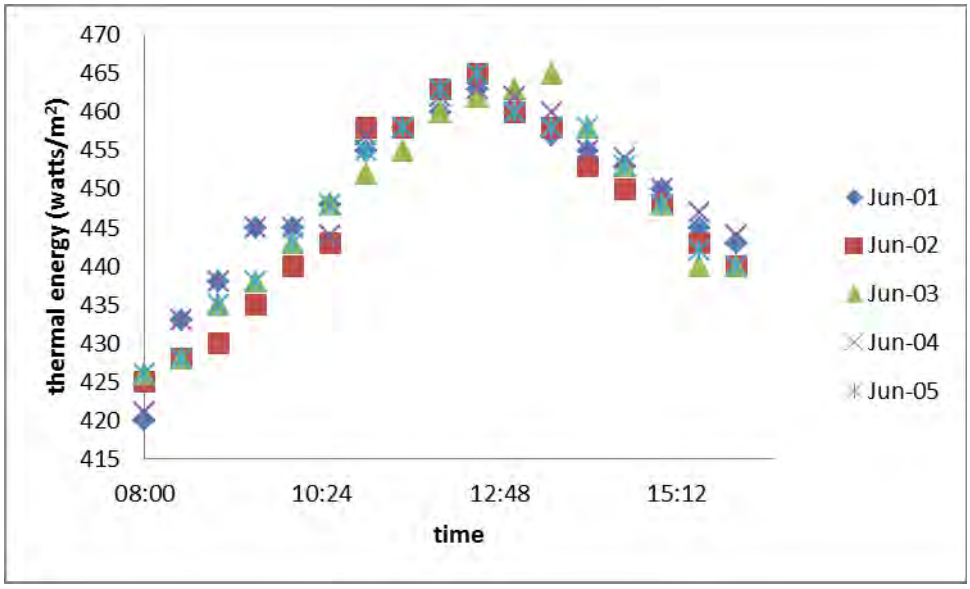


Figure 1 Thermal energy of solar collector

Figure 1 shows that solar thermal energy increased from 08:00 until 01:00 then it will be reduced until 16 00. Climate condition on days of testing is the same relatively. This solar collector can collected energy from the sun maximun 465 watts/m^2. Temperature rate of output hot water is 56°C.

CONCLUSION

Active direct water flow system of the solar collector been measured their capability for collected of solar thermal energy. After 5 days of testing, rate of water temperature output is 56°C and rate of thermal energy outputs is 456 watts/m^2 **.**Water flows in the tube of solar collector is 1,4 bar. This project results meets requirements for integration solar collector in the dewvaporation system.

ACKNOWLEDGMENT

This project is granted by DIPA-Unggulan P3M Politeknik Negeri Bali

REFERENCES

[1] Aintablian et al., 2013. Desalination Expands as Technology Becomes More Affordable. *Water Desalination.*

[2] Bassem M. Hamieh, et al., 2006. Seawater desalination using Dewvaporation technique:theoretical development and design evolution. *Desalination.*

ISBN : 978-602-99806-3-9

[3] Duffie et al, 2006. *Solar Engineering of Thermal Processes*. Third Edition ed. Wisconsin, USA: John Willey and Sons Inc.

[3] G V G Reddy, et al, 2009. Effect of Inclination on Mean Heat Loss Co-efficient of all Glass Evacuated Solar Tube Collector. *IE Journal*, 90, pp.14 -17.

[4] Graham L. Morrison, et al., 2003, Heat Transfer in Evacuated Tubular Solar Collectors. John Willey and Sons Inc

[5] H M S Hussein, et al., 2006. Performance of Wickless Heat Pipe Flat Plate Solar Collector having Different Pipe Crosssection Geometries and Filling Ratios. *Energy Conversion and Management*, 47, pp.1539-50.

[6] Putra., I.A.T., 2005. Perancangan Alat Pengering Air Garam Dengan Sumber Energi Thermal Surya Untuk Peningkatan Produksi Garam. *Logic*, xv, pp.12-20.

[7] Qiblawey, et al., 2008. Solar thermal desalination technologies. *Desalination*, 220, pp.633-44.

[8] SUKHATME, S.P., 1997. Solar thermal power generation. *Proc. Indian Acad. Sci.* , 109, pp.521-53.

[9] Z. T. Yu, et al., 2005. Investigation and analysis on a cellular heat pipe flat solar heater. *Heat Mass Transfer*, 142, pp.122–28.

[10] ZHAO Hui et al, 2009. A Mechanical and Experimental Study on the Heat Loss of Solar Evacuated Tube. *Journal Shanghai Jiaotong Univ*, 14, pp.52-57.

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

Marketing information system design based on local community tourism destinations

I G P Fajar Pranadi Sudhana[1)] and I Made Suarta[2)]

[1)]Tourism Department, Politeknik Negeri Bali
[2)]Accounting Department, Politeknik Negeri Bali

Authors correspondence: fajar.pranadi@gmail.com

Abstract: Information and Communication Technology has evolved into one of the tourism industry infrastructure. The integration of information and communications technology to support the tourism industry becomes very important in today's digital era. This research offers an alternative solution in developing a Local Community Based Destination Marketing Information System (DMIS). This information system was developed to facilitate the distribution and marketing of small and medium enterprises of local tourism throughout the global tourism distribution network either directly or indirectly. This information system platform is designed to be able to meet the needs of small and medium enterprises in the field of tourism in the market penetration, promotion of tourist accommodation, and allows transactions between small and medium businesses with costumer directly. This study used a combination of field research with locations in Pecatu Village, and research and development. The results of field research concluded that Pecatu Village has many tourism potentials managed by local communities. This potential if managed well, can have a significant impact on improving the welfare of the community. This destination marketing information system can be utilized by the local community in penetrating the market.

Keywords: *tourism information systems; small and medium enterprises; community-based tourism industry.*

INTRODUCTION

As a favorite tourist destination, Bali consistently places tourism as a leading sector. Goh et al. (2010) mentions tourism has developed into one of the service industry with a very high growth rate. Tourism provides a considerable impact on economic growth of Bali.

As one source of local revenue, the tourism industry needs to be well managed. One of them by integrating the use of information and communication technology (ICT) in the tourism sector as a media campaign, media transactions and media communication with stakeholders. ICT has developed into one of the tourism industry infrastructure (Law et al., 2009; Bethapudi, 2013; Hanif et al., 2013). In some ways, ICT has provided many changes and created new opportunities for the advancement and development of

ISBN : 978-602-99806-3-9

the tourism industry, such as for marketing, publication, promotion of objects and tourist attractions using websites (Eraqi & Abd-Alla, 2012).

Utilization of ICT for sustainable tourism development in order to empower local communities is still lacking. Until now, the Government of Bali does not have Master Plan of Information Technology or IT Master Plan at provincial government level to implement e-Government in order to run the implementation of regional tourism development based on ICT (Puslitbang Penyelenggaraan Pos dan Informatika, 2012). In addition, there is no website portal that specifically provides information about tourism in an integrated manner, such as information of tourist location, tourist attraction information, hotel and restaurant information managed by a particular community or village.

The tourism sector as the flagship of the government is time to take advantage of ICT as an implementation of e-Government to market and publicize the potential of local tourism. In comparison, the Singapore Government through Infocomm Development Authority (IDA) has established a partnership with Singapore Tourism Board (STB) called Digital Concierge. Digital Concierge (DC) is one of the main programs in IDA's 10-year Intelligent Nation Masterplan ("iN2015") to help transform tourism, hospitality and retail sectors in Singapore (http://digitalconcierge.sg/).

Learning from the experience of other countries in managing the tourism industry by utilizing the progress of information technology, it is necessary to develop a tourism information system to raise the potential of rural community tourism. This research offers an alternative solution in developing an integrated rural tourism information system based on local rural communities. This information system is developed in order to empower the local community, so that people can play an active role as tourism actors in the region. All potential related to tourism in a region is packaged in an on-line and real time information system, so that tourists who want to know information related to tourism in one village area can access it easily.

In general, tourists need complete information about a tourist destination. Pecatu Village has a variety of tourism potential, ranging from Uluwatu Temple, Beach, and art attractions. Tourism supporting facilities such as accommodation and restaurants are also growing rapidly. Currently, there is no integrated information system in managing all tourism potential in Pecatu Village. Even if it exists, the information presented from an information system is partial and often incomplete. The main focus of the study is how the information system needed to be able to promote various local tourism potentials in an integrated manner. The information system is expected to serve as a comprehensive tourism database, accurate, and reliable to support the development of community-based tourism. Based on the main focus of the research, this research is aimed at making the design of information system for marketing tourism potency managed by local community.

RESEARCH METHODOLOGY

This research is an applied research that aims to develop the application of information technology for the tourism sector. The research was conducted with a combination of field research approach and research and development. Field research is intended to get an overview of the various tourism potentials that exist. The field research location is Pecatu Village, South Kuta District, Badung Regency. During field research conducted interviews with local business actors, observation and documentation of various destinations, tourist attractions, accommodation and other tourism support industries.

Simultaneously, also carried out the development of information system applications using research and development approach (research and development). Procedures in developing this application using

ISBN : 978-602-99806-3-9

the approach of system development life cycle (SDLC) method. This method consists of six stages which include: (1) system engineering, (2) analysis, (3) design, (4) coding, (5) testing, and (6) maintenance (Pressman, 2009). The life cycle of system development is also known as the waterfall model. The design of information systems proposed in this research is web based using several system design tools such as: creating flowcharts, context diagrams, and data flow diagrams that can explain the flow of data processed to produce the desired information.

RESULTS AND DISCUSSION

Summary of Field Research Results

Based on the results of interviews, observations and documentation in order to field data collection, can be presented several things as follows:

a). Pecatu Village is an area already known as a tourist destination, has tourist destinations including: Pura Luhur Uluwatu, Suluban Beach, Padang-Padang Beach, Labuan Sait Beach, Bingin Beach, Dreamland Beach and Nyang-Nyang Beach.
b). Tourist attractions that become tourism icon of Pecatu Village is Kecak Dance, performed every day from 18.00 - 19.00 local time. The stage position is on the south of Uluwatu Side Tourism Object Area.
c). Pecatu Village as a tourism area has evolved a variety of accommodation facilities, ranging from Villa and 5 star hotels to tourist accommodation managed by local communities. This tourism accommodation is managed by the community is actually the target of this research activity. Some of them: Uluwatu Cottages, Nyama Adi, Padang-Padang Breze, Bali Bule.
d). Tourism supporting industries are also developing include: coffe luwak, local transport, souvenir traders, massage groups, and so on.

Results of Development and Information System Testing

The system design process includes creating flowcharts, context diagrams, and data flow diagrams that can explain the flow of data processed to produce the desired information. Flowchart is a chart with certain symbols that describe the process sequence in detail and the relationship between a process with other processes in a program (Ladjamudin, 2005). Context diagram is a general or broad diagram of an information system that describes the flow of data from within and outside the entity. An external entity is an entity located outside the system that sends data to the system or receives data from that system in this case ie the visitor, the tour manager and the administrator. Data Flow Diagram (DFD) describes the logic function of a system, in the DFD there is data flow and processes that occur in the system.

The design of information systems proposed in this research is web based using several system design tools such as flowchart (Figure 1), context diagram (Figure 2), and Data Flow Diagram (DFD) (Figure 3).

ISBN : 978-602-99806-3-9

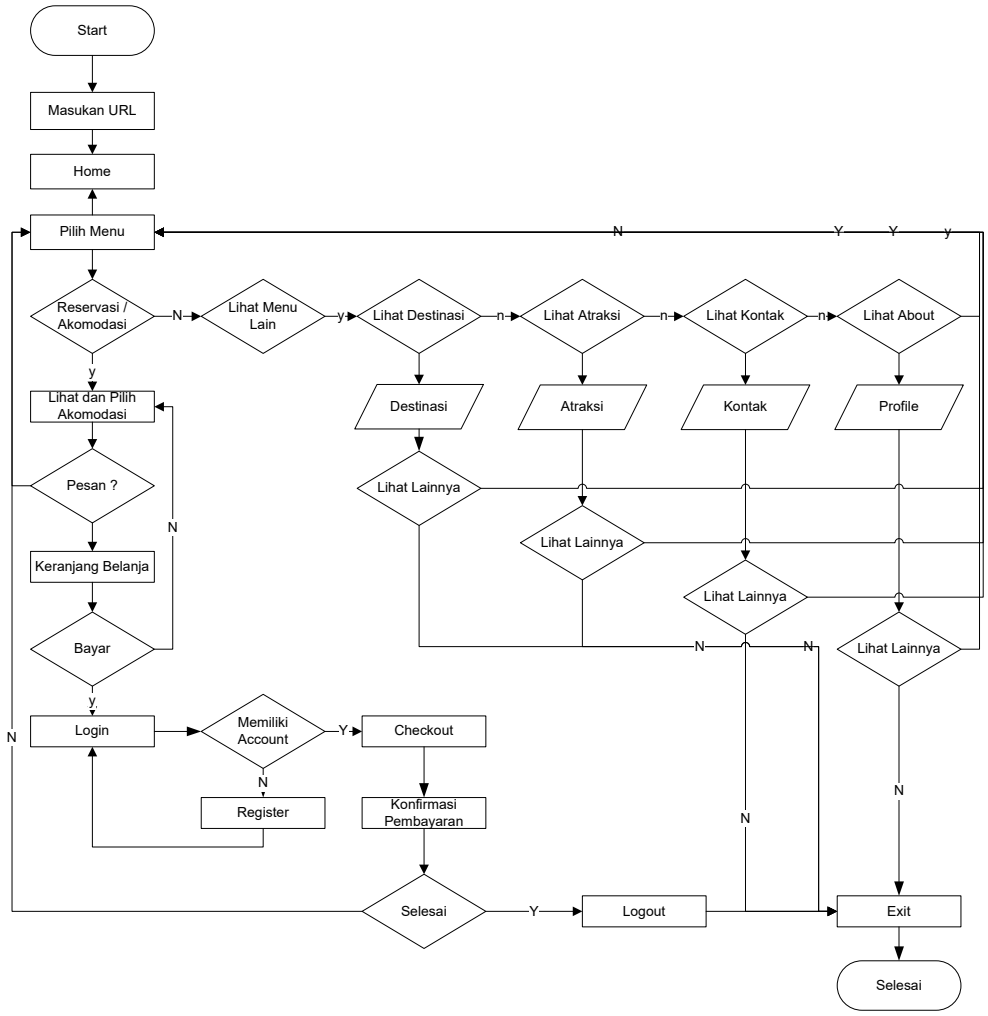


Figure 1. Flowchart of local community-based tourism information system

The developed tourism information system is designed to be able to handle key processes, including: reservation / accommodation, process for viewing destinations, process of viewing tourist attractions, process of viewing contacts, process of viewing other menu. In the reservation process, it is planned to be used as an online transaction medium. At this stage only a simulation is made to make the reservation process. In the process of viewing destinations and attractions, users are allowed to browse to get various information about destinations and tourist attractions in Pecatu Village.

ISBN : 978-602-99806-3-9

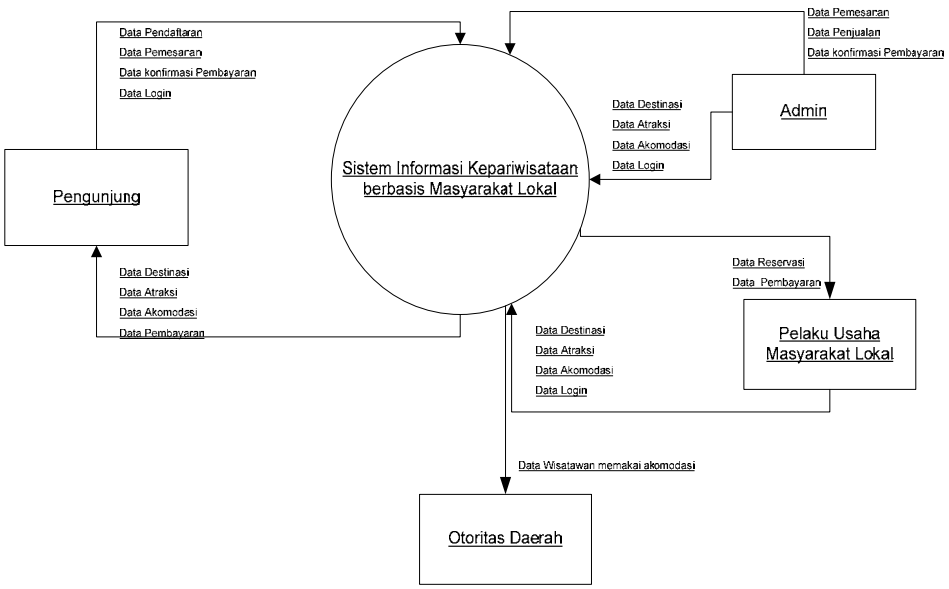


Figure 3. Context diagram of local community-based tourism information system.

Context diagram is a tool in making an information system design. The design results are still general which describes the flow of data from within and outside the entity. An external entity is an entity located outside the system that sends data to the system. In this design external entities include visitors, tour managers and administrators. Tour managers can be local business actors or regulators in the field of tourism.

Visitor entity can send data request to information system in the form of registration, ordering, login, confirm payment. In response to these data requests, the information system will send information to the user in the form of destination data, attractions, accommodation, or data related to the payment.

Admin entities are given the authority to submit data requests to information systems in the form of marketing data, sales, or payment confirmation data. Admin can also update data destination, attraction, accommodation. Tour managers in this case are business actors from local communities and tourism regulators. Through accounts owned by each business actor, they can update data limitedly to the business they manage. Business actors may also request order data that occurs for the business they manage, as well as know the payment information. Tourism regulators can utilize this information system as a means to monitor various tourism activities in their area, such as tourist attractions, tourist destinations, tourist accommodation along with the number of tourists staying.

ISBN : 978-602-99806-3-9

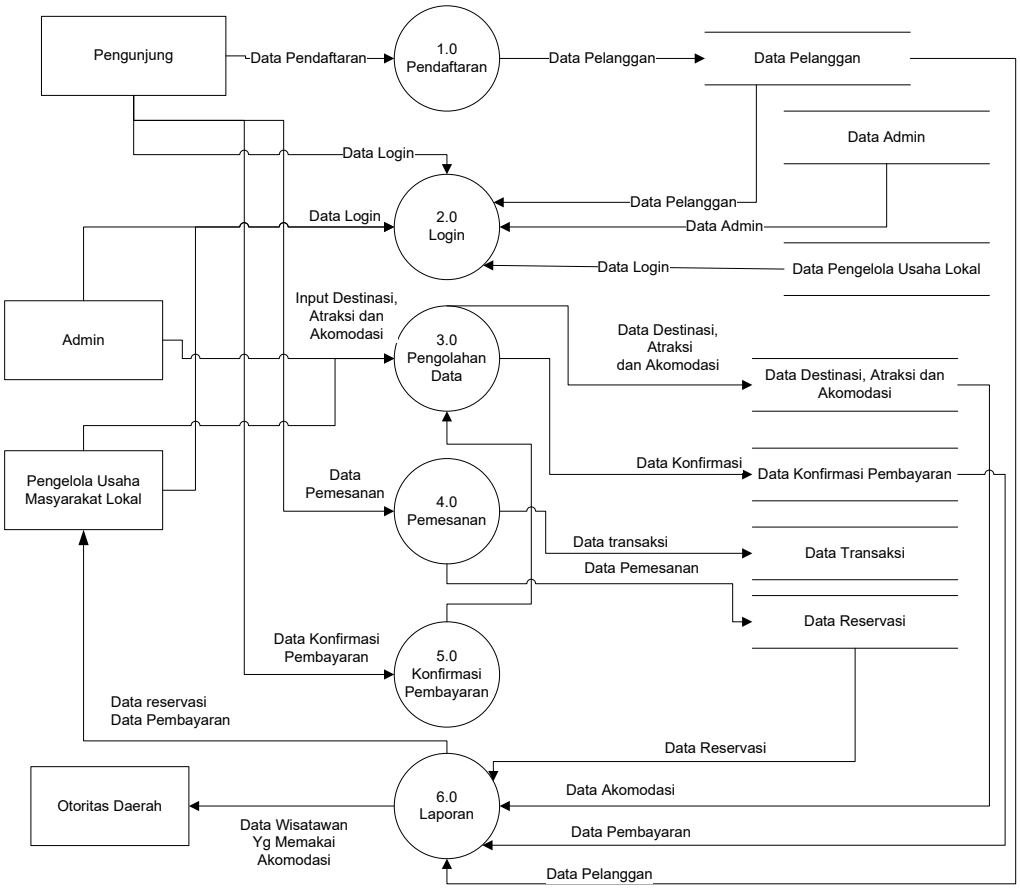


Figure 3. DFD Level 0 local community-based tourism information system

Data Flow Diagram (DFD) describes the logic function of a system. In the DFD there is a flow of data and processes that occur in the system. The logic function of the information system developed includes: registration, login, data processing, ordering, payment confirmation, and report. Every function of this information system is equipped with data flow and process as needed. Suppose that in the registration function, a user can perform the registration process by sending some data required by the information system, and then processing it into customer data. Likewise with data processing functions, can be done by business actors and admin of this information system.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of interviews, observation and development of information system applications, it can be concluded several things as follows: (1) Pecatu village has a lot of tourism potential. If managed well, it can have a significant impact on improving the welfare of local communities; (2) Developed information systems can be utilized by local communities to market potentials that are managed by the community.

ISBN : 978-602-99806-3-9

Based on the above conclusions, this study recommends: (1) In an effort to develop the existing tourism potential in Pecatu Village, the role of government is expected in an effort to empower the local community; (2) The application of information systems developed is still in the test phase, so it still needs to be refined. Support from the community in the data collection becomes very important, so that all the potential of existing tourism can be made in one database.

ACKNOWLEDGMENTS

The author expresses his gratitude to the Director of Directorate of Research and Community Service, Directorate General of Research and Development of KEMENRISTEKDIKTI on trust and financing approval so that this research can be done. The research was funded by the Directorate of Research and Community Service of the Directorate General for Research and Development of the Ministry of Research, Technology and Higher Education, in accordance with the Research Contract No. 023/SP2H/LT/DRPM/IV/2017.

REFERENCES

[1] Bethapudi, A. (2013). The Role of ICT in Tourism Industry. *Journal of Applied Economics and Business*, 1(4): 67 – 79.

[2] Eraqi, M., & Abd-Alla, G. (2008). Information Systems and Tourism Marketing: New Challenges for Tourism Business Sector in Egypt. *Information Technology in Hospitality*, 5: 1 – 14.

[3] Garzotto, F., Paolini, P., Speroni, M., Pröll, B., Retschitzegger, W., & Schwinger, W., (2004). *Ubiquitous access to cultural tourism portals*. Paper presented to Database and Expert Systems Applications, 15th International Workshop on (DEXA'04), Zaragoza, Spain, August 30 - September 03, 2004.

[4] Goh, D.H., Ang, R.P., Lee, C.S., & Lee, C.K. (2010). Determining services for the mobile tourist. *Journal of Computer Information Systems,* 51(1): 31-40.

[5] Hanif, M. I., Yunfei, S., Xiu-Yin, B., Hanif, M.S., & Shareef, M.T. (2013). The Efficiency of Innovative Marketing Information System: An Empirical Study of Tourism Industry of Pakistan. *International Review of Management and Business Research*, 1(4): 1042 – 1056.

[6] Law, Leung, & Buhalis, D. (2009). Information Technology Applications In Hospitality and Tourism: A Review Of Publications From 2005 TO 2007. *Journal of Travel & Tourism Marketing*, 26(5): 599 - 612.

[7] Meladze, M., & Jerenashvili, N. (2012). Demand for Modern Information and Communication Systems in Tourism. *European Scientific Journal*, 8(2): 20 – 26.

[8] Mistilis, N., & Buhalis, D. (2012). Challenges and potential of the Semantic Web for tourism. *e-Review of Tourism Research (eRTR)*, 10(2): 51 – 55.

ISBN : 978-602-99806-3-9

[9] Pressman, Roger S. (2009). *Software Engineering: A Practitioner's Approach*. 7th Ed. New York: McGraw-Hill International Editions.

[10] Puslitbang Penyelenggaraan Pos dan Informatika. (2012). *Kajian Mengenai Pemanfaatan TIK dalam Pengembangan Kepariwisataan di Bali dan Nusa Tenggara: Pengembangan Sistem Informasi dan Komunikasi Pariwisata Digital*. Executive Summary Penelitian Swakelola dan Penelitian Mandiri, Badan Penelitian dan Pengembangan SDM Kementerian Kominfo.

[11] Rachman, Z.M., & Buchanan, J. (1999). Effective Tourism Web Sites, Part 1: Literature Review and Features Survey. Department of Management Systems University of Waikato, Hamilton, New Zealand. Diakses pada 19 Februari 2014 dari http://www.mngt.waikato.ac.nz/

[12] Shanker, D. (2008). *ICT and Tourism: Challenges and Opportunities*. Paper presented to Conference on Tourism in India – Challenges Ahead, 15-17 May 2008.

[13] Valčić, M., & Domšić, L. (2012). Information Technology for Management and Promotion of Sustainable Cultural Tourism. *Informatica*, 36: 131–136.

ISBN : 978-602-99806-3-9

The Degree of Subjective Complaints of Students Practice on Mechanical Technology Laboratories

I Ketut Widana
Mechanical Engineering Department, Bali State Polytechnic, Badung, Bali, Indonesia, 80361
Email: widketut@yahoo.com

Abstract : The working practice of the engineering students is part of the learning process that is irreducible and indispensable. The composition of lecturing between theoretical and practical one is 40% to 60%. With this condition, the students spend more time at the lab. Generally, the students perform the lab work by standing position. The research is conducted at the lab of engineering dept. on January 11, 2016 at 08.00-15.00 WITA. The design of research is observational cross sectional. The method applied is observation, interview and measuring. The subjects of research are practicing students amounting to 21 students with average ages of 19,5 ± 0,67. Body mass index on the average of 21.33 ± 2.13 kg/m2, considering normal. Referring to the analysis of statistical test of wilcoxon signed ranks test, the difference of effect of work position is significant, namely $p<0.05$ towards musculoskeletal disorders (MSDs) before and after working. The quantity of the average complaint after working is 44.52 ± 9.28. The musculoskeletal complaint is felt 100% on skeletal muscles with details as follows: (a) 76% is waist ache; (b) 71% left tarsus ache; (c) 67% back pain; (d) 62% felt stiff on upper neck, lower neck and left calf ache. The result of wilcoxon signed rank test shows that there is significant different effects of standing work position, namely $p<0.05$ towards fatigue generally before and after working. The degree of fatigue effects is on the average of 65% and 100% of practicing students feel tired. Based on the questionnaire, 30 items of general fatigue are grouped into 3 (three), namely: (a) Question group 1 – 10 shows the attenuation of activity of 77%; (b) questions 11-20 show the attenuation of motivation of 86% and; (c) questions 21-30 show the description of general physical fatigue of 53 %. The degree of *working* pulse is on the average of 110.00 ± 10.44 bpm (beats per minute) which can be categorized into the medium workload. By means of paired t test, the result is $p<0.005$. The concentration, consisted of the speed, correctness and constance also will be decrease each 15.23%, 11.20% dan 16.33%. It shows that there is a significant difference of standing work position effect towards the musculoskeletal disorders, fatigue, workload and concentration when having a rest and working of the practicing students. The efforts of working station repair, short term-rest and supplying drinking water are able to decrease musculoskeletal disorders, fatigue, workload and increase concentration as well as increase the work productivity.

Keywords: ergonomics, work position, musculoskeletal disorders, fatigue, workload, concentration

1. INTRODUCTION

The working practice is the core of the learning process in the Engineering Department of Bali State Polytechnic. The working practices involve turning, cutting, scrapping, welding, grinding training and so on. Almost all working practices are conducted in standing position. With eight hour a day, it can be predicted that there will be a lot of disorders, especially the subjective ones such as the musculoskeletal disorderss and general fatigue as well as the workload [1,2].

Nowadays, at the general workshops and construction ones, especially those located in Denpasar

ISBN : 978-602-99806-3-9

and Badung regency have been devised to decrease the disorders resulted from works. The efforts are such as providing working seat for the operator, short term rest or supplying water while practicing. In order to be able to compete, hence, the industry has to be able to give the best service to the customers, have a comfortable working atmosphere, interesting and friendly performance of the students, fast service, and the products fulfill the customers expectation [3,4].

Consequently, the efficiency and productivity of work must be accelerated optimally in order to reach the above goal.

The improvement of the work productivity can be reached by pressing all kind of input into the minimum level and increasing output into the maximum one [4]. The input, especially related to resources, has to be employed in an optimal fashion. In order to reach such condition, the students must be facilitated with comfortable, safe, and efficient work facilities. The work facilities comprise of, work station, work environment and work organization that are in accordance with the capability, skill and limitation of students in the hope that the productivity can be reached at the highest level [5,6].

Based on the background above, we can formulate the following problems. Is there any difference of work position effect before and after working towards the musculoskeletal disorders, general fatigue and workload on the students and How big is the effect of standing work position towards the musculoskeletal disorders, general fatigue and workload on the students?

2. CONCEPT AND METHODOLOGY

This research is conducted at the mechanical workshop of engineering department of the state polytechnic of Bali I Jimbaran, dated 11-15 January 2016, at 08.00 until 15.00 WITA. The research design is performed with the observational cross-sectional. The work process comprises cutting, forming and finishing. The amount of students or students observed are 21 students who are all male, aged 18-21 years old, being on the third semester.

The standing work position is frequently performed by the students at the cutter station. They rarely perform the work with sitting position as they consider it can slower the finishing process of working. They do not realize that such condition can have an effect on the musculoskeletal disorders, fatigue and workload. According to reference 7 and reference 8, the standing position is an alert position physically and mentally, therefore the work activity performed is faster, stronger and more careful. Basically, standing is more tiring than sitting and the energy spent when standing is more, 10-15 % compared to sitting.

3. RESULTS AND DISCUSSION

The descriptive analysis results of average, stretches of time, standard deviation of the subject characteristics that involve age, height, weight, body mass index and work experiences is presented on table 1 below.

Table.1. Characteristics of Subjects

No	Variable	N	Average	SD	Range
1	Age (year)	21	19.48	0.68	18.00 – 21.00
2	Height (Cm)	21	157.48	3.98	150.00 – 166.00
3	Weight (kg)	21	56.62	3.47	49.00 – 67.00
4	Body Mass index	21	22.88	1.98	19.88 – 29.77

Description : SD=standard of deviation

The average age of subjects is 19.48 ± 0.68 years old, which means within productive ages. Body mass index (BMI) is a comparison of weight (kg) and height quadrate (m). The average of body mass index of subjects is 22.88 ± 1.98 kg/m^2, which shows a normal body mass. According to reference 9, body mass index of the Indonesian is considered to be normal if it reaches an average value of 18,5 – 25 kg/m^2, therefore body mass index of the subjects is considered to be normal as it is within the value

ISBN : 978-602-99806-3-9

range.

To minimize the effect of musculoskeletal disorders, fatigue, and workload, consequently the work must be designed in such a way that it is not reach forth, bend down, or performing unusual positions of the head.

Figure 1 Work Position of Students

To find out the musculoskeletal disorders of the students at the cutter station, one of the ways is by filling questionnaire of Nordic Body Map before and after working with the Likert scale scored from 1 to 4. From the tabulation

data, the musculoskeletal disorders are analyzed descriptively and by normality test supported with the application program of SPSS15,00 for Windows. The result of data tabulation of musculoskeletal disorders before and after working with statistical analysis can be seen on table 2 below.

Table.2. Results of descriptive analysis and normality test

No	Variable	n	Average	SD	Normality test K-S test
1	Musculoskeletal disorders before working	21	28.67	1.06	p = 0.002
2	Musculoskeletal disorders after working	21	44.62	9.47	p = 0.515
3	Difference before and after working	21	15.95	9.59	p = 0.000

The table 2 above shows that data of musculoskeletal disorderss before working is not distributed normally p=0.002 ($p< 0.05$). As there is one of data is not distributed normally, therefore non parametric test is applied namely the wilcoxon signed test. The result is, there is a significant difference standing work position effect towards musculoskeletal disorderss before and after working on the students with p=0.000 ($p<0.05$).The average amount of effect of standing work position towards musculoskeletal disorderss is 44.62 ± 9.47. Musculoskeletal disorders felt according to the percentage per item of disorders, with the details (a) 100% stiff on the upper and lower neck, right shoulder, back, right upper arm, waist, right elbow, right wrist, right hand, right and left thighs, right and left knees, right and left calves, right and left tarsus, and right and left legs; (b) 91,67 % aches on left shoulder and left hand; (c) 50% aches on left elbow, and left tarsus.

Such condition results from the standing work position of the students that is performed continuously and repeatedly. The complaint of skeletal muscles generally occurs as the muscle contracts exceedingly due to the excess of workload and long duration of loading [10,11,12]. The muscle disorders may not occur if the muscles contraction ranging from 15-20% of the maximum muscle power. If the contraction of muscle is over 20%,so the blood circulation to the muscle will reduce according to the contraction level that is influenced by the capacity of energy needed [13,14]. The oxygen supply to the muscle decreases, the carbohydrate metabolism process is blocked and as a result the accumulation of lactate acid occurs which results in muscle aches [15,16,17].

ISBN : 978-602-99806-3-9

To obtain data of fatigue, the questionnaire is used which contains 30 items of general fatigue before and after working [18,19]. The results of the questionnaire applies the Likert scale with scores from 1 to 4. The result of tabulation data and general statistical fatigue test before and after working of the students is obtained with the descriptive analysis and normality test. For more details, the analysis results of the general fatigue before and after working are clearly defined on table 3.

Table.3. The results of descriptive analysis and normality test

No	Variable	n	Average	SB	Normality test K-S test
1	General fatigue before working	21	30.00	0.00	
2	General fatigue after Working	21	53.90	6.71	P=0.17
3	Difference between before and after working	21	23.90	6.71	P=0.17

Seen from table 3, it is ascertainable that one of the data of general fatigue before working is not distributed normally as p is zero, therefore the general fatigue data is tested non-parametrically with the Wilcoxon Signed Rank Test. The data analysis data is revealed that there is a significant difference of standing position effect towards the general fatigue before and after working on the students, in which p=0,000 (p<0,05). The average amount of the standing position effect towards general fatigue on the students is 53,90 ± 6,71. Based on the questionnaire of 30 general fatigue items, it can be grouped into 3 (three) namely (a) group of questions 1-10 showing the attenuation of activity of 77%, (b) group of questions 11-20 showing the attenuation of motivation of 86% and (c) group of questions 21-30 showing the general physical fatigue description of 53%.

The fatigue results from the body condition that accepts excessive work loads, continuously, repeatedly and also the standing position as well as the uncomfortable working environment. The fatigue will be recover, if a short-term rest is applied to the temporary fatigue. The permanent fatigue will be recover if a one day sleeping rest is taken [20,15,21].

The quantity of work load of the students can be discovered by calculating the pulse when having a rest and working with the ten-pulse method. The calculation is done with the formula = (60 x 10)/t bpm [22,23]. The results of the calculation of the pulse when resting, and when working then are analyzed with statistical tests. Data is analyzed descriptively and then continued with normality tests. If the data is distributed normally, the Paired T test is applied and if the data is not distributed normally then the Wilcoxon Signed Ranks Tests is applied. For more details, table 4, shows the results.

Table.4. Descriptive analysis results and Normality test

No	Variable	N	Average	SD	Normality Test K-S Test
1	Pulse when resting	21	72.27	8.15	p = 0.108
2	Pulse when working	21	110.78	17.80	p = 0.145
3	Working pulse	21	38.51	18.84	p = 0.504

Result of research indicate that all of indicators is decreased. Speed average work at period of I is 8.24 ± 1.05 and at period of II is 9.72 ± 1.56, or happened by the speed decrease work equal to 15.23%. Meaning analysis with the test t-paired indicate that the value p < 0.05 owning meaning that speed

ISBN : 978-602-99806-3-9

average work at second period differ to have a meaning. Correctness average hereafter conduct the work at period of I is 19.34 ± 6.68 and at period of II is 21.78 ± 5.54 or there is decrease equal to 11.20%.

Meaning analysis with the test t-paired indicate that the value $P < 0.05$. Matter of this means that correctness average at second period differ to have a meaning. average constance hereafter conduct the work at period of I is 4.51 ± 1.48 and at period of II is 5.39 ± 1.70, or decrease 16.33%.

4. CONCLUSIONS

Based on the research and discussion above, we can have conclusions as follows. Based on Wilcoxon Signed Rank Test, it shows that there is a difference of effect of standing work position significantly towards the musculoskeletal disorders before and after working on the students with $p=0.02$ ($p<0.05$). The degree of standing work position effect on the students is on the average of 72.25 ± 2.63. The musculoskeletal disorders are suffered according to the percentage per item of complaint of ache with the details (a) 100% stiff on the upper and lower neck, right shoulder, back, right upper arm, waist, right elbow, right and left wrist and right and left feet; (b) 91.67 % aches on left shoulder, and right hand; (c) 50% aches on left elbow and left wrist. Based on the analysis of Wilcoxon Signed Rank Test, it is ascertainable that the difference of standing work position effect is significant towards general fatigue before and after working on the students with $p=0.002$ ($p<0.05$). The degree of the effect of standing work position towards general fatigue is on the average of 75.67 ± 5.84.

Based on the questionnaire of 30 items of general fatigue can be grouped into 3 (three) namely : (a) group of question 1-10 showing activity attenuation of 66.67 %; (b) group of questions 11-20 showing a motivation attenuation of 52.08% and; (c) group of questions 21-30 showing general physical fatigue description of 54.17%.

Based on *paired t test*, it is ascertainable that there is a difference of pulse beat while having a rest and working on the students with $p=0.00$ ($p<0.05$). The degree of the effect of the *standing* work position towards the work load on the students is on the average of 110 ± 10.44 bpm and can be categorized into a medium work load [24,25]. Hard and soft of the workload can be accepted by the students depending on the length they perform the activity of work which is adjusted to their capability. The work load can be influenced by the continuous, repeating works and the *standing* position while working, as well as the working environment that is hot.

Concentration will decrease really if job attitude do not be natural in a condition. Concentration consisted of the speed, correctness and constance will experience of the degradation of each 15.23%, 11.20% and 16.33%.

ACKNOWLEDGMENTS

The author would like to thank the Director of the Bali State Polytechnic which has helped facilities the research. The author also wishes to thank the Chairman of P3M PNB who have helped and facilitated the process of writing and reporting of the research.

REFERENCES

[1] Chan, A.D.C. and Fishbein, J. 2009, A Global Engineer for the Global Community. *The Journal of Policy Engagemen*, 1 (2) 4-9.

[2] Dul, J. and B. Weerdmeester. Ergonomic for Beginners A Quick Reference *Guide*. London: Taylor & Francis, (1993).

[3] Parasuraman, A. Zeithaml, V. A. & Berry, L.L. *Servqual* : A Multi-item Scale for Measuring Consumer Perceptions of Service Quality. Journal of Retailing, 64 (1) (1988) 12-40.

[4] Manuaba, A. 1992a. Makalah disampaikan pada Seminar Produktivitas Tenaga Kerja di Jakarta, *30 Januari 1992*. Pengaruh Ergonomi Terhadap Produktivitas : Hal 14.

[5] Chandna, P. Deswal, S. dan Chandra, A. 2010. An anthropometric survey of Industrial Workers of the Northern Region of India. *International Journal of Industrial and Systems*

ISBN : 978-602-99806-3-9

Engineering. Vol. 6 (1): pp. 110-28.

[6] Manuaba, A. 1992b. Makalah disampaikan pada Seminar Membudayakan Ergonomi di Pabrik Gula PTP XXI-XXII di Surabaya, 30 November 1992. Upaya membudayakan Ergonomi di PTP XXI-XXII. Hal. 26.

[7] McCann, M. 2010. Hazards in cottage industries in developing countries, *American Journal of Industrial medicine*, 30 , 125-129.

[8] Sutalaksana, I.Z. 2000. dalam Tarwaka, dkk. (2004). Ergonomi Untuk Keselamatan, Kesehatan Kerja dan Produktivitas. UNIBA PRESS, Surakarta-Indonesia.

[9] Almatsier, S. 2003. Prinsip Dasar Ilmu Gizi. Gramedia Pustaka Utama, Jakarta.

[10] Adiputra, N., Sutjana, D.P., Suyasning, HIS., dan Tirtayasa, K. 2001. Gangguan Muskuloskeletal Karyawan Beberapa Perusahaan Kecil di Bali. *Jurnal Ergonomi Indonesia (The Indonesian Journal of Ergonomics),* Vol: 3, No. 2. Desember p. 22-26.

[11] Adiputra, N. 2003. Kapasitas Kerja Fisik Orang Bali. *Majalah Kedokteran Udayana (Udayana Medical Journal),* Vol. 34, No.120. April : p.108-110.

[12] Pandit, S., Kumar, P., & Chakrabarti, D.C. Ergonomic problems prevalent in handloom units of North East, International of Scientific and Research Publications, 3 (1) (2013) 1-7.

[13] Chaff'm, D.B. 1974. Human strength capability and low back pain, *Journal of Occupational medicine*, 9, 248-254.

[14] Carrivick, P.J.W., Andy H. Lee and Kelvin K.W. Yau. 2002. Effectiveness of a Participatory Workplace Risk Assessment Team in Reducing the Risk and Severity of Musculoskeletal Injury: *Journal of Occupational Health*. Vol. 44. No. 4. July. 2002.: Japan Society for Occupational Health.

[15] Suma'mur. 1995. Higiene Perusahaan dan Kesehatan Kerja. PT.Toko Gunung Agung, Jakarta.

[16] Grandjean, E. 1993. Fitting the Task to the Man. : ATextbook of Occupational Ergonomics. 4 th Edition. Taylor & Francis Ltd.,London.

[17] Purnawati, S. 2002. Keluhan Muskuloskeletal Karyawan pada CV. DS di Desa Mas. *Jurnal Ergonomi Indonesia (The Indonesian Journal of Ergonomics)*, Vol.3, No.1 Juni. 41-48

[18] Bubb, H. 2013. A Consideration of the Nature of Work and the Consequences for the Human Oriented Design of Production and Products *Journal of Applied Ergonomics*. Vol. 37 (4): pp. 401-7.

[19] Erensal, Y. C. dan Albayrak, E. 2007. The Impact of Micro dan Macroergonomics Considerations on Appropriate Technology Transfer Decisions in Developing Countries : The Case of Turkey. *Journal of Human Factors and Ergonomics in Manufacturing*. Vol. 17 (1): pp. 1-19.

[20] Mitchell, KS. 2013, Optimising Business Performance through Innovative Workplace Strategies, *Journal of Facilities Management*, 258-276.

[21] Gilad, I. Ergonomic Participatory Plan in The Diamond Industry. Global Ergonomic. Cape Town South Africa: Elsevier, (1998).

[22] Epstein, Y. dan Moran, D.S. 2006. Thermal Comport and the Heat Stress Indices. *Industrial Health Journal*. Vol. 44 (1): pp. 388-98.

[23] Christensen, E.H. 1991. Physiology of Work. In : Parmeggiani, L. Editor. *Encyclopaedia of Occupational Health and Safety*, 3rd (revised) Ed. Genewa : ILO. p. 1698-1700.

[24] Hignett, S. Wilson, J.R. dan Morris, W. 2005. Finding Ergonomic Solutions – Participatory Approaches. *Occupational Medicine Journal*. Vol.55 : pp. 200-7.

[25] Grandjean, E. 1988. Fitting the Task to the Man : ATextbook of Occupational Ergonomics. 4 th Edition. Taylor & Francis Ltd.,London.

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

Improvement of work posture to decrease musculoskeletal disorder and increase work productivity jewelry worker in bali

M Yusuf[1)], M Santiana[2)], W D Lokantara[3)]

[1] Mechanincal Engineering Department Politeknik Negeri Bali, Jalan Kampus Bukit Jimbaran, Kuta Selatan, Badung 80364, Bali, Indonesia

[2] Civil Engineering Department Politeknik Negeri Bali, Jalan Kampus Bukit Jimbaran, Kuta Selatan, Badung 80364, Bali
Indonesia

[3] Faculty of Economics & Business Universitas Gajah Mada, Jalan Sosio Humaniora, Bulaksumur 55281, Yogyakarta
Indonesia

Corresponding email: yusuf@pnb.ac.id

Abstract. *Finishing process of workmanship on jewel stone at small scale industry of jewelry crafting in Bali was polishing. This process was done manually by working posture were cross-legged sitting on the floor. This awkward working posture (cross-legged sitting) caused more musculoskeletal disorder (MSD) special on the arm, waist, and low back pain. The MSD problem can decrease production. To solve these problems and increase productivity, the improvement of work posture should done by ergonomics approach. The research was conducted on 12 jewel craftsmen by "treatment by subject design". Work load was measured by using work heart rate which was count using ten pulses methods. Musculoskeletal disorders were assessed by Nordic Body Map questionnaire. And work productivity was assessed by amount of product per pulse rate. The data were analysed by using t-pair test at significant level 5%. Results of this reserach showed that there was significant different ($p < 0.05$) of work load, MSD, and work productivity betwen befere improvement and after improvement. Work load decrease11,8%, MSD decrease 30,4%, and work productivity increase 38,7%. Its can be concluded that inprovement of work posture decreased of work load and musculoskeletal disorders and increased of productivity of jewel workers. That is why, it was recommended the improvement of work posture should be used by workmanship the jewel stone and ergonomics work station.*

1. INTRODUCTION

Gemstone jewerlry handicrafts is small industry or home industry that produce jewelry such as rings, eye necklaces, jewelry on the handle of kris or spear, and so forth. It has become an alternative business to earn income in facing the current monetary crisis. This business can be found in several districts in Bali and generally they only have a tool in the form of grinding wheels for the workmanship. Types of stone used include turquoise, agate, amethyst, mirah stone and the like. The final process of making this gemstone is the process of smoothing. In some places in Bali generally, this process is done by sitting cross-legged position on the floor.

The finishing process of smoothing a gemstone is still done by sitting cross-legged on the floor for few hours. This position of work is unnatural, and can cause few problems. Unnatural working position can be the cause of various disorders of the musculoskeletal muscle system [1-2]. It leads to disruption to the musculoskeletal system and there is considerable pressure on the intervertebral discs that can lead

ISBN : 978-602-99806-3-9

to lower back pain. In the long run this working position can cause the body to become bent [3]. Working position by sitting cross-legged on the floor causes complaints from the workers especially pain and sore in skeletal muscles in certain body parts. As the result it adds weight to the workload of the workers and affects their productivity.

This problem of working posture and muscle complaints should be resolved soon, as it may cause serious health problems for the workers [4-5]. Steps that can be taken to reduce their workload, complaints on muscle pain and sore, as well as to increase the productivity of the artisans is to improve the work station of where all their activities take place. This improvement is done by considering the aspects of ergonomics and participatory approaches. A change of working position from stting on the floor to stiing on a chair is proposed in this research. Grinding wheels are placed on the workbench, so the jeweler can work more comfortably. The size of the chair and work table is adjusted to the anthropometry of the crafters' body. In addition, the organization of working hours and breaks in between them is to be looked upon. Improvements suggested in the organization of the work and break is a 5 minutes rest time for every hour of work. We predicted, that with these steps are to be taken, it will reduce workload, skeletal muscle complaints, and increase labor productivity.

2. METHODOLOGY

This research was conducted experimentally using treatment by subject. This experiment took place in Subagan Village, Karangasem, Bali. The number of samples was calculated based on the Colton formula [6], to obtain a sample of 12 gemstone craftsmen. Subjects were divided into two group where P0 group are the untreated who are doing the usual work done by previous craftsmen and the P1 group would be treated with an improvement of work posture and work station with participatory approach. Workload is measured by the pulse of crafters, musculoskeletal complaints measured by Nordic Body Map questionnaire, and labour productivity is measured from the amount of production divided by workload and working time. Data were analyzed descriptively and inferentially. In order to tell the difference of treatment, workload data, musculoskeletal complaints, and labour productivity were analyzed using t-pair test at 5% significance level.

3. RESULT FINDINGS

3.1 Research Subject Condition

The result of the analysis in the subject of this research is shown in the table below which is summarized in a table from the 12 samples.

Table 1. Reseacrh Subjects Characteristic Summary

No	Variable	Ave.	SD	Range
1	Age (year)	35.07	3.41	28 – 41
2	Body Weight (kg)	62.17	4.72	57.3 – 69.8
3	Body Height (cm)	163.21	3.14	160 – 172
4	Working Experience (year)	5.32	3.21	3 – 10
5	Body Mass Index	22.71	1.08	20.92 – 23.17

From the characteristic of the subject it is seen that the research samples are under normal conditions and the subjects, when the study is done, are healthy and fit. The average age of the subjects was 35.27 years. This shows the subject is in the productive age to work. The average work experience is 5.32 years indicating that the subject has experience in terms of gemstone workmanship. The mean body mass index was 22.71 with range 20.92 - 23.17 in normal condition (not lean and not fat). The subject's condition is still in an optimal physical state to do the job because it is in productive age and in good physical condition. Age conditions affect the ability of physical work or muscle strength of a person.

ISBN : 978-602-99806-3-9

Maximum physical ability of a person is achieved at the age between 25 -35 years and will continue to decline with age [3]. Organ systems such as the cardiovascular, respiratory, and muscular systems may decrease by 2% per year after the age of 30 years [7].

3.2. Microclimate Condition

Microclimate conditions are the working environment conditions where the artisans work. These conditions include temperature, relative humidity, light intensity, and sound intensity. This environmental condition data was tested for normality by using Shapiro-Wilk test and obtained normal working environment data results (p> 0,05) both in group P1 (before improvement) and P2 (after repair). The result of different test of working environment condition on P1 and P2 is presented in Table 2 below.

Tabel 2. Microclimate Condition

No	Variable	P1 Group		P2 Group		t	p
		Ave	SD	Ave	SD		
1	Temperature (°c)	26.13	3.22	26.59	2.62	3.193	0.214
2	Relative Humidity (%)	72.55	4.15	73.04	3.19	2.691	0.192
3	Light Intensity (lux)	421.55	29.71	433.29	30.81	9.107	0.088
4	Sound Intensity (dBA)	69.13	3.07	69.87	2.94	0.936	0.309

SD = Standard Deviation

From the results of microclimate condition analysis, it showed that the working environment microclimatic conditions of the craftsmen of the gems both in group P1 and group P2 were still within comfortable working condition for the workers. Temperature variables, relative humidity, light intensity, and noise (sound intensity) did not have a significant difference between the groups P1 and P2 (p> 0.05). This means that the working environment between P1 and P2 can be considered the same and consistent.

The microclimate condition is still within normal limits and feels comfortable for working. The threshold value of air temperatures for workers is 33°C and the relative humidity for Indonesian workers is between 70% - 80% [1]. It is suggested as well that headgear is worn by the workers to prevent excess heat to the face and head [8], and other body armor so that workers can work comfortably. The highest sound intensity threshold that is tolerable by human being for working time of not more than 8 hours a day is 85 dBA [9].

3.3 Workloads

Workload is measured by the pulse of the crafters of the gems both at rest (resting pulse) and at work (working pulse). This workload data is tested in normality by using Shapiro-Wilk test. From the test it is found that the resting pulse and the work pulse in both groups (P1 and P2) are normally distributed (P> 0.05). Prior to analysis of the effect of treatment, first comparability of resting pulse. This is done to see the initial conditions of the craftsmen whether the difference is signficant or not. It is necessary to see if the workload change is purely due to the effects of research intervention or any external factors contributing to the change in the workload. The comparability of the resting pulse on this gem crafter is done by using t-pair test. The result of the analysis shows that there is no difference between P1 and P2 in the istirahanya pulse (p> 0,05) as shown in Table 3. It means that the initial condition of craftsmen workload can be considered the same. Treatment effects were also analyzed using a t-pair test with the results shown in Table 3.

Table 3 Workloads Analysis on Workers

Variable	Group P1	Group P2	t	p

ISBN : 978-602-99806-3-9

	Ave	SD	Ave	SD		
Resting Pulse (beats/minute)	68.17	2.68	69.27	2.19	0.109	0.305
Working Pulse (beats/minute)	119.32	3.12	105.21	4.07	-19.163	0.000

SD = Standard Deviation

From Table 3 above it can be seen that there are significant differences between group P1 and group P2 (p <0,05) in the workload (working pulse rate). Judging from the average there is a decrease in working pulse from 119.32 beats per minute to 105.21 beats per minute, or decreased by 11.8%. It is in line with research conducted by Tirtayasa [10], that ergonomic intervention could reduce the workload of the heart and the pulse of work to workers in small industries.

3.4 Muscluloskeletal Complaints

Musculoskeletal complaints were predicted using a Nordic Body Map questionnaire with 5 Likert scales. These muscle complaints were measured both before and after work on P1 and P2 groups. The results of the analysis are presented in Table 4 below.

Table 4 Musculoskeletal Complaints Analysis

Variabel	Group P1		Group P2		t	p
	Ave	SD	Ave	SD		
Before	32.08	1.56	31.83	1.74	-2.814	0.164
After	69.48	3.62	48.31	3.26	12.571	0.000

SD = Standard Deviation

Table 4 shows that the before activity muscle complaints condition between the two groups was not significantly different or could be considered the same (p> 0.05). While conditions after work there are significant differences between P1 and P2. Judging from the average of skeletal muscle complaints there was a significant decrease between group P1 and group P2 by 30,4%. In line with research conducted by Curwin [11], it was mentioned that ergonomic intervention in workers could decrease skeletal muscle complaints, about 10% decrease in prevalence of musculoskeletal disorders for 12 months, ranging from 4% for hip/thigh problems to 12% for lower back problems and upper back.

3.5 Labour Productivity Analysis

Labour productivity of jewelry crafter is obtained from the division between the production of gems with the working pulse and then multiplied the required working time. While production is the results obtained from the number of gems produced by each craftsman for every working hour. Prior to the significance test between each treatment, production data and work productivity is tested normality by using Shapiro-Wilk test. From normality test results obtained that the data of production and work productivity is normally distributed (p> 0.05).

In order to know the effect of treatment, the mean difference test between each group (group P1 and P2) is tested using pair t-test. The analysis results are shown in Table 4 below.

Table 4 Production and Labour Productivity Comparison Analysis

Variable	Group P1		Group P2		t	p
	Ave	SD	Ave	SD		
Production (pieces/day)	10.31	0.19	12.67	0.41	34.157	0.000

ISBN : 978-602-99806-3-9

Labour Productivity	0.0863	0.0021	0.1198	0.0042	37.165	0.000

SD = Standard Deviation

From Table 4 above, it can be seen that the production and productivity of the work of jewelry craftsmen has a significant difference between each group ($p<0.05$). Judging from the average of work productivity there was an increase of 38.7%.

The use of desks and chairs and the use of appropriate technology in the form of a gemstone machine will increase the productivity of the crafters, in accordance with the concept of total ergonomics which requires that the technology to be applied in the industry should be reviewed and discussed through the SHIP approach (Systemic, Holistic, Interdicipliner, and Participatory) so as to increase worker productivity [1]. Performing ergonomic interventions in the industrial world will increase the production and productivity of workers [12].

4. CONCLUSION

From the results and discussion above can be concluded the following things, 1) improved working position and posture reduced musculoskeletal complaints of gemstone craftsmen in Bali, 2) improvement of work posture increased labour productivity of gemstone crafters in Bali. It is suggested to small industry managers including gem industry to pay attention to employee working posture and position problem so employees can work in healthier and more productive working enviroment.

REFERENCES

[1] Manuaba, A., 2005, Accelerating OHS-Ergonomics Program By Integrating 'Built-In" Within The Industry's Economic Development Scheme Is A Must-With Special Attention To Small And Medium Enteprises (SMEs), Proceedings the 21st Annual Conference of The Asia Pasific Occupational Safety & Health Organization, Bali, 5-8 September.

[2] Fam, M., Azadeh, A., Azam, A. 2007. Modeling an integrated health, safety and ergonomics management system: aplication to power plant. *Journal of Res Health Sci*. 7(2):1-10

[3] Kroemer, K.H.E., and Grandjean, E. 2000. *Fiting the Task to the Human*, 4th ed. Taylor & Francis Inc. London.

[4] Kermit G. Davis PhD, Susan E. Kotowski MS . 2007. Understanding the ergonomic risk for musculoskeletal disorders in the United States agricultural sector. American Journal of Industrial Medicine. Volume 50, Issue 7, July 2007. Pages 501–511

[5] Pirvu C, Patrascu I, Pirvu D, and Ionescu C. 2014. The dentist's operating posture – ergonomic aspects. Journal of Medicine and Life. Jun 15; 7(2): 177–182.

[6] Colton T. 2005. Encyclopedia of Biostatistics, 8 Volume Set 2nd Edition. John Wiley and Sons, Inc.

[7] Sehl, M.E., and Yates, F.E. 2001. Kinetics of human aging: I. Rates of senescence between ages 30 and 70 years in healthy people. J. Gerontol. Biol. Sci. Med. Sci. 56: B198–B208. PMID:11320100.

[8] Cornelis P.B., Jean M.A., Simon A., Peter B., Guidode B., Andreas D. F., Kalev K., Tiago S.M., Rene M.R. 2015. A review on ergonomics of headgear: Thermal effects. International Journal of Industrial Ergonomics. Volume 45, February 2015, Pages 1-12.

[9] BSN. 2004. Nilai Ambang Batas iklim kerja (panas), kebisingan, getaran tangan-lengan dan radiasi sinar ultra ungu di tempat kerja. Badan Standarisasi Nasional. SNI 16-7063-2004.

ISBN : 978-602-99806-3-9

[10] Tirtayasa, K., Adiputra I.N., Djestawana IGG. 2003. The Change Of Working Posture In Manggur Decreases Cardiovascular Load And Musculoskeletal Complaints Among Balinese Gamelan Craftsmen. Journal of Human Ergology. Vol. 32 (2003) No. 2 P 71-76.

[11] Curwin, S., Allt J, Szpilfogel C., Makrides L. 2013. The Healthy LifeWorks Project: The Effect of a Comprehensive Workplace Wellness Program on the Prevalence and Severity of Musculoskeletal Disorders in a Canadian Government Department. Journal of Occupational & Environmental Medicine: June 2013 - Volume 55 - Issue 6 - p 628–633.

[12] Lia B de M, Guimarães M., Jose A., Jose L.D., RibeiroT.A., Saurin. 2015. Participatory ergonomics intervention for improving human and production outcomes of a Brazilian furniture company. International Journal of Industrial Ergonomics. Elsevier. Volume 49, September 2015, Pages 97-107.

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

Characterized Temperature and Humidity for Classroom Comfort Zone in Bali

L P I Midiani, I W A Subagia, and I B G Widiantara

Bali State Polytechnic

putuikemidiani@pnb.ac.id

Abstract. Thermal comfort conditions were result from a desirable combination of temperature, humidity, air movement, and air cleanliness. The thermal comfort have a significant impact on people's productivity and health. This study written as a result of theoretical and practical research, conducted a series of experiments aimed at characterization on classroom comfort zone in a tropical climate in Bali. A series experiment was conducted in an air conditioning simulation process. Through experimental study, temperature and relative humidity are studied. The experiments were conferred with reference literature to correlate the standard comfort. The obtained results indicate to improve comfort in hot-humid environment were to control the temperature and humidity.

1. Introduction

In tropical climates, thermal comfort studies are necessary to obtained the comfort zone, where buildings are exposed to solar radiation throughout the year.

The thermal comfort have a significant impact on people's productivity, health, morale, working efficiency and satisfaction [1,2].

Thermal comfort standards are therefore central to not merely providing comfortable environments but also ensuring a sustainable design through low heating and cooling energy used in buildings [3]. For human's thermal comfort is essential to control temperature and humidity. In every life humidity control is obviously required wherefore humidity usually associated with the risk of infection through germs, bacteria or virus [4].

The behavior of air varies with its temperature, the higher the temperature, the greater its ability to hold moisture. To obtain comfortable conditions, combination of temperature, humidity, air movement, and air cleanliness control obviously required. The process of treating air so as to control simultaneously its temperature, humidity, cleanliness and distribution to meet the requirements of the conditioned space defined as air conditioning [5]. In the summer require automatic control of the air conditioning system to maintain the desired room temperatures, requires dehumidifiers, which pass air to be cooled over cold evaporator surfaces. Humidity controls operate to remove moisture from the air.

Comfort zone represents a considerable area, American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) recognizes the comfort range for most people when temperature between 70 ^{o}F and 85°F (21-29°C dry-bulb temperature) and relative humidity between 30% and 70% as shown Fig. 1.

ISBN : 978-602-99806-3-9

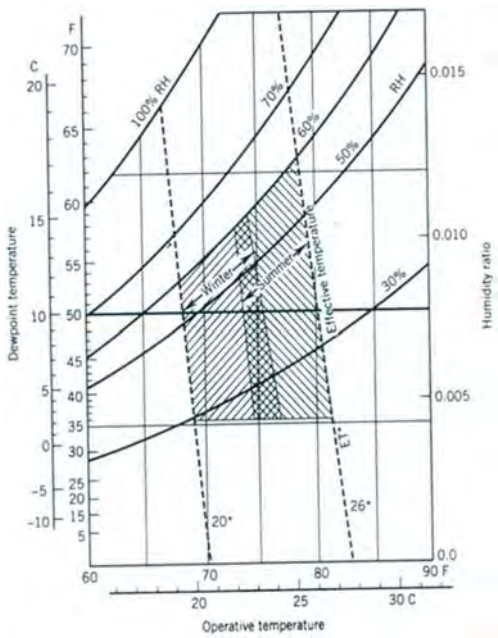


Fig. 1. Graph of comfort zone [Andrew et al, 2004]

There has been widely studied in respect to comfortable. In Japan the highest mean comfort temperature when the occupants felt less humid (dry condition), relevant to air movement [6].

Human thermal comfort under high temperature or high humidity conditions can greatly improve and energy used for air conditioning decrease by airflow. To maintain thermal sensation at a higher air temperature or relative humidity (RH) needed a higher air speed [7].

To improved comfort and reduced warm sensation, combination of cooling ceiling and desk fan were exerted significant effects. The combination had potentials of energy conservation since it could extend acceptable range and reduce the energy for dehumidifying indoor air [8].

Compared to the environment temperature, the local environment humidity has a greater cooling effect. The temperature drop and humidity increase rates under different pressures, droplet diameters, airflow rates, temperatures and humidity levels [9,10] .

To regulate air temperature and humidity, these experiment would conducted air conditioning simulation process were equipped with ducting, adding a humidifier and heater device.

2. Methodology

2.1 Experimental Facilities

The experiments divided into two sections: existing air conditioning simulation process and simulation results and discussion. Air conditioning simulation process were equipped with ducting, therefore can measure and record the data and needed technical information. The experiments carried out in Air Conditioning Laboratory at Bali State Polytechnic, Bali, Indonesia. Bali is one of the islands in Indonesia, is characterized by hot-humid climate in summer and the relative humidity outdoors ranges from 60-90%. The information about outdoor globe temperature were from BMKG (Badan Meteorologi, Klimatologi dan Geofisika). The outdoor globe temperature and the relative humidity were used to support the analysis, and characterize the outdoor conditions during the experiments.

The layout of experimental apparatus as shown in Fig. 2. Ducting dimension were 23.5 cm x 26.5 cm x 271 cm. The important physical parameters were recorded during the experiments. Air temperature, humidity and air velocity were measured with environmeter, while relative humidity, moisture content, wet bulb temperature and other were obtained at Psychrometric chart.

ISBN : 978-602-99806-3-9

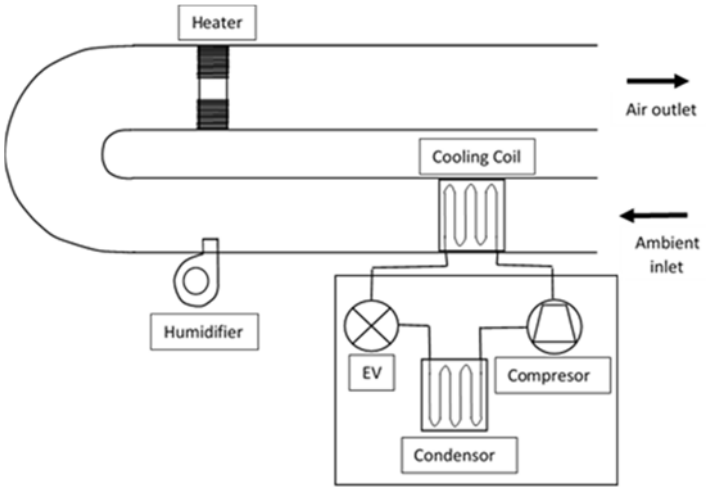


Fig. 2. Experimental apparatus

2.2 Experimental Procedure

The experiments were carried out from July to August 2017. The important physical parameters were recorded during the experiments. The measurements were conducted to obtaine the temperature and humidity therefore determine the relative humidity on Psychrometric chart. First experiments were measure temperature and humidity along the ducting, before evaporator and after pass the evaporator, each lasted for 6 h.

Second experiment was performed by adding a humidifier device placed after the evaporator, then carried out measurements of air temperature and humidity before entering evaporator, after pass evaporator and after pass humidifier device.

Third experiment was performed by adding a heater placed after the evaporator, then carried out measurements of air temperature and humidity before entering evaporator, after pass evaporator and after pass heater device. Detailed information of air temperature and humidity that has been recorded were shown in process in Fig. 3. The Psychrometric chart described process changes to regulate air temperature and humidity.

3. Conclusions

To improve the indoor environment in humid climates, such as Bali, regulate air temperature and humidity is a needed.

Fig.3 explained the process of air conditioning simulation. Three kinds of colors that explained the air conditioner process. The red line stated the ordinary air conditioner process, the green line stated the air conditioner process with added humidifier device, and the yellow line stated the air conditioner process with added heater device. The ordinary air conditioner process, temperature decrease after pass the evaporator. The resulting temperature were fulfill the comfort zone, but the relative humidity not fulfill the comfort zone yet. Humidifier and heater device added in order to change relative humidity so that fulfill the comfort zone.

The results showed that temperature increase and relative humidity decrease when added heater device. Relative humidity decrease caused moisture content and humidity decrease. Temperature constant and relative humidity decrease when added humidifier device. Humidifier device were produce cold steam, so temperature constant.

The obtained results indicate control temperature and humidity would improve comfort in hot-humid environment.

ISBN : 978-602-99806-3-9

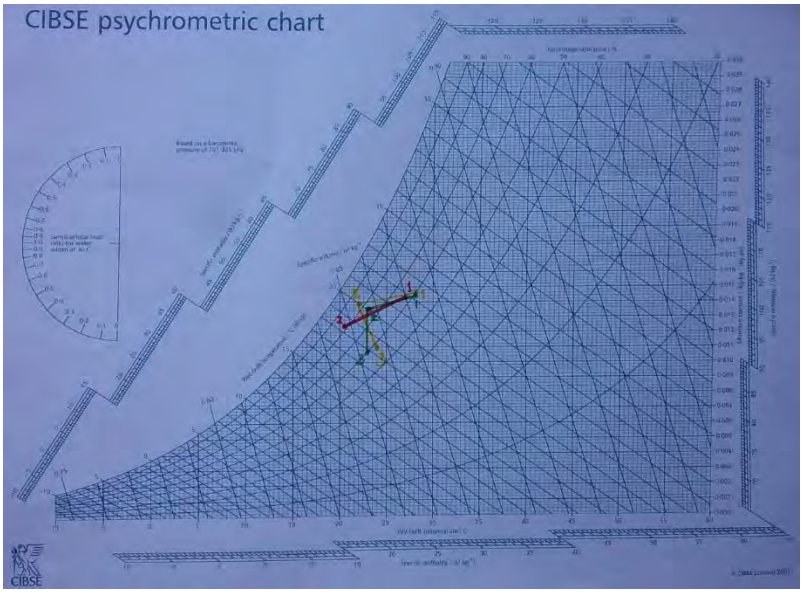


Fig. 3. Air conditioner process

References

[1] De Vecchi R C Candido R de Dear and R Lamberts 2017 Thermal comfort in office buildings: Finding from a field study in mixed-mode and fully-air conditioning environments under humid subtropical conditions *J. Building and Environment* JBE (Accepted Manuscript)

[2] Pervez H S Nursyarizal B M N Perumal N Irraivan E Taib I 2014 A review on optimized control systems for building energy and comfort management of smart sustainable buildings *J. Renewable ans Sustainable Energy Reviews* JRSER34(2014)409-429

[3] Marika V Manuel H Daniel F and Sukumar N 2017 The influence of relative humidity on adaptive thermal comfort *J. Building and Environment* JBE124(2017)171-185

[4] Muhammad S Ibrahim I E Takahiko M Bidyut B S and Shigeru K 2015 An overview of solid desiccant dehumidification and air conditioning systems *J. Renewable and Sustainable Energy Reviews* JRSER46(2015)16-29

[5] Andrew D A Carl H T and Alfred F B 2004 *Modern Refrigeration and Air Conditioning* (Illionis: The Goodheart-Willcox Company Inc.) p 727

[6] Damiati S A Zaki S A Rijal H B Wonorahardjo S 2016 Fielsd study on adaptive thermal comfort in office buildings in Malaysia, Indonesia, Singapore and Japan during hot and humid season *J. Building and Environment* JBE Accepted ManuscriptXing H Xu Z Lihui W Rumping N 2013 A Novel system of the isothermal dehumidification in a room air-conditioner *J. Energy and Buildings* JEB57(2013)14-19

[7] Yi C Yufeng Z Haolei T 2017 Comfortable air speed for people lying at rest in the hot-humid area of China in summer *J. Building and Environment* JBE Accepted Manuscript

[8] Yingdong H Xiang W Nianping L Meiling H De H Kuan W 2017 Cooling ceiling assisted by desk fan for comfort in hot-humid environment *J. Building and Environment* JBE122(2017)23-24

[9] Chen H Jiao C Zhifen L Qianru Z Yesan C 2017 Solving model of temperature and humidity profiles in spray cooling zone *J. Building and Environment* JBE123(2017)189-199

[10] Xing H Xu Z Lihui W and Runping N 2013 A novel system of the isothermal dehumidification in a room air-conditioner *J. Energy and Buildings* JEB57(2013)14-19

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

Development Of Simulation Control Two Water Supply Pump Using *Relay Change Over* And *Floatless Level Switch*

I Nyoman Gede Baliarta [1], I Made Sudana[1]
Jurusan Teknik Mesin – Politeknik Negeri Bali
bungabatukaru@gmail.com

Abstract. System of water supply pump must be installed in a building. The purpose of this research is to create the practical module for system of water supplay pump for building. So the students' competence on the utility of the building, especially in the field of water supply pump system can be achieved more easily. This practice module uses 2 pumps, 2 water tanks, 1 as tank as underground tank and 1 again as tower tank. Using WLC (water level control) to control on-off the pump, based on the water level in the tower tank. Using Relay Change over to automatically convert the pump on duty. In addition it helps to control the water reservoir automatically so that no empty or empty water holding tanks will be available and maintain the stability of the water distribution in the water holding tank

Key words : *system pompa supplay, water level control, relay change over.*

1. Introduction

The pump is used to move the fluid from lower place to the higher level, as in the supply of clean water in the building. While the other function is to circulate fluid liquid, as in a swimming pool system.

In the application, the pump is not always installed single pump in serving a system. Pumps can be installed more than one pump in parallel to serve a system. Chilled Water Supply System uses more than one pump to circulate cold water to serve the AHU and FCU in the building. Fire fighting system uses 3 types of pumps in accordance with its function ie Jocky pump, Electric Pump and Diesel Pump

In the hotel's swimming pool water system, using pumps more than one pump. Because the pond water must continue to circulate continuously to maintain the condition of the pool water is always in clear condition and free from dirt. If only one pump is installed and there is damage that takes a long time, it will adversely affect the image of the hotel. Because the pool can not be used by Guest. Clean water supply system in buildings using more than one pump to keep clean water needs fulfilled for occupants in the building, avoid system failure to meet the needs of residents of clean water, in case of damage to one of the pumps. The pumps operate on the basis of the control system made and needed.

2. Experimental apparatus

2.1 .Mechanical Komponen

Figure 2.1 shows the mechanical image to be created. Consisting of 2 tanks, the first tank as an underground tank, as a reservoir of water from taps or underground water. While the second tank, is as a tower tank, a tank of water supply that will be distributed to outlets in gravity. Before the pump is installed suction pipe with foot valve, which serves to keep the water in the suction pipe always there

ISBN : 978-602-99806-3-9

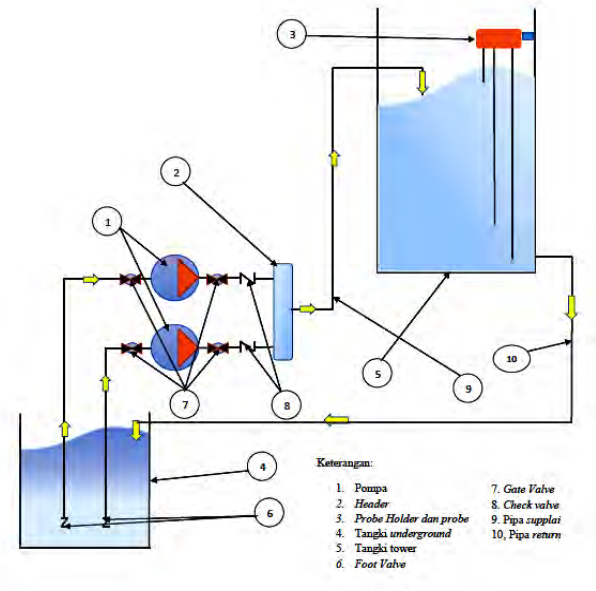


Figure 1. Mechanical schema

Figure 1. shows the mechanical image to be created. Consisting of 2 tanks, the first tank as an underground tank, as a reservoir of water from taps or underground water. While the second tank, is as a tower tank, a tank of water supply that will be distributed to outlets in gravity. Before the pump is installed suction pipe with foot valve, which serves to keep the water in the suction pipe always there.
If there is no footvalve, the pump will not be able to pump water into the tower, because the suction pipe is not filled with water. Each pump will be filled with gate valve and check valve. Check valve serves to block the pipeline installation when the pump requires repair, while the check valve serves to close the flow if the pump
next to it is on duty. Header serves to collect water before heading to the tower tank.
The way this installation works is, 2 pieces of pump that will be on duty alternately. When Pump 1 on duty, pump 1 will multiply the water to the tower tank from the underground tank. When the tower tank is full, by installing a WLC (Water level Control) sensor, Pump 1 will automatically shut off. Furthermore Pump 2 will be automatic as on duty. When the WLC sensor indicates the tower tank is reduced due to water flowing into the underground tank, Pump 2 will automatically live water to the tower tank. Thus next pump 1 and pump 2 will alternate its life.

ISBN : 978-602-99806-3-9

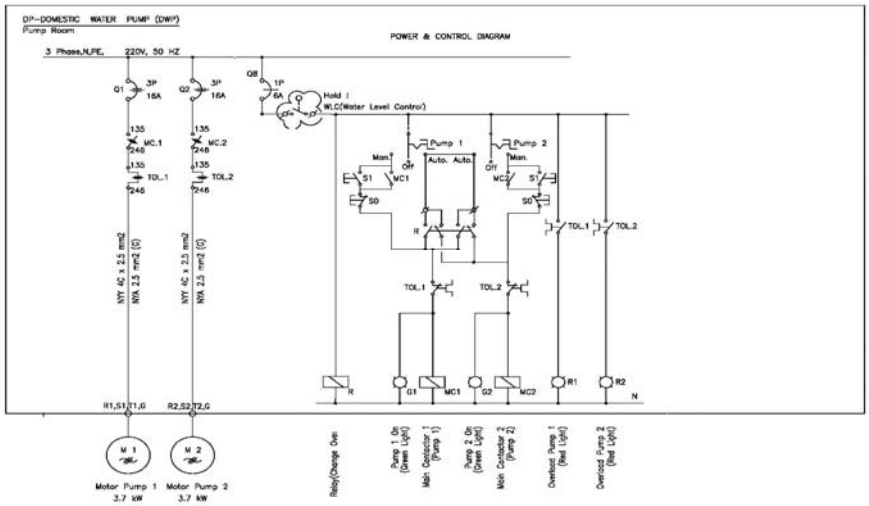


Figure 2. Electrical schema

2.2. Electrical Component

Figure 2. The above installation consists of power and control installations, each power installation comprising MCB 16 A, contactor and thermal overload as a safety. The pump will not live if the water tower condition is full, because of the WLC as a water level controller in the tower. The pump can be turned on manually or automatically as long as the water level of the tower is not full. By rotating the selector switch each Pump, manual, off and automatic. If selected manual mode, then we need to press the Push button On to turn on the pump. If you select the auto mode then the pump will live on auto. The relay change over will move the pump on duty automatically, after the tower tank is full. When the 1 on duty pump transfers the water from the underground tank to the tower tank, once the tower tank is full, the pump 1 dies, the change over relay will instantly move the on duty pump from pump 1 to pump 2. So on.

Indicator lights will live according to operational conditions. If pump1 is live, then pump lamp 1 will be green pump 1 light will live. If there is a problem with pump1, then pump 1 red light will be on.

3. Design of the Practice Module.

This type of research is a design simulation for the students of Refrigeration and Air conditioning Program Study , in the course of Utilization of Building and BAS practice. This module of practice is divided into 2 parts, mechanical and electrical parts.

The student's mechanical part will describe the piping and answer the function of each section installed on the installation.

The student's electrical section will redraw the electrical installation and reinstall the power and control installation cabling from this module of practice

4. Results Of Designs

The result of this research is Product Simulation Control 2 clean water supplay pump using Relay Change over and Floatless Level Switch. This product is divided into two parts, namely:

1. Mechanical Part.

ISBN : 978-602-99806-3-9

Form of pipeline piping from underground tank (foot valve, charging valve part, suction pipe then pump), tank tower piping (check valve, valve and discharge pipe).

2. Electrical Parts.
   In terms of electrical and control, this section consists of MCB, Contactor, Thermal Overload, switch over relay, floatless level switches and cables.

4.1 Mechanical section.

4.1.1. Underground Tank Section

This section consists of a water tank, suction pipe, foot valve at the end of a suction pipe and a suction pipe water filling section.

Figure. 3. Underground Tank

1. Foot valve serves to hold water on suction pipe so that water dipipa suction is not empty. If the suction pipe does not contain water, but contains air, the centrifugal pump will not work (can not suck water). In some pumps, the air containing on the suction pipe will be sucked by the pump out and finally the water will be pumped. For this pump, the suction pipe must be filled with water.
2. Water filling valve, this section serves to fill the suction pipe with water, once filled with water, the valve must be in closed condition.
3. Water tank, serves as a place of water to be pumped.

4.1.2 Tower Tank Section

This section consists of water tanks, pump discharge pipes, probe holder and probe.

Figure 4. Tank Tower

ISBN : 978-602-99806-3-9

1. This discharge pipe is the outlet pipe from the pump coming from the underground tank to the tower.
2. The probe holder is where the probe binds as a water level sensor.
3. Probe is in the form of 3 pieces of stainless steel rod of different length that serves to sensor the water level.

Probe no. 1 serves as a cummon.
Probe no. 2 serves as a low level sensor.
If the water level no longer touches the no. 2, then the pump will live on, because the water has reached the lowest level.
Probe no. 3 serves as an upper level sensor. If the water has touched the no.3 probe feeding the pump will be off / 0ff. because it has reached the highest permissible level.

4.1.3 Water pump.

Figure. 5 Water pump.

This pump is in charge of moving water from the underground tank to the tower tank. On duty 2 pieces of this pump alternately. If the first on duty Pump 1. When the low-level tower tank Pump 1 will be on, and in charge of meeting the tower tank, after the tower tank is full, Pump 1 will Off. Next on duty is Pump 2 automatically if the tower tank reaches low level. After Pump 2 on duty and tower tank has reached Upper Level and Pump 2 will Off. After that Pump 1 will be on duty, and so on.

4.2 Electrical Suction

Electrical circuit is divided into 2 section , namely the power circuit which is the power circuit to the main load, the pump. And the control circuit that keeps the 2 pump control system running according to plan. Overall the electrical circuit is as below.

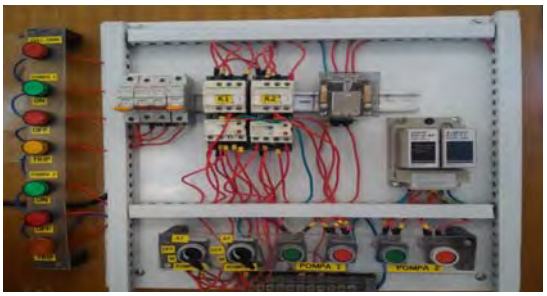


Figure. 6 Electrical system

ISBN : 978-602-99806-3-9

4.2.1 MCB (mini circuit breaker)

Gambar. 7. MCB

There are 4 MCBs attached, the leftmost MCB 1 serves as main MCB, main MCB receives power from outside and distributes to other MCB. MCB 2 as power for Pump 1, MCB 3 as Power for Pump 2 and MCB 2 right to MCB for Control.

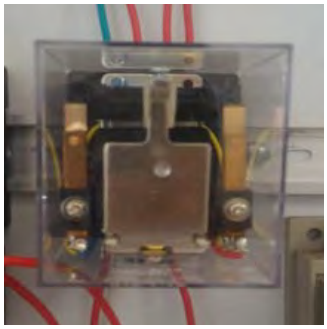
4.2.2 Contactor and Thermal overload

Figure. 8. Contactor and Thermal overload

Contactor functions to pass Power from MCB to Pump 1 and 2 based on control command. While the thermal overload is functioning as a safety pump If the pump has a problem, and cause the motor pump heat and overload, then the thermal overload will cut the current to the Contactor. So the problematic pump will Off.

ISBN : 978-602-99806-3-9

4.2.3. Switch over relay.



Gambar. 9. Swich over relay

This relay works to move the on duty pump automatically. After Pump 1 on duty and Off, then Pump 2 will be the on duty.

4.2.4 Floatless Level Switch probe

Gambar10 Floatless level switch dan probe

This section serves to set the water level ditangki tower. So the tower will never be over flow as long as the part is working properly. The FLS will be connected to a probe that acts as a water level sensor.

4.2.5 Control Switch Manual – Automatic

This section works for the operator choosing whether the pump is run automatically or manually? If Auto mode is selected, the pump will operate automatically, meaning that the pump will live and die based on the water level in the tower tank. And will alternate on duty it. If manual mode is selected, the live pump based on the operator chooses whether Pump1 or Pump 2 will be turned on by pressing the existing push botton switch

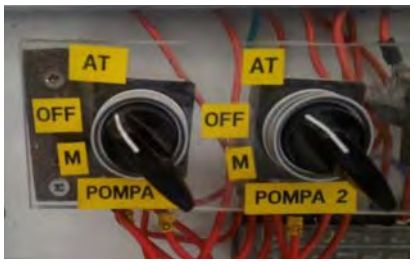


Figure 11 ***Control Switch Manual - Automatic***

ISBN : 978-602-99806-3-9

Keep in mind: if the water level in the tower tank has reached the upper level, the pump will not be able to On, either manual or Automatic mode is selected.

4.2.6 Push button switch.

Figure. 12 ***Push button switch.***

This section is required if manual mode is selected operator. This is used if one needs maintenance and aoutomatis mode can not be run, then other pumps can be turned on manually to fill the tower tank. To turn on the pump pressed the green button, if you want to turn off the red button pressed.

4.2.7 Indicator Light.

Figure 13. Indicator Light.

This section shows the status of this system. The top lamp indicates the tower tank is already full, the pump will not live, although manual or automatic mode is selected.
the status of Pump 1, if Pump 1 On or Off the lamp is on, if Pump 1 has problems, Trip lamp will be on.
The status of Pump 2, if Pump 2 On or Off light is on, if Pump 2 has problem, Trip lamp will live.

Figure 14 Tampak depan simulasi

ISBN : 978-602-99806-3-9

5. Test Simulation Tool

This simulation tool has been completed assembled, the next step is to test the reliability of the control system, whether the pump installed can alternate his life to serve the tower tank.
For this test, a valve mounted between the tanks, opened halfway, so that the water pumped into the tower tank does not stay in the tower tank, but directly partly into the underground tank.
With the valve condition of the tower tank tank and the underground tank open halfway, the live pump alternates, as shown below.

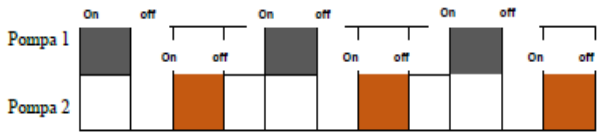


Figure 16 Figure of two pump simulation tools

6. CONCLUSIONS

6.1 Control Simulation Equipment 2 clean water supply pump using Relay Change over and Floatless Level Switch when tested Pump 1 and Pump 2 work alternately as planned. After Pump 1 works to fill the tower tank, Pump 1 will stand by, Pump 2 that works when tower tank level reaches low level.
6.2 Control Simulation Equipment 2 clean water supply pump using Relay Change over and Floatless Level Switch, ready for practice practice in Building Utilities and BAS

References

[1] Darma Adiantoro, 2009, Perancangan Otomatisasi Kontrol Pompa Sirkulasi Air Dingin Gedung Media Energy Supply(Mes) IRM, Hasil-hasil Penelitian EBN Tahun 2009, Jakarta

[2] Marina Rosadi Harahap, 2015, Rangkaian Dan Pengujian Sistem Kontrol Aliran Air Dengan Mikrokontroler Atmega8535 dan Pemrograman C, Universitas Sumatera Utara, Medan

[3]Omron, 2016, Manual WLC OMRON 61FG3, Bangkok.

[4]Omron, 2015, Manual Relay swich over Omron GQ-212S, Bangkok

Proceeding International Joint Conference
on Science and Technology (IJCST) 2017
ISBN : 978-602-99806-3-9

Development of special-interest marine tourism In serangan village denpasar

I KetutSuarta[1*], A. Agung Putu Swabawa,[2] I Putu Budiarta[3]
[123]Lecturers of Tourism Departement at Bali State Polytechniques
Bukit Jimbaran Campus, Bali. Indonesia

*Email: ketutsuarta@pnb.ac.id

Abstract. This resarch is held in Serangan Village, Denpasar Selatan District, Denpasar Municipility. Purpose of this researchis to identify the potencies of Serangan Island which could be developed as tourism product such as special-interest marine tourism and to know the visitors' perceptions to the objects and attractions they visit in order to determine the most favorite tourist attraction in Serangan Village.Data of this research was collected by survey, interview, documentation and library study. The data is analyzed by using quantitative analysis (descriptive statistics)and qualitative analysis (descriptive and comparative analysis). The resultsshowed that there are five potencies of natural attractions identified in Serangan Island which could be developed as tourist objects and special-interest marine tourism. They are the white sand beach, seaweed, clean blue sea, coral garden, and mangrove forest. The special interest-marine tourism are surfing, parasailing, waterski, snorkeling, diving, flying fish, underwater seawalker, banana boat, jetski, donat boat, glass bottom boat, horse riding, fishing, fast boat, turtle conservation and coral transplantation. The biggest market segment of those special marine attractions are 95 % Chinese. The foreign visitors that visit Serangan Island about 94.41 %, and the domestic visitors are about 5.59 %. The most favorite marine attractions in Serangan Village is travelling through the quay by fast boat, it is 311,344 people. Then the second and third favorite are turtle conservation and parasailing, they are 18,040 people and 1,890 people. From the capacity ratio, the most favorite attraction is travelling through the quay by fast boat, it is 276.75, the second and third favorites are flying fish and underwater sea walker with ratio 157.50 and 132.38.

1. Introduction

Serangan Island is located in South Denpasar. It is a strategic tourism area which is located between two famous tourist destinations. There are Tanjung Benoa and Nusa Dua in the South, Sanur in the North East, and Benoa Harbor in the West. From its topography, Serangan Village is surrounded by the sea and mangrove forest in the North and the sea in the South, East and West. It is almost 60 % of its area is the seaboard. Its coastline which surrounds the village is about 8 km long. Serangan Village has productive natural resources such as coral, seaweed, mangrove and beach. As a tourist destination, Serangan Village has some marine potency which needs to be developed maximumly in order to increase the tourism development in this area. Those potencies need to be developed based on the local genious concept of *Tri Hita Karana* so that they could bring sustainable development and benefit for culture and economy of the local people.

According to the Law of Tourism No. 10 Year 2009 it is stated that marine tourism is an effort to conduct tourism and water sport, also infrastructure and suprastructure and other services which is managed commercially in the sea, beach, river, lake, and dam. Indonesia with its 17,504 islands and 95,181 km coastlines, beautiful beaches and highest sea biodiversity in the world means that Indonesia has the biggest potencies of marine tourism in the world (Mann, 1995: Allen, 2002).

ISBN : 978-602-99806-3-9

Some activities which could be done in the sea and beaches are exploring the beauty of the underwater such as sea walker, diving, snorkeling, water sports, enjoy the sea products, and doing conservation. Concept of marine development must include some efforts to conserve and rehabilitate the biodiversity and ecosystem of the area. Furthermore, its management should apply professional management in community-based, so that the effect of development could give some positive contribution to the economy of the society. The development of marine attraction must be supported by developing villages-tourism to create some businesses in the society (Bakkara and Sunantri, 2012).

Development of marine tourism needs the right system and management and accurate target (Siti, 2001). Marine tourism management must be changed from bureaucratic system to entrepreneurial system; mapping the potencies of marine tourism such as value, their characteristics, supporting facilities, and its capacity in supporting the economy; planning the investment and development which is got from potencies mapping, in order to develop its supporting facilities such as transportation, telecommunication, and other supporting facilities; developing the qualified human resources in marine tourism; making a good marketing strategies; developing more attractive competitive, inclusive, and sustainable new marine tourism objects or destinations; increasing the safety, comfortness, and friendship in the location of marine tourism; stop sectoral and local ego, and developing "Indonesia Marine Tourism Incorporated" and applying KISS management (coordination, integration, simplification, and synchronization); and creating conducive investment climate and economy-politic for marine tourism development.
The development should also guarantee the environment conservation and the local genueus and culture in order to keep the ecological process; to protect biodiversity and to guarantee the preservation of the species and its ecosystem (Peter Mason, 2003). Seeing those marine potencies in Serangan Village, the researchers are interested in researching the development of special-interest marine tourism in Serangan Village.

Problems in this research are the following: **(1)** What are the potencies and potential market of the special-interest marine tourism in Serangan Village? (2) What is the perception of the tourists to the special-interest marine tourism in Serangan Village in accordance with their market need?

Purposes of this research are as follows: (**1**) To identify the potencies and potential market of the special-interest marine tourism in Serangan Village, (2) To know perception of tourists to the special-interest marine tourism in Serangan Village in accordance with their market need.

Benefit of this research is that it could give ideas in determining the potencies of special-interest marine tourism that becomes development priority in Serangan Village and to determine the strategic planning for development.

2. Research Methodology

This research is conducted in order to identify the potencies of the special-interest marine tourism in Serangan Village and to determine the favourite marine product which was conducted from April to September 2017. Data collection in this research is done through survey, interview, documentation, and literature study. The analysis used is quantitative analisis in the form of descriptive statistics, and the qualitative analysis techniques in the form of descriptive and comparativeanalysis (Suharsimi Arikunto, 1992:25).

3. Discussion

a. The Potencies of Special-Interest Marine Tourism

The potencies of special-interest marine tourism in Serangan Village which could be developed as special-interest product are as follows: a) The beach with white sand is very potencial to be developed as special-interest tourism product such as parasailing and the business or rental of long

ISBN : 978-602-99806-3-9

chair, beach umbrella, and traditional massage; b) Seaweed is very potencial to be developed as various cakes and drink for tourist's souvenirs or consumtion; c) A clean, blue, and wide ocean which surround Serangan Island could give a beautiful and attractive panorama; d) Various and calorful coral garden and transplantation in the eastern beach of Serangan Island could be developed as tourist object or attraction; e) Mangrove forest in the right and left handside of the entrance to Serangan Village could be developed as ecotourism.

b. Tourist Facilities

There are some public facilities in Serangan Island, such as road and a bridge, means of communication, health centre, worship places, quay, fishing spot, water, electricity, parking area, petrol station, and public toilet. Furthermore, the tourist facilities includes a) Sea-transportation such as phenisi boats and fast boats which connect to the islands of Nusa Penida, Nusa Lembongan, Nusa Ceningan, and Lombok; b) Accommodation (Paras Paros Hotel with 20 rooms); c) seven (7) restaurant (café) and twenty-eight (28) food stalls which sell seafood and seaweed products; d) Tourist object and attraction such as white sand beach; Water sport such as parasailing, waterski, snorkeling, flying fish, underwater seawalker, banana boat, jetski and donat boat; Turtle conservation and Education Center (TCEC), turtle garden, turtle release to their habitat; Dolphin Lodge is dolphin attraction; Horse riding; fishing from the beach or to the fishing spot; 2 quays of fast boat (Sire Angen and Eka Jaya Quays); Coral transplantation; Seaweed plantation and crops by local farmers; Segara Mantra Camp for the students; Shell handicraft by local people are as souvenir and export. The special-interest of marine tourism product in Serangan Island are surfing, parasailing, waterski, snorkeling, diving, flying fish, underwater seawalker, banana boat, jetski, donat boat, glass buttom, horse riding, fishing, Quays/fast boat, turtle conservation and coral transplantation.

c. Tourist Visit to Serangan Island

Tourists that visited and used facilities for travelling through the quay by fast boat and phenisi boat and consumed other tourist attractions in 2016 are mostly international tourists, they were 321,954 people or about 94.41 %. On the other hand, domestic tourists were 19,056 people or 5.59 %. The biggest market segment of international tourists are from China, is about 95 %, and most of them visited Lembongan Island and Gili Terawangan. Only a few of them used marine attraction in Serangan Island.

d. Tourists Perception to the Special-Interest Marine Tourism

In determining the tourist's perception to the tourism objects and attractions and services, it is more effective by using the number of tourist's perception in visiting and using the marine tourism objects and attractions in Serangan Island.

1) Determining the favouriteness of the special-interest marine tourism

Based on the number of tourists visit and usage to tourism objects and facilities, the most favourite tourism product in Serangan Village is travelling through quay with fast boat, it is 311,344 people. The second favourite is turtle conservation, it is 18,040 visits and the third is parasailing attraction, it is 1,890 visits. Based on the capacity ratio, the most favourite is also travelling through quay by fast boat, with ratio 276.75. The second favourite is flying fish, with ratio 157.50 and the third is underseawalker attraction, with ratio 132.38.

2) Condition Analysis for Policy and Development Strategy

In determining the development of tourism product in Serangan Village is by analising all components condition which related with tourism development generally and special-interest of marine tourism specifically.

The condition of nature in Serangan Village seems good, especially the access to the water sport and to the quay in the South access/route of Serangan Village. On the other hand, the access in the North of the village seems dirty; especially when the sea in low tide, its cleanliness is not maintained well. The field of the village also has the same condition; it is not managed and maintained well. There are some animals like goats and cows walked around the field and the street. Their dirt polluted the environment of the village. Overall the cleanliness and beauty of Serangan Village is under standard. Furthermore, the area of pines and mangrove forest at the

ISBN : 978-602-99806-3-9

unpopulated area of Bali Turtle Island Development (BTID) has a big potency to be developed as some tourism products.

The condition of the road in Serangan Village especially the route to the tourism objects is narrow and its parking area is limited. This condition will slow down the development of special-interest marine tourism in Serangan Village in long term. On the other hand, the availability and condition of the infrastructure such as water and electricity are good enough.

Overall, the facilities of marine tourism in Serangan Village are good enough, but they are not managed well / not in good order. For example the fast boat, glass buttom, jetski, waterskis, phenisi boat, and fisherman's boat were not parked well at the beach and they could disturb the attraction of water sport. Number of accommodation is very limited and there is no travel agent in Serangan Village. There is a Bugis village which is rich with Islam culture but there is no cultural attraction at all.

Based on those conditions the policy and strategy of tourism development in Serangan Village in the future is by cooperating with BTID management in developing the tourism facilities; making zonation of parking area for water sport beside the beach; improving the environment management; making diversivication of tourism product by increasing the types and numbers of tourist facilities from those potencies such as BTID areas, canal, local culture; increasing the capacity, quality, and number of public facilities which could influence the visitor's conveniences in visiting the village, especially in high season; improving the management of business organizations in, especially those are managed professionally; increasing the cooperation with some travel agencies that can promote and sell the tourism products in Serangan Village and to increase its popularity.

4. Conclusion And Sugestion

Based on the discussion above, it could be concluded that:

1. The potencies of Serangan Village which could be developed as special-interest marine tourism are the white sand beach, seaweed, a clean, blue ocean, coral garden and mangrove forest.
2. The special-interest marine tourism or attraction in Serangan Village are surfing, parasailing, waterski, snorkeling diving, flying fish, underwater seawalker, banana boat, jetski, donat boat, glass buttom boat, horse riding, fishing, Quays/fast boat, turtle conservation, and coral transplantation.
3. The tourist visit in 2016 was mostly international tourists, they were 321,954 people (94.41 %) and domestic tourists were 19,056 people (5.59 %). Most of the international tourists were from China, and most of them visited Lembongan Island and Gili Terawangan. Only a few of them used marine attractions in Serangan Island.
4. Based on the number of tourists visit and usage of tourism objects and facilities, the most favourite tourism product in Serangan Village is travelling through quay by fast boat, it is 311,344 people. The second favourite is turtle conservation, it is 18,040 visits and the third is parasailing attraction, it is 1,890 visits. Based on the capacity ratio, the most favourite is also travelling through quay with fast boat, with ratio 276.75. The second favourite is flying fish, with ratio 157.50 and the third is underseawalker attraction, with ratio 132.38.
5. The policy and development strategy for Serangan Village are by cooperating with BTID management in developing the tourism facilities, making zonation of parking area for water sport beside the beach, improving the environment management, making diversivication of tourism product, increasing the capacity, quality, and number of public facilities, improving the business management, and increasing the cooperation with some travel agencies.

   Based on the discussion, there is still much potential potencies that is not yet managed in Serangan Village such as the areas of BTID, the canal, and the local culture. It is suggested to make tourist products diversification which is relevant with the potencies of the village. Morover, it is important to optimize the existed tourist attractions. It is also suggested to give a special attention to improve the favourite tourist objects and attractions based on the tourist visit.

References

ISBN : 978-602-99806-3-9

[1] Undang-Undang No 10 Tahun 2009 tentang Kepariwisataan (the Law of Tourism No. 10 Year 2009)
[2] Pendit, S Nyoman, 2002. *Ilmu Pariwisata Sebuah Pengantar Perdana*, PT Pradnya Paramita, Jakartan Mann, 1995: Allen, 2002
[3] Bakkara, Riana UWK dan Sunantri, Yudy. 2012. Analisis Potensi Wisata Bahari Melalui Pendekatan CBT (Community Based Tourism) di Tanjung Utama Kota Batam. Universitas Internasional Batam.
[4] Siti N. 2001. Rencana Pengembangan Fisik Kawasan Wisata Bahari di Wilayah Pesisir Indonesia.
[5] Peter Mason, 2003. *Tuirism Impacts, Planning and Managenent,* P Elsevier Butterworth-Heinemann Linancre House, Burlington
[6] Arikunto, Suharsimi, 1992, *Prosedur Penelitian*, Ed. Revisi, Renika Cipta, Yogyakarta

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

Preferred Pricing Technique Used in Tourism Small and Medium Enterprises in Badung, Bali, Indonesia

Ni Luh Eka Armoni[1], Nyoman Mastiani Nadra[2], I Ketut Suarta[3]
[1,2,3]Politeknik Negeri Bali
luhekaarmoni@pnb.ac.id

Abstract. This research aims to examine various pricing techniques used in 3 types of tourism small and medium enterprises (SMEs) as well as to identify dominant techniques applied in support to sustainable business and tourism. The method used is qualitative method by means of interviewing pricing decision makers in tourism SMEs in Badung regency, in Bali. The results showed that there are 5 techniques used by Tourism SMEs, in Badung regency; among those, 2 pricing methods are dominantly used, these include: the accommodation and transportation businesses are more dominant in using competitor-based pricing techniques, whilst for restaurant business generally using cost-plus pricing techniques. Except for the motor/car rental, which has methodically assessed the financial sustainability of the business by devising 'breakeven point' pricing technique, the others still use a traditional way of common sense and gut feeling in assuring the sustainability of the business and the return of the investment. Successful businesses, in addition to considering the current operational wellbeing of the enterprises and the short-term profitability, should also take into account and systematically calculate the return on investment and long-term profitability of the business. Further discovered, SMEs should not simply use price as a competitive advantage but also use product/service advantage by way of delivering more value to consumers on core or augmented levels to win the competition and survive in the industry. It is expected that the research results could become a reference for tourism SMEs in setting prices for sustainable enterprises. Academically, the research result will enrich the knowledge about tourism especially those related to product-costing specifically in the field of small and medium enterprises.

Keywords: pricing, small and medium enterprises (SMEs), sustainable tourism

1. Background

Small and medium enterprises (SMEs) experience many obstacles in running the business due to various limitations. The constraint is also faced by tourism SMEs. These limitations include: lack of capital (Weaver and Lawton, 2010), lack of competence of the tourism supporting human resources (Rocharubgsat, 2008), inaccurate market targeting that causes less focus on promotional activities (Egemond, 2007), less understanding of the characteristics Alternative tourism (Ernawati, 2015), which otherwise provides feasibility for the growth of tourism SMEs. As it is known that, although the role of large-scale business in the field of tourism is growing today (Harrison, 2012), the role of small business remains significant in supporting tourism (Gartner, 2004). SMEs in Indonesia are very supportive to the government programs in terms of creating new jobs. SMEs are also created many new work units that employ fresh graduates that support household incomes. Small and Medium Enterprises (SMEs) have an important role in the Indonesian economy. Due to SMEs, unemployment due to the unabsorbed labor force in the workforce is reduced.

A tourism expert, Rodenburg (1980), in his study conducted in the early phase of the proliferation of tourism in Bali, found that the development of small-scale tourism is more appropriate for Bali because the income will be received directly by local people and the practice is aligned with

ISBN : 978-602-99806-3-9

Balinese traditional culture. One major obstacle to SMEs is the pricing of products offered which does not methodically take into account business sustainability (Baum, 2013), as stated by (Ernawati (2015, pp. 84) 'A case of low quality product packaging and pricing was provided by Baum (2013) who stated that in some Asian developing countries, locals offer accommodation for as little as seven dollars per night..…. This small amount will not allow economic returns in the destination'.

Pricing that considering long-term and short-term needs will result in a rational product price, which will prevent price wars which ends in very small margins. This, in turn, caused Bali as touris destination to be sold at a very cheap price and invite low budget tourists to come, then the tourism businesses in Bali are required to increase the volume of tourist visits to reach the tergeted sales and profits. Large volume of tourist visit can adversely affect the quality of tourism in Bali and the life quality of local people because the carrying capacity was overlooked. Given the parentheses of problems caused by product pricing, it was identified the need for a study of pricing on tourism small and medium enterprises in order to identify pricing methods that support business sustainability and tourism industry in general. The study raises the issue: what is the pricing method applied by SMEs in tourism sector in Badung regency, Bali? Which pricing techniques that can support the sustainability of SMEs in the context of sustainable tourism? The purpose of the study is to examine various pricing techniques on SMEs in tourism and to identify appropriate techniques to be applied for the sustainable of tourism. It is expected that the results of the research could provide input for SMEs in setting prices for business sustainability. Academically, the research result will enrich the knowledge about tourism especially those related to product-costing particular in SME field.

2. Sustainable Tourism

Sustainable tourism becomes an implementation form of sustainable development promoted by the United Nations, of which four basics include (World Commission Environment Development, 1987):

1. Holistic planning
2. Preservation of vital ecological processes
3. Urgency in protecting heritage and biodiversity
4. 'Progress' should be understood as productivity and the sustainability of future generations.

Furthermore, the principle is implemented in the field of tourism. The UN World Tourism Organization (UNWTO) defines sustainable tourism 'Tourism that takes full account of Current and future economic, social and environmental impacts, consider/anticipate the needs of visitors, industry, environment and host communities' (UNWTO, 2013, p.1). The development of tourism in Indonesia is based on the Law of the Republic of Indonesia Number 10 Year 2009 on Tourism which among other things mentioned:

'That the state of nature, flora and fauna, as a gift of God Almighty, as well as the ancient relics, heritage, art and culture owned by the Indonesian nation are the resources and capital of tourism development for the improvement of prosperity and welfare of the people as contained in Pancasila and the Preamble of the 1945 Constitution of the Republic of Indonesia'.

Furthermore UNWTO (2013) explains that Sustainable tourism in its implementation covers three aspects, namely: Society, Natural Environment and Economy. One important aspect is the economic aspect. The sustainability of tourism in the economic aspect is determined, among other things, by the availability of employment in the field of tourism for the local people, the low level of revenue leakage sourced from tourism, and the business with sufficient profitability in short term as well as long-term return on investment, as well as contributions to the development of Public facilities as well as infrastructure. Business practices that provides enough profit is one of the issues that need prime attention in order to achieve the goal of tourism development which are the prosperity of local communities and the sustainability of tourism. One aspect that significantly affects the level of profitability is a comprehensive pricing method applied for products offered.

ISBN : 978-602-99806-3-9

3. Small and medium enterprises (SMEs)

Based on the Presidential Decree no. 99 Year 1998, Small and Medium Enterprises is defined as: "Small-scale economic activities of the people within the business fields that are small business activities in major and need to be protected to prevent from unfair business competition'. The Indonesian Central Bureau of Statistics (BPS) defines Small and Medium Enterprises based on the quantity of manpower employed. Small-scale business is a business entity that has a workforce of 5 to 19 people, while medium-sized businesses are business entities that have a workforce of 20 up to 99 people. Based on the Decree of the Minister of Finance No. 316/KMK.016/1994 dated June 27, 1994, Small and Medium Enterprises is defined as an individual or business entity that has undertaken business activities that accrues sales or turnover as high as Rp 600,000,000 per year or assets as high as Rp 600,000,000 (excluding land and occupied buildings), which consists of: Business are (Fa, CV, PT, and cooperative), Individual (craftsmen/home industry, farmers, ranchers, fishermen, forest encroachers, miners, merchants of goods and services).

4. Pricing

Pricing is very important, because it does not only affects the profits to be achieved by a business entity, but also determines the survival of the company. In a narrow sense according to Kotler (in Nehen, 2001: p. 474) price is the amount of value imposed on goods or services, in a broader sense it is defined as the amount of value exchanged by consumers to the benefits derived from the ownership or use of products or services. Further explained, some objectives of pricing that are influenced by business conditions at one point of time are: Company survival, Maximising profit, Leadership in market share, Leadership in product quality, Stabilising the price, and Increasing the sales. Kotler also put forward several approaches that can be used in pricing, these include:

1. Cost -plus pricing
   Cost-based pricing is often called cost-plus pricing. The basic principle of standard product pricing is: the price should be sufficient to cover all costs and is able to generate profits in the long run.
2. Analysis of break-even point pricing with specific profit targets.
   Price is determined to break even with the cost of production and marketing of the product to gain a certain amount of profit.
3. Competitor-based approach
   Competitor-based pricing is the price formation in overall based on the business competitors, without the consideration of cost and demand. The company determines either: the same price, higher, or cheaper than the price of its main competitor. Applying competitor-based pricing will avoid an adverse price war.

5. Research Method

This research is undertaken with the aim to examine various pricing techniques on tourism SMEs and to identify appropriate techniques to be applied in the context of sustainable business and tourism industry. The sampling technique used is convenience sampling method with saturated sample limit (Sugiyono, 2013). The study was conducted on the scope of Badung regency to represent the tourism SMEs. The SMEs specification is businesses that have a workforce of under 99 people. Data was collected using survey method by conducting in-depth interviewing to the employees or owners of SMEs that determine the policies or who carry out costing at the respective businesses. Interviews were conducted following a semi-structured interview guideline (Table 1). The analysis technique used in this research is descriptive qualitative analysis that is the analised data is logically presented accompanied by argument so that a conclusion can be drawn. Data analysis is undertaken by following the steps as follows:

1. Firstly, classifying the various pricing techniques that have been recorded in accordance with the pricing techniques developed by Kotler, namely: Cost-based approach, Breakeven Analysis, Competitor-based approach, and the remaining technics are identified.

ISBN : 978-602-99806-3-9

2. Furthermore, the various techniques are analyzed considering the sustainability of the business thus, the industry tourism; therefore the most appropriate method could be identified.

Table 1: The Interview guideline

No	Questions	Responses
1	**Lodging/Homestay** A. How to set room price per night B. Whether the pricing could provide profit for the business to survive.	
2	**Restaurant/Cafe** A. How to set the food price per portion B. Whether the pricing could provide profit for the business to survive.	
3	**Transportation – car/motor rental** A. How to set the rental price per hour or day B. Whether the pricing could provide profit for the business to survive.	

6. Results and Discussion

The research undertaken aims to examine the various pricing techniques on tourism SMEs and identify appropriate techniques to be applied in the context of sustainable tourism, using a sample of x business units with profiles presented in Table 2. After the classification of data, the results show that the pricing method applied by SMEs business practitioners in the field of tourism varies among individual businesses and among type of businesses. The analysis result in the form of a variation of pricing method applied in tourism SMEs can be seen in Table 3.

Table 2: Sample profile

No	Business field	Number of respondent
1	Accommodation	x
2	Restaurant/food outlet	x
3	Transportation – rent car and motorcycle	x

There are a total of 5 types of pricing approaches applied by tourism SMEs in Badung. Observing the results of the analysis (Table 3), in general, the most widely used technique is the competitor-based pricing approach (19), followed by: cost plus pricing (18), target profit pricing (7), Break-even point analysis (5), perceived value pricing approach (1). However, the number of SMEs using competitor-based pricing approach is almost balanced with businesses that use cost plus pricing. In general, respondents said they already get adequate profit from the business and the company can still operate and survive.

From business type perspective, the accommodation/lodging providers and the car/motorcycle rental businesses in majority use competitor-based pricing techniques, whereas, the 'cost plus pricing' technique becomes a preference for food and beverage businesses. However, unlike in the accommodation business, the difference in the use of various techniques in the car/motorcycle rentals business is not as extreme as the accommodation business. It is interesting to note that there are 5 units of transportation rental business that apply break-even analysis method, which shows that the business not only sets the profit to be gained, but also takes into account the investment payback period.

From the results, it can be concluded that the approach of 'competitor-based price' becomes a preferred pricing method of Tourism SMEs, however SME entrepreneurs should also use long-term oriented pricing approach, thus, the business managers understand the level of profitability they are operated on. It also allows entrepreneurs to take advantage of opportunities in applying a demand driven pricing as known that tourism industry has sharply fluctuating demand.

ISBN : 978-602-99806-3-9

The pricing approach of 'perceived value pricing', in which the price is charged based on the value received by the consumer is carried out by one of a business that operates in accommodation provision area. For businesses that are settle and confident with the quality of services offered should be able to operate profitably by using this pricing approach. Tourism SMEs should strive to develop quality products and services that differentiate it from competitors and use it as a competitive advantage.

Table 3: Pricing methods applied in Tourism SMEs in Badung

No	Business type	Product	Pricing method used	Total Respondent
1	Accommodation	Room rental	Pricing for room rental based on *cost plus pricing* approach	2
			Pricing for room rental based on *target profit pricing* approach	2
			Pricing for room rental based on *perceived value pricing* approach	1
			Pricing for room rental based on *competitor-based pricing* approach	10
2	Restaurant/ food outlet	Food and beverage	Pricing for food and beverage products based on *cost plus pricing* approach	12
			Pricing for food and beverage products based on *target profit pricing* approach	2
			Pricing for food and beverage products based on *competitor-based pricing* approach	1
3	Transportation	Car/ motorcycle Rental	Pricing for car/motorcycle rental based on *cost plus pricing* approach	4
			Pricing for car/motorcycle rental based on *target profit pricing* approach	3
			Pricing for car/motorcycle rental based on *competitor-based pricing* approach	8
			Pricing for car/motorcycle rental based on break-even analysis	5

Resource: Data analysed

7. Conclusion and Discussion

The pricing methods applied by SMEs in the tourism sector in Badung regency, among others: cost plus pricing approach, target profit-based pricing approach, perceived value pricing, competitor-based approach (price applies), the break-even analysis approach.

There are two methods of pricing techniques dominantly used by SMEs in the field of tourism in Badung: accommodation and transportation business use competitor-based pricing techniques, whilst restaurant businesses use cost-plus pricing techniques.

The pricing techniques that could support the sustainability of SMEs in the context of sustainable business and tourism industry in Badung regency is to consider the internal and external factors of the company. Internal factors are related to marketing objectives, marketing mix strategy, cost and organization while external factors are related to market characteristic, demand, competition, other environment.

'Competitor-based pricing' becomes the preference of Tourism SMEs, however SME entrepreneurs should also use long-term oriented pricing techniques, therefore business managers know the level of profitability the company operate in, are clear about the payback period, and are able to take advantage of the demand fluctuations in tourism industry.

ISBN : 978-602-99806-3-9

The price that is charged based on values received by customers is referred to as 'value-based pricing' approach, is applied by one business respondent – an accommodation provider. This could be used as a reference by other tourism SMEs, as this shows customer orientation and uses quality as an advantage to compete and survive in the industry. To be able to operate in this domain tourism SMEs needto develop quality products and services and use it as a 'competitive advantage'.

References

[1] Baum, T. (2013, October). Human resource development (HRD) in emerging tourism destinations. Paper presented at the Tourism Research Cluster Seminar, Curtin University, Perth, Western Australia.

[2] Egmond, T.V. (2007). Understanding western tourists in developing countries. Norfolk, UK: Biddles Ltd.

[3] Ernawati, N. M. 2015. Producer–market orientation of community-based tourism (CBT) products: A case study in Bali, Indonesia. Unpublished thesis. Edith Cowan University. Perth, Australia.

[4] Gartner, W. C. (2004). Factors effecting small firms in tourism: A Ghanaian perspective. In R. Thomas (Ed.). Small firms in Tourism: International Perspective (pp.35-70). Oxford: Elsevier.

[5] Rodegburg, E. E. 1990. The effect of scale in economic development: Tourism in Bali. Annals of Tourism Research 7 (2): 177-196.

[6] Rocharungsat, P. (2008). Community-based tourism in Asia. In G. Moscardo (Ed.), Building community capacity for tourism development (pp. 60-74). Oxfordshire, UK: Cabi International.

[7] Perpustakaan Nasional R I. (n.d.). Undang-Undang Republik Indonesia Nomor 10. Tahun 2009 tentang Pariwisata.

Sugiyono. 2013. Metode Penelitian Manajemen: Pendekatan, Kuantitatif, Kualitatif, Kombinasi (Mixed Methods), Penelitian Tindakan (Action Research), Penelitian Evaluasi. ALFABETA. Bandung.

United Nations World Tourism Organisation [UNWTO]. (2013). Sustainable development of tourism. Retrieved from http://sdt.unwto.org/en/content/about-us-5.

Weaver, D., & Lawton, L. (2010). Tourism management. Milton, Australia: John Wiley & Son.

World Commission of Environment and Development [WCED]. (1987). Report of the World Commission on Environment and Development. Retrieved from http://www.un.org/documents/ga/res/42/ares42-148.htm

Supranto, J. 2000. Teknik Sampling untuk Survei dan Eksperimen. Penerbit PT Rineka Cipta, Jakarta.

Philip Kotler, John Bowen, James Makens, Pemasaran Layanan dan Pariwisata edisi dua 2001 dialih bahasakan oleh I Ketut Nehen Fakultas Ekonomi Universitas Udayana

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

Physical and electrical parameters measurement module in solar panel physics laboratory Politeknik Negeri Bali

I Made Aryasa Wiryawan, I Nyoman Sugiarta, I Wayan Teresna
Program Studi Teknik Listrik, Politeknik Negeri Bali
Bukit Jimbaran, P.O.Box 1064 Tuban Badung – Bali
Phone : +62-361-701981, Fax: +62-361-701128

Abstract. Practice related to Solar Panel for Electrical Engineering program students conducted in Physics Laboratory of Electrical Engineering Department of Politeknik Negeri Bali as the introduction of solar cell still use equipment separately so that the measurement result not yet optimal. Based on these conditions, this study aims to create a Solar Panel practice module as a student practice tool and increase student competence in performing measurements of Solar Cell output in Physics Laboratory. Methods in the manufacture of modules include: determining the types of measuring devices and solar cell specifications, drawing solar cell module designs and determining the position of solar cells with a slope of 0^0, 30^0, 60^0 and 90^0. Measurements include Open Circuit Voltage (Voc) and Short Circuit Current (Isc) from series of two solar panels in series and parallel. Based on the measurements made in the Solar Panel conditions the series circuit obtained Voc value changed 0 - 7 volts, Isc ranged from 1 to 6 Ampere, whereas in parallel series Voc measurement results change between 0 - 1 Volt and Isc value changes between 2- 11 Ampere. The output of physical parameters (angle) of influence is not significant because the slope angle of the Solar Panel is facing east (sunrise). The effect of Solar Panel Output Isc is a bright or sunny cloudy weather with a temperature level between 22 ^{0}C – 42 ^{0}C.

Keywords : Solar Panel,Series and Paralell Circuit , Open Circuit Voltage, Short Circuit Current

1. Introduction

In this modern era electrical energy is a major requirement to operate electrical appliances in households, transportation, industry and other service sectors. The source of electrical energy comes from renewable energy sources and non-renewable energy sources. Based on topography in Indonesia is ideal to develop solar module as a source of electrical energy [1]. The solar module is one of the electronic devices that can directly transform the energy of solar radiation into electrical energy. [2] The system, the size of the solar cell and the output parameters of a given region determine the magnitude of electric energy production [3]. Solar cells are arranged in several groups called solar panels with DC output units (Direct Current) where each solar cell is connected in parallel or series [4,5]. Placement of solar panels on the roof of the house [6] but on large generating systems placed in the field. To get the maximum solar panel output, the direction of the panel is changed according to the direction of sunlight [7]. In the laboratory of Physics, Department of Electrical Engineering, Politeknik Negeri Bali, there are practical materials related to solar cell for Electricity Study Program students as the introduction of solar cell as one of the alternative source of electrical energy. In the experiment, current and voltage measurements were conducted to find out the characteristics of the I-V curve that affect the efficiency of solar cells. The experiments were conducted outside the Physics lab by bringing practicum equipment such as solar cells, amper meter measurements,

ISBN : 978-602-99806-3-9

volt meter gauges and connecting cables. Existing conditions cause the experiment can not be performed optimally constrained pratikum equipment that is still separated from one another, this is correlated with the measurement results obtained are not optimal.To improve the condition it is necessary to create a permanent module with equipment measuring equipment installed and calibrated with either in accordance with the type of experiment / practice performed.

2. Methodology

This research is an experimental research, design and test by testing Solar Panel practice module on series and parallel relationship.

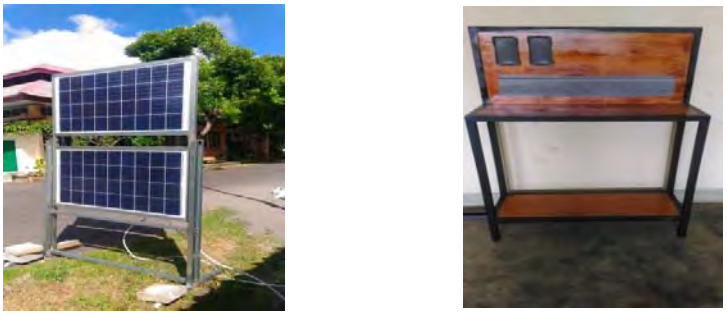


Figure 1. The Design of Solar Panel Modules

The data used in this study is the primary data in the form of Survey Panel output measurement results in series and parallel relationships conducted outside the Laboratory of Physics Department of Electrical Engineering Politeknik Negeri Bali

The data collection method is done by measuring the Solar Panel output which includes:

- Voltage (Voc) and current (Isc) measurements for Solar Panel series and multimeters at DC Volt range of 50 Volt and Ampermeter DC range of 10 A.
- Voltage (Voc) and current (Isc) measurements for parallel Solar Panels and multimeters at Volt DC range of 50 Volt and Ampermeter DC range of 10 A.
- Measurements are made every 2 minutes at each corner of the solar cell position (0^0 s / d 90^0) starting at 09.30 am - 12.30 pm.

The analysis is done from experiment data of solar panel practice module in the form of open circuit voltage (Voc) and short circuit current (Isc) at angle 0^0, 30^0 60^0 and 90^0. The analysis results determine the magnitude of the effect of the solar panel angle on the magnitude of the I-V curve and the influence of other parameters according to the measurement results.

3. Results and Discussion

The Solar Panel Practice Module Testing is conducted on two conditions solar panel connected series (2 solar panels) and in parallel. Parameters measured are Open Circuit Voltage (Voc), Short Circuit (Isc), Temperature on the surface of solar panels and outside weather conditions when taking data.

Tests on the solar panel practice module with series relationships are shown in Figure 2. The results of the Voc and Isc measurements are shown in Table 1. For the solar panel practice module test the parallel relationship is shown in figure 3, while the measured data is shown in Table 2.

ISBN : 978-602-99806-3-9

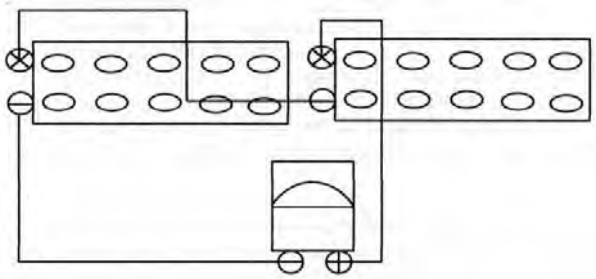


Figure 2. Solar Panel Series relationships

Table 1. Voltage (Voc) and Current (Isc) Series Relationships
(Wednesday, 8-8-2017)

No.	Time (Wita)	Tilt Angles (o)	Voc (Volt DC)	Isc (Ampere DC)	Temp (◦C)	Weather
1	9,32	90	41,4	3,2	35,0	Briht-Cloudy
2	9,34	60	38,9	1,1	31,5	Bright-Coudy
3	9,36	30	39,9	1,4	27,9	Cloudy
4	9,38	0	41,7	4,5	31,9	Briht-Cloudy
5	10,04	0	38,3	1,9	28,6	Cloudy
6	10,06	30	39,1	2,2	30,1	Cloudy
7	10,08	60	38,7	2,1	30,8	Cloudy
8	10,10	90	41,3	3,4	33,1	Briht-Cloudy
9	11,00	90	41,1	3,3	32,3	Bright
10	11,02	60	42,3	3,2	31,2	Bright
11	11,04	30	42,4	6,2	33,2	Bright
12	11,06	0	41,7	6,0	35,4	Bright
13	12,00	0	35,5	1,2	32,9	Cloudy
14	12,02	30	42,9	6,4	33,8	Briht-Cloudy
15	12,04	60	38,9	4,0	31,1	Briht-Cloudy
16	12,06	90	38,4	3,2	32,3	Briht-Cloudy

ISBN : 978-602-99806-3-9

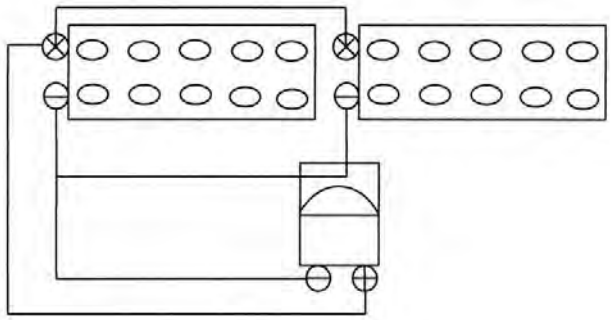


Figure 3. Solar Panel Parallel relationship

Table 2. Voltage (Voc) and Current (Isc) Parallel Relations
(Tuesday, 18-8-2017)

No.	Jam (Wita)	Tilt Angles (o)	Voc (Volt DC)	**Isc** (Ampere DC)	**Temp** (◦C)	Weather
1	9,32	90	19,0	7,8	32,2	Bright-Coudy
2	9,34	60	20,9	10,2	30,2	Bright-Coudy
3	9,36	30	19,2	7,4	30,3	Bright-Coudy
4	9,38	0	20,6	9,0	30,1	Bright-Coudy
5	10,04	0	19,7	6,5	33,2	Cloudy
6	10,06	30	20,1	3,0	34,2	Cloudy
7	10,08	60	20,0	2,1	31,7	Cloudy
8	10,10	90	19,2	2,0	33,1	Bright
9	11,00	90	20,4	4,0	34,3	Bright
10	11,02	60	19,4	2,0	34,4	Cloudy
11	11,04	30	19,8	7,5	32.7	Bright
12	11,06	0	19.6	2,0	30,6	Cloudy
13	12,00	0	20,7	10.1	39,6	Bright
14	12,02	30	20,6	11,2	35,5	Bright
15	12,04	60	20,4	7,5	31,0	Bright
16	12,06	90	19,0	2,0	32,2	Cloudy

In Table 1 the results of the solar panel practice module test show that the voltage range (Voc) ranges from 35 volts to 42 volts, while the current value (Isc) varies considerably between 1.1 ampere - 6.4 amperes. The largest current output value in bright weather conditions with 30^0 solar panel angles at 12.02

ISBN : 978-602-99806-3-9

wita. The output value of solar panels is highly dependent on the direction of solar panel placement and the angle of sunlight. In the solar panel condition the series relationship of voltage variation is quite large and the current value also experienced a considerable difference.
Table 2 shows the test of solar panel practice module parallel relationship obtained output measurement with voltage parameters (Voc), current (Isc) and temperature. The voltage values range from 19 volts - 20 volts. Measurement of current output obtained values between 2 amperes - 11 amperes. The output voltage of the solar panel is quite stable even though the weather conditions change (bright - cloudy). While the output current fluctuations in value is large enough due to the influence of weather factors. In sunny conditions with a tilt angles 30^0 obtained the greatest current value. From table 1 and table 2 we get quite different values that the solar panel measurements for the parallel relationship of current measurement value (Isc) are quite large compared to the measurement of the current value (Isc) of the series relationship.

4. Conclusion

Open Circuit Voltages and Short Circuit Flows are influenced by the intensity of sunlight that affects the surface of the solar cell. The effect of solar panel angle change slightly plays on the short circuit current value in bright conditions whereas in cloudy conditions and overcast the panel angle is quite influential. The current measurement value (Isc) in the parallel relationship reaches 11.2 Amper at an angle of 30^0 compared to the solar panel relationship in series with the value of 6.4 Amper at the measurement at 12.02 Wita.

References

[1] Elieser Tarigan, 2013, *Assesment of PV Power Generation for Household in Surabaya Using SolarGIS-pvPlanner Simulation*, Conference and Exhibition Indonesia Renewable Energy & Energy Conservation.

[2] Rakhmad Indra Pramana, 2016, *Performance analysis of photovoltaic modules in Baiturrahman Islamic Boarding School,* International Conference on Sustainable Energy Engineering and Application (ICSEEA)

[3] Abram Wawi Putra, 2016, *Study and Design of Hybrid Off-Grid PV-Generator Power System for Administration Load and Communal Load at Three Regions ini Indonesia*, The 3rd IEEE Conference on Power Engineering and Renewable Energy.

[4] Bryan Hosford and Reena Cole,2014/2015, *An Economic Analysis of Solar Photovolatic Installations in Ireland*, M. Eng Research Project

[5] M.A. Albadi, 2011 , *Cost Of PV Electricity in Oman,* IEEE GCC Conference and Exhibition

[6] A B Pangaribuan, 2016, *Harnessing the hybrid supply systems of utility grid and photovoltaic panels at retrofit residential single family building in Medan*, International Conference on Computing and Applied Informatics,

[7] Abdul Ghafoor, Anjum Munir, 2015, *Design and economics analysis of an off-grid PV system for household electrification,* Renewable and Sustainable Energy Revews , Elsevier.

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

The effect of the angular change and the rotation of the blade on the thickness of incision on the cocoa skin machine

Achmad Wibolo,[1] I Gede Nyoman Suta Waisnawa[2]
[1,2]Department of Mechanical Engineering Politeknik Negeri Bali
Bukit Jimbaran P.O. Box 1064 Tuban Badung – Bali
Phone : (0361) 701981, Fax. (0361) 701128

Corresponding author: E-mail address : bolo_pnb@yahoo.com

Abstract. Slicing machine designed in this study is expected to be able to change the size of cacao skin to be thinner so it can be processed into bran. The method of processing the skin of cocoa fruit inti bran is expected to be able to increase the amount of animal feed supply so it can be used not limited to cattle and goats but also for other livestock. The purpose of this research is to realize a machine capable of processing the skin of cocoa fruit that has been only a little can be utilized by community to be processed livestock feed to help supply livestock feed farmers.
Designing technique is a very important basic step undertaken in the design of this cocoa fruit skin slicing machine. The purpose of this designing technique is to get the construction data required in building this slicer. Furthermore, the design process of cocoa skin cutting machine construction with consideration is the main driving force using the motor, slicer knife can be adjusted, ergonomic engine specifications, easy operation, and the machine does not cause noise.
Testing is done by designing various variations of angle and rotation on the slicing knife disc.
Testing on the performance of this cocoa fruit skin cutter machine still has some weaknesses, such as disks and knives steel material replaced with stainless steel to be more hygienic. The test results obtained that the smaller the slicing angle the thickness of the slices the thinner and the lower the rotation of the slicing knife then the slicing process will be longer.
Further research is possible on the vibration direction of the cutting tool and the design of the next machine for the grinding process

Keywords: cocoa fruit, cocoa fruit skin, slicing machine

INTRODUCTION

Feed is one of the most decisive factors in the livestock business. The availability of feed is very fluctuating, abundant in the rainy season and there is a shortage during the dry season. It becomes an obstacle as well as a challenge for farmers to keep feeding with high protein content, cheap and sustainable (Pond, W.G *et al*., 1995). The provision of feed has shifted to the exploration and utilization of non-conventional feed ingredients with low competition value, among others cocoa peel. Utilization of the skin of cocoa fruits as animal feed will provide two main effects, namely the increased availability of feed ingredients and reduce environmental pollution due to the disposal of the skin of cocoa fruit is not good. However in the utilization as animal feed ingredients have the main obstacle that is high content of lignin an low protein (Aregheore, 2000).

Furthermore, it is said that the waste of cacao fruits given directly to livestock will actually decrease the weight of livestock body, because the protein content of cocoa skin is low, while the lignin and cellulose are high. One alternative technology to utilize the skin of cocoa fruit as raw material for animal feed is to turn it into a quality product that is through the process of fermentation. Fermentation can increase the nutritional value and fodder ingredients and inhibit the growth of

ISBN : 978-602-99806-3-9

micro organisms that are not favored. In principle, the processing of food by fermentation is to active the micro organisms needed to form new products different from the raw material (Nguyen *et al*., 2001).

Processing of cocoa fruit skin is done through four stages : slicing, fermentation, drying and grinding. This research is devoted to realize the tool that is able to slice the cocoa fruit skin into a smaller size to facilitate the process of drying and grinding. The method of processing cocoa fruits into bran is expected to be able to increase the amount of animal feed supply so that it can be used not only on cattle and goats but also for other livestock.

MATERIALS AND METHODS

The materials used : Skin fruits of cocoa is a waste agroindustry generated plant cocoa Fruits of cocoa consists of 74% cod, 2% placenta and 24% seeds.Kulit buah kakao adalah merupakan limbah agroindustri yang dihasilkan tanaman kakao. Buah coklat terdiri atas 74 % kulit buah, 2 % plasenta dan 24 % biji.

Tool used : The cocoa skin machine is the result of design and manufacture process and its equipment (Khurmi, R.S *et al*., 2005) (figure 1). The tachometer is used to measure the per minute spin due to the change in diameter of the pulleys from the slicing disk shaft. The design of the slicer used by research. Varnier caliper is used to measure the thickness of the slice material. Stopwatch is used for slicing time during ferfect sliced material.

Condition : After a survey to the location of the planned application of the tool in Dusun Pempatan Kecamatan Pupuan Tabanan to get cocoa skin as the intial planning, but there are constraints that the cocoa harvest has passed so as not to get wet cocoa skin as a test material. The test material uses cassava as a substitute material assuming cassava hardness with the same cocoa skin, Dimensions of cassava used as a test material with a diameter of 8 cm and a length of 20 cm. The length of cassava is determined to get the time required in slicing until the material is sliced.

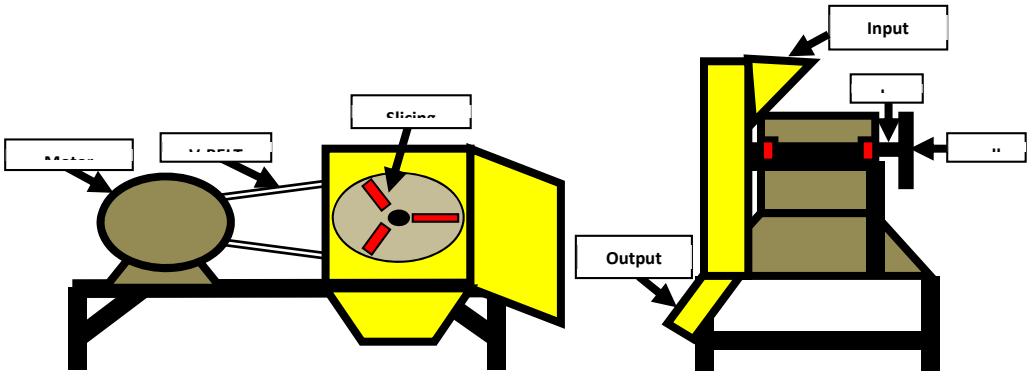


Figure 1. Design slicing machine

Variables that are executed : Changes will be made at the angle of the blade as well as the speed of the incision rotation to determine the thickness of the cocoa skin. The angle change is done three times that is 5^0, 10^0, 15^0 and the change of speed is done by changing the diameter of pulley at knife that is 8 inch, 10 inch and 12 inch.

Procedure : Testing at Mechanical Laboratory Departement of Mechanical Engineering Politeknik Negeri Bali. The machine is turned on and set to idle position (1000 rpm). The machine is left to operate for five minutes to make condition stable. The ingredients are inserted and left untouched by themselves. The slicing time was recorded and the slices were taken randomly for measurement. The measurement results were taken as many as 10 pieces then measured to get the thickness.

ISBN : 978-602-99806-3-9

RESULTS

Based on the calculation of the driving machine using an electric motor, but the anticipation of the unavailability of electricity sources in the location of the application is used motor fuel. The result of manufacture and assembly of slicing machine is shown in figure 2.

Figure 2. Sliced machine designed

Specifications of the machine are designed according to table 1

Table 1. Slicing machine specification

No	Description	Specification
1	Motor Drive	5,5 hp
2	Shaft driven	Ø 25 mm
3	Pillow block	502
4	Material inlet	45°
5	Outlet of materals	45°
6	Disk knife	Ø 400 mm
7	Lenght of knife	150 mm

In accordance with the objectives of the study carried out variations on the movable pulley as in table 2

Table 2. Pulley Rotation Rasio

No	D1	N1	D2	N2
1	3	1000	8	375
2	3	1000	10	300
3	3	1000	12	250

D1 = diameter of the drive pulley (inch)
D2 = diameter of the driven pulley (inch)
N1 = round pulley drive (rpm)
N2 = round pulley driven (rpm)

The slicing knife disk is made of three pieces according to the specified angle variations of 5°, 10° and 15° as show in figure 3.

ISBN : 978-602-99806-3-9

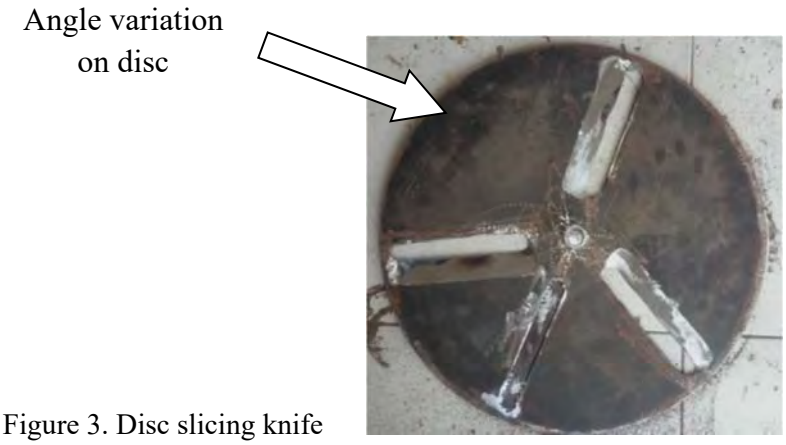


Figure 3. Disc slicing knife

The test is performed to obtain the thickness of the incision as well as the time required for the incision. The dimensions of cassava are selected and cleaned before being put into the hoper. Purpose cleaned to anticipate damage to the slicing knife. When the yam is inserted the stopwatch is activated to get the time of incision of each knife angle and the diameter of the pulley used.

Figure 4. Slicing result

The test results from the slicing machine by varying the angle of the knife and the pulley diameter are moved as in table 3, table 4, and table 5.

Figure 5. Measuring the thickness of the slices

ISBN : 978-602-99806-3-9

Table 3. Data of test result with angle of disk 5°

No	Sampel	Knife Angle (°)	Diameter Pulley (in)	Thick Result (mm)	Average Thickness	Time (seconds)
1				0.6		
2				0.8		
3				0.75		
4				0.8		
5	**A**	5	8	0.8	0.71	12
6				0.6		
7				0.8		
8				0.5		
9				0.65		
10				0.8		
11				0.8		
12				0.8		
13				0.6		
14				0.8		
15	**B**	5	10	0.9	0.79	18
16				0.8		
17				0.8		
18				0.65		
19				0.8		
20				0.9		
21				0.8		
22				0.9		
23				0.8		
24				0.8		
25	**C**	5	12	0.6	0.8	23
26				0.8		
27				0.7		
28				0.8		
29				0.9		
30				0.9		

Table 3 shows that at a blade angle of 5° has an effect on the average thickness of the yield of between 0.71 - 0.8 mm. The diameter of the pulley driven affects the time of slicing the material, the larger the pulley the slicing speed will decrease as a result of the lower knife rotation.

Table 4. Data of test result with angle of disk 10°

No	Sampel	Knife Angle (°)	Diameter Pulley (in)	Thick result (mm)	Average Thickness	Time (seconds)
1				1.2		
2				1.4		
3				1.5		
4				1.2		
5	**D**	10	8	1.2	1.27	12
6				1.2		
7				1.6		
8				1.5		
9				1.2		
10				1.6		
11				1.2		
12				1.4		
13				1.5		
14				1.2		
15	**E**	10	10	1.6	1.46	20
16				1.2		
17				1.6		
18				1.5		
19				1.7		
20				1.7		
21				1.2		
22				1.4		
23				1.5		
24				1.4		
25	**F**	10	12	1.5	1.54	24
26				1.6		
27				1.7		
28				1.5		
29				1.8		
30				1.7		

ISBN : 978-602-99806-3-9

Table 4 shows that at a 10° knife angle affects the average thickness of the incision yields from 1.37 to 1.54 mm. The diameter of the driven pulley affects the time of slice of the material, the greater the pulley the slicing speed will decrease due to the lower knife rotation

Table 5. Data of test result with angle of disk 15°

N	Sampe	Knife Angle (	Diameter Pulley	Thick Result (mm	Average Thickness (mm	Time (seconds
1				2.		
2				3.		
3				2.		
4				3.		
5	**G**	1	8	2.	2.9	1
6				2.		
7				2.		
8				3.		
9				3.		
1				3.		
1				3.		
1				3.		
1				3.		
1				3.		
1	**H**	1	1	3.	3.2	2
1				3.		
1				3.		
1				3.		
1				3.		
2				3.		
2				3.		
2				3.		
2				3.		
2				3.		
2	**I**	1	1	3.	3.5	2
2				3.		
2				3.		
2				3.		
2				3.		
3				3.		

Table 5 shows that at a blade angle of 15° has an effect on the average thickness of the incision results between 2.94 - 3.51 mm. The diameter of the driven pulley affects the time of slice of the material, the greater the pulley the slicing speed will decrease due to the lower knife rotation

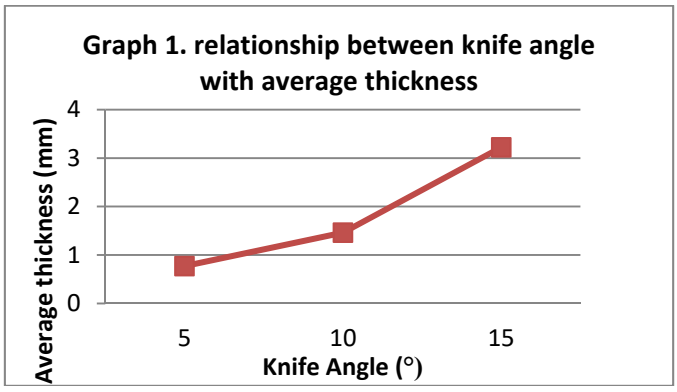
The results of the test of variation to the next round are included in the table and a graph is made to facilitate the discussion.

ISBN : 978-602-99806-3-9

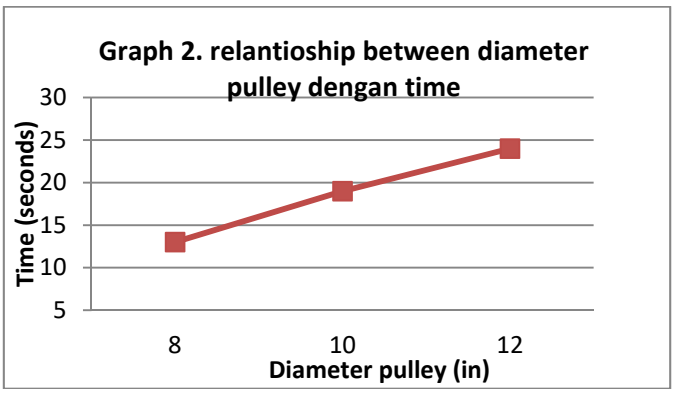
Table 6 Test results data with angle variations and pulley diameters are driven

No	Sampel	Knife Angle (°)	Diameter Pulley (in)	Average Thickness (mm)	Time (seconds)
1	A	5	8	0.71	12
2	B	5	10	0.79	18
3	C	5	12	0.80	23
4	D	10	8	1.37	13
5	E	10	10	1.46	20
6	F	10	12	1.54	24
7	G	15	8	2.94	15
8	H	15	10	3.22	20
9	I	15	12	3.51	24

Furthermore, from table 6, a graph explaining the relationship between the angle of the knife to the thickness of the slice and the relationship between the diameter of the pulley against the time of incision.



From the graph 1 can be explained that the variation of the slicing angle affects the thickness of the result of incision. The smaller the angle of the knife then the thinning result, otherwise the greater the angle of the knife then resulting thicker.



ISBN : 978-602-99806-3-9

Graph 2 can be explained that the smaller the pulley diameter the faster the slicing time is required, the larger the pulley diameter the longer the slicing time of the material until the whole sliced out.

CONCLUSIONS

Slicing machine designed to be able to perform the process of slicing the material as needed. The thickness of the incision results is influenced by the angle of the knife made on the slicer and the time of incision is affected by diameter of the driven pulley. The smaller the slicer angle the thickness of the result will be smaller and the langer the diameter of the pulley driven then the slicing time is longer.

DAFTAR PUSTAKA

[1] Aregheore, E.M. 2000. Crop residues and agroindustrial byproduct in four Pacific Island countries: availability, utilization and potential value in ruminant nutrition. Asian – Aust. J. of Anim. Sci. 13 (Supplement B): 266-269.

[2] Khurmi, R.S, J.K. Gupta. 2005. Textbook Of Machine Design. Eurasia Publishing House (PVT.) LTD. Ram Nagar, New Delhi – 110 055.

[3] Nguyen, X.T., C.X. Dan, L.V. Ly, & F. Sundstol. 1998. Effect of urea concentration, moisture content and duration of treatment on chemical composition of alkali treated rice straw. LIvest. Res. Rural. Devel. 10 (1). http://www. cipav.org.co/lrrd10/1/trac101.htm

[4] Pond, W.G., D.C. Church & K.R. Pond. 1995. Basic Animal Nutrition and Feeding. 4th ed. John Willey and Sons, Canada

[5] Reddy, K Venkata. 2008.Textbook Of Engineering Drawing. Second Edition. BS Publications. 4-4-309, Giriraj Lane, Sultan Bazar, Hyderabad - 500 095 - A. P.

ISBN : 978-602-99806-3-9

Conversion of compressive strength of concrete cement using adhesive pozolan on age variation of concrete

[1]I Wayan Intara*, [2]I Wayan Sudiasa, [3]I Made Jaya, [4]I Wayan Dana Ardika

[1,2,3,4] Civil Engineering Deoartment, Politeknik Negeri Bali
[1,2,3,4] Jln. Raya Kampus Bukit Jimbaran, Bali-Indonesia
email : intarajoist@yahoo.com (indicated by *)

Abstract. It is known that the adhesive to the concrete mix in general use cement types of PPC (pozollan portland cement) and PCC (portland cement composite) of various cement brands marketed in bali. The same was done by ready mix concrete pabric, they are also substituting cement with fly ash in the concrete mix a certain percentage of the sale. Material pozolan as a cement substitute material include: fly ash, coverslag, spent catalis, stone powder, and portland cement pozolan. From previous studies it is known that in ages early (before 28 days) concrete using pozolan as a substitute for cement produces the compressive strength is lower than the concrete of the adhesive cement type I (Ordinary Portland Cement), an increase in compressive strength occurred after 28 days ,
Research conducted at the Laboratory of Materials Engineering Department of Civil Bali State Polytechnic using the test piece cylindrical with a size of 15x30 cm quantity of 20 pieces for each age concrete with compressive strength Designed 25 MPa, tested at the age of 3, 7, 14, 21 , 28, 56, and 90 days following the PBI'71. Material agregate from Karangasem district, ppc cement production of gresik and pcc production of Tonasa. Value slump concrete mix according to the interval of 30mm-60mm. Concrete compressive strength designed is reached at the age of 56 days, with a value of 25.990 MPa for PCC and 25.961 MPa for PPC. res Conversion Age and Compressive Strength Characteristics for cement adhesive PCC is 0.60, 0.67, 0.80, 0.88, 0.96, 1.00, and 1.33, and for PPC cement adhesive was 0.56 , 0.65, 0.81, 0.86, 0.92, 1.00, and 1.23 according to the concrete in a row 3, 7, 14, 21, 28, 56, and 90 days.
Keywords: Concrete, Pozzolan Cement, Age of Concrete, Compressive Strength of Concrete

INTRODUCTION

In general, it is very difficult to get Portland type I (OPC) cement, which is currently available in PPC (portland pozollan cement) and PCC (portland composite cement). This type of cement is currently used as an adhesive in a mixture of concrete. In the ready mix business there is also a tight competition, so to be able to exist they substitute cement with fly ash to get more competitive price. Problems arise in the field at the time of testing of cube and cylinder test objects, ie testing of concrete samples in various ages. Often obtained test data at age 3, 7, 14 that the compressive strength of concrete in accordance with the compressive strength of the plan even greater. However, on a 28-day sample test often results in a smaller value than the quality of the plan. To determine the value of compressive strength test at age less than 28 days converted with the coefficient of age and compressive strength dikutif of PBI 71. Cube test object used in PBI 71 comes from cement type I. The expected goal of this research is to get answers on the achievement of concrete compressive strength values in the variations in age for PCC and PPC cement. The value is to become a new reference in the construction industry which still uses the age conversion and concrete compressive strength value of type I cement adhesive.

ISBN : 978-602-99806-3-9

METHODOLOGY

The implementation of the research is divided into several stages: preparation, manufacture of test specimens, specimen treatments, data collection and data analysis. Preparatory steps include the preparation of tools, inspection of materials including the making of the implementation schedule. Equipment used such as mixer, cylinder mold 30 mm x 150 mm, vibrating machine, place of care and press test equipment, examined feasibility of conducting research condition. Examination of the material concerning the examination of the characteristics of the basic materials used in the study such as specific gravity, unit weight, the design of fine aggregate gradation and coarse aggregate to be used in any mixture and others. Mixing of materials is done by Mixer machine by following the standard procedure. In this study aggregates before mixing were prepared under SSD conditions. The number of specimens prepared according to the age of the test and the number of specimens per test. Power measurements were performed at ages of 3, 7, 14, 21, 28, 56 and 90 days using each 20 (twenty) cylinders 30 mm x 150 mm for each type of cement and test life. Thus the required test material for each treatment is 140 (one hundred and forty) pieces, so the total of 30 mm x 150 mm total cylinders made entirely is 280 (two hundred and eighty) pieces. The printed test piece was left in the mold for 24 hours and then opened from the mold for further maintenance. Treatment is carried out by placing test specimens in a room protected from direct sunlight up to the time specified for testing: 3, 7, 14, 21, 28, 56 and 90 days. The test is done at the material laboratory of Civil Engineering Department of Bali State Polytechnic. The data collected are crushed loads for compressive strength. All of it was obtained from the test results of the cylindrical test object in accordance with the specified test age. Before testing the specimens were weighed and measured on the sides. From the information of compressive strength values, produced for each group of specimens and each subsequent age of testing is analyzed to obtain the age and strength relationship of concrete made with mixed adhesive of PCC and PPC and concrete with Cement Type I adhesive. For the purposes of drawing conclusions, a discussion involving both tested parameters and related theories is present in the literature. To facilitate an understanding of the discussion, the test results will be displayed in the form of tables and curves.

RESULT AND DISCUSSION

Concrete Test Results

A. The value of slump

The slump value test is intended to determine the degree of viscosity of the concrete mix which can further illustrate the workability of the concrete mixture. The slump test results obtained can be seen in the following table below.

Table 1 The value of concrete slumps

Mixture	Slump value (cm)						
	PCC3	PCC7	PCC15	PCC21	PCC28	PCC56	PCC90
I	4	3	3	5	3	3	3
	PPC3	PPC7	PCC14	PCC21	PCC28	PCC56	PCC90
II	3	3	3	3	6	3	5

From table 1 it can be seen that the slump value occurring is still within the required inteval range of 30 mm - 60 mm, so mixing and molding of concrete can be continued.

B. Strong Press Concrete Characteristics

Calculation of compressive strength using Pres 2.1 and 2.2. Strong Press Mean (Rm) is the sum of compressive strength of the test object divided by the number of specimens (20

ISBN : 978-602-99806-3-9

pieces). The concrete characteristic strength of the concrete (f'c) is calculated by equation 2.3 as described in the calculations using simple statistical analysis, according to the formula in PBI'71.The compressive strength value of the concrete characteristics for each treatment of the adhesive for each test age is shown in Table 2.

C. Age Conversion Rate and Strong Concrete Press

After obtaining the result of strength value, press the concrete characteristic for each cement, then inserted in the concrete compressive strength recapitulation table in the variation of age (3, 7, 21, 28, 56, and 90 days), then calculated age conversion rate against concrete compressive strength age 56 days, shown in table 2 and figure 1.

Table 2 Conversion Rate of Age and Strong Concrete Press

[redacted]

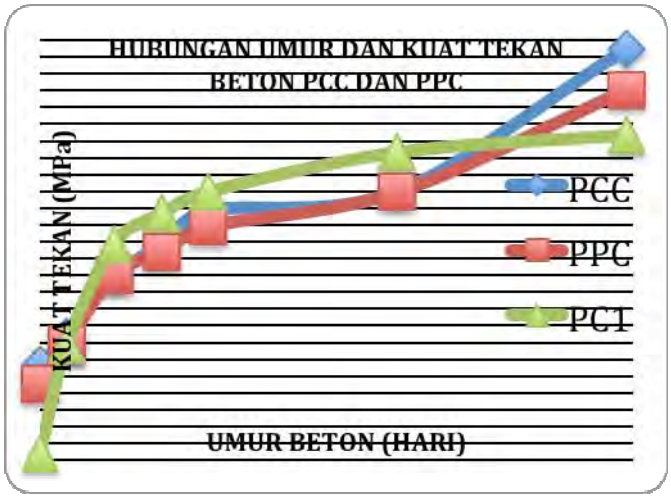


Figure 1 Age and Strength Press Concrete

From table 2 and Figure 1 can be seen some of the concrete behavior of PCC and PPC as follows:

a. At the age of 3, 7, 14, 21, 28, and 56 days the compressive strength values achieved by PCC and PPC concrete are close to the same, in the graph also almost coinciding with the red and blue lines.
b. Stronger characteristic of the plan was achieved at age 56 days with 25,990 MPa and 25,961 MPa values for PCC and PPC concrete. This value is greater than the value of

ISBN : 978-602-99806-3-9

compressive strength of the targeted plan of the calculation of job mix design is 25 MPa.

c. At the age of 90 days the value of compressive strength of PCC concrete characteristics of 34.466 MPa greater than 8% of the value of compressive strength of PPC concrete characteristics of 32.038 MPa.
d. When compared to compressive strength values of PC1 concrete characteristics it is seen that the compressive strength of PCC and PPC concrete characteristics at age 3 and 7 days is greater than PC1 concrete by about 30%. However, at the age of 14, 21, 28, and 56 days of concrete PCC and PPC produce a compressive strength smaller than PC1 concrete. Increased compressive strength of PCC and PPC characteristic concrete is high after 56 days to 90 days. This is also seen in Figure 5.3 the green color curve is above the red and blue color curves.
e. From table 5.6 it can be seen that when using age conversion of compressive strength of PC1 concrete characteristic then at age 3 and 7 days will be produced compressive strength of PCC and PPC concrete characteristics higher than compressive strength of concrete plan (25 MPa). But at the ages of 14, 21, and 28 days yield a lower compressive strength characteristic than the compressive strength of the plan. This is the answer to the field practitioner's question as to why at the early age of the test specimen they tested yielded a compressive strength higher than the compressive strength required in the planning.

CONCLUSIONS

From the above data can be concluded several things as follows:

a. The material of sand and gravel concrete formers meets the applicable requirements; sand enter zone 2 mud content below 5%, gravel gradation max 20 mm, mud content below 12%.
b. The slump value of the concrete mixture is obtained in a range that meets the requirements of 30 mm-60 mm
c. Strong targeted target characteristics achieved at age 56 days, for both types of concrete; PCC with 25,990 MPa and PPC of 25,961 Mpa
d. Age Conversion Rate and Strong Press The characteristics for PCC cement adhesive are 0.60, 0.67, 0.80, 0.88, 0.96, 1.00, and 1.33 according to age 3, 7, 14, 21 , 28, 56, and 90 days
e. Age Conversion Rate and Strong Press The characteristics for PPC cement adhesives are 0.56, 0.65, 0.81, 0.86, 0.92, 1.00, and 1.23 by age 3, 7, 14, 21 , 28, 56, and 90 days

ACKNOWLEDGMENT

The author would like to thank to all partners and technicians in Politeknik Negeri Bali who helped us during the research since the beginning.

REFERENCES

[1] Angraini R, 2004, *Pengaruh Perubahan Temperatur Terhadap Senyawa Kimia Pada Beton Mutu Tinggi Dengan Silica Fume*, Universitas Merdeka, Malang
[2] Anonim, 2008, *Potensi Bangunan,* www_pertambangan-jatim
[3] Anonim,1987, *Teknologi Bahan* , DepDikBud PEDC, Bandung
[4] Anonim,2002, *Tata Cara Perhitungan Struktur Beton Untuk Bangunan Gedung SNI 03-2847-2002*, Badan Standardisasi Nasional, Jakarta.
[5] Anonim,2004, *Semen portland SNI 15-2049-2004*, Badan Standardisasi Nasional, Jakarta.

ISBN : 978-602-99806-3-9

[6] Anonim,2004, *Semen portland pozolan SNI 15-0302-2004*, Badan Standardisasi Nasional, Jakarta.
[7] Barkiah I, 2003, *Studi Laju Peningkatan Kekuatan Tekan Beton yang memakai Abu Terbang*, Fakultas Teknik Unlam, Banjarmasin
[8] Bermansyah S, 2002, *Sifat mekanis Beton Mutu Tinggi Dengan Campuran Copper Slag Sebagai Cementitious Material,* Teknik Sipil Universitas Syiah Kuala.
[9] Hadi S., 2004, *Analisa Regresi*, Andi, Yogyakarta.
[10] Kusuma G. H., 1994, *Pedoman Pengerjaan Beton*, Erlangga, Jakarta
[11] Muljono T, 2004, *Teknologi Beton*, Andi, Yogyakarta
[12] Murdock, L.J. dan Brook, K.M. 1991. *Bahan dan Pratek beton*. terjemahan Stephanus Hendarko. Jakarta: Erlangga.
[13] Nugraha P, 2007, *Teknologi Beton Dari Material, Pembuatan, Ke Beton Kinerja Tinggi*, Universitas Kristen Indonesia, Andi Offset, Yogjakarta.
[14] Salain I.M.A.K., 2007, *Kekuatan Serta Produk Hidrasi Dari Campuran Terak Tanur Tinggi Dan Abu Terbang Yang Dihasilkan Melalui Teknologi Pembakaran Bantalan Yang Difluidasi,* Prosiding Konferensi Nasional Pengembangan Infrastruktur Berkelanjutan, Program Magister Teknik Sipil Fakultas Teknik Universitas Udayana, Hotel Sahid, Kuta, Bali.
[15] Stanislaus S.U. 2006. *Pedoman Analisis Data Dengan SPSS*. Graha Ilmu. Yogyakarta
[16] Sugiyono. 2006, *Statistika Untuk Penelitian*. CV Alfabetha. Bandung
[17] Sunaryo G, 2007, *Rancangan Campuran Batu Padas Buatan Jenis Kelating Dengan Memanfaatkan Limbah Batu Tabas*, Tesis Magister Teknik Sipil Universitas Udayana, Denpasar.
[18] Tjokrodimuljo K, *Teknologi Beton*, Fakultas Teknik Universitas Gajah Mada,Yogjakarta.
[19] Wibowo FX. N dan Bintari, 2000, *Pengaruh Perawatan Uap Air Pada Beton Dengan silica Fume*, Teknik sipil Universitas Atma Jaya, Yogyakarta.
[20] BS dan Coull, A, 1991, *"Tall Building Structures : Analysis And Design"*, Jhon Wiley & Sons, Inc., Edisi Kedua
[21] Taranath BS, 1998, "*Steel, Concrete, and Composite Design of Tall Building",* McGraw-Hill, Second Edition.
[22] SNI 03 6825 2002. *Metode pengujian kekuatan tekan mortar semen Portland untuk pekerjaan sipil*.
[22] SNI 15 3758 1995. *Semen Aduk Mortar Pasangan*.

ISBN : 978-602-99806-3-9

The Effect of Gel Coat Layer Composition on Bending Strength of Kenaf Fiber Reinforced Polymer

Ahmad Haya[1] and Mardiana Amir [2]
[1]Department of Mechanical Engineering, Politeknik Neg. Ujung Pandang, Indonesia
[2]Department of Civil Engineering, Politeknik Neg. Ujung Pandang, Indonesia

[1]ahmadcharmyhaya@gmail.com, [1]mardiana.amir@yahoo.com

Abstract. This research was a report of the effects of the gel coat against bending stress kenaf fiber composite/polyester before and after immersed in sea water. The research method that was applied in this study is by immersing the test specimen using a composite absorption for 1 to 6 months followed by bending test. The results were compared between the gel coat code K1, K2, K3, K4 and K5. The results showed that the most excellent bending stress was containing gel coat 0:35 Reolosil QS-102 kg with 10 kg of resin SHCP 268BQTN (K2) with the value of the bending stress is 19.98 MPa after immersed for 6 months. Bending stress before immersed is 43.1299 MPa, imply that it was decreased by approximately 53.6%, compared with other compositions that decrease to 54.1% (K3). The effect of the composite surface before and after immersed was analyzed by Scanning Electron Microscopy (SEM).

1. Introduction

Kenaf Fibres derived from fiber tree called kenaf tree (Fig. 1) or in the Latin is named Hibiscus cannabinus Lynn. It is a species of plant origin from African countries [1-5]. Kenaf is widely cultivated for jute sacks of raw materials, raw materials and textile yarn fabrics, even for a car bumper beams [6-8]. Kenaf Fibres have been widely cultivated in several countries in the world such as Indi a, Bangladesh, Thailand, parts of Africa, southeast Europe and Malaysia [9]. In Malaysia, the government through the National Research and Development Program of the National Kenaf, allocating funds starting in 2006 - 2010 with amount of RM 12 million for industrial purposes such as kenaf-based applications for automotive products, food packaging, furniture and sports equipment [10]. Currently there is a demand for these fibers used as reinforcement for the polymer [11]. One thing is a shortage of kenaf fibres to water absorption is very large [12]. From this reason that in this study the manufacture of composite with kenaf fibres coated with a gel coat surface to reduce water absorption. This research is started to use kenaf fibre composites / polyester products used for applications in aqueous media.

There are many studies that examine the kenaf fibre strength. Shinichi et al [13] developed the biocomposite boards that are lighter and more resilient by using kenaf fibres in biaxial directions, and polypropylene fibres. . The elastic modulus is measured to determine the effect of the number of layers of kenaf and heating time. From these studies, it showed that the optimum weight fraction of kenaf showed maximum flexural modulus, decreases with the decrease in bulk density. Development of thermoplastic elastomer composites reinforced with 20 vol.% Kenaf fibres. Two types of effect modifier mixed with polypropylene (PP), namely; thermoplastic natural gums (TPNR) and polypropylene / ethylene-propylene-diene-monomer (PP / EPDM). The presence of kenaf fiber (KF) has significantly increased tensile strength / PP EPDM about 81% while only 55% of the increase achieved in

ISBN : 978-602-99806-3-9

TPNR-KF-Mapp compared with TPNR principle without reinforcement. In addition, the flexural strength and excellent impact strength.

Figure 1. Tree Kenaf (Hibiscus cannabinus Lynn)

2. Research methodology

2.1 Materials and specimens preparation.

The used Polyester material is divided into two parts, one is used to make the gel coat and the other is used for the manufacture of composite kenaf fibres.

The used Kenaf Fibres has a density value of 56.68 kg / m3 with Randomly oriented discontinuous fibre types. This type of composite short fibers are scattered at random among the array of rows and columns (matrix). To create a composite with kenaf fibers used polyester resins (Highpolymer Chemical Products Singapore Pte Ltd) types SHCP 268BQTN. Especially for create a gel coat used Reolosil QS-102 and Resin SHCP 268BQTN with a specific composition. In this study used five types of gel coat with different compositions as shown in Table 1. Reolosil used is a product of Huaqiang FRP International Trading Co., Ltd. With a density value of 50 g / Ltr. The specimen surface is coated with a gel coat thickness of 0.5 to 0.6 mm in order to protect the surface from water penetration. Results of this study as the materials that will be applied to the product engineering materials that are used in sea water as boats and for others purposes.

Table 1: Mixed content gel coat and resin SHCP 268BQTN 10 kg

No.	code	Reolosil QS-102
1	K1	0.35
2	K2	0.3
3	K3	0.25
4	K4	0.2
5	K5	0.175

2.2 Flexural strength test

Flexural strength is the highest voltage experienced in the materials at the point of rupture. Tensile strength test specimens prepared in accordance with ASTM D790 [15]. The specimen is placed in between two pedestal in the range of 65 mm. Bending test performed using a model 4486 Instron machine with a maximum load of 100 KN. Speed suppression of flexure testing machine is 2.0 mm / min.

2.3 Absorption Test.

Absorption test aims to determine the percentages of water absorption during immersed in water. Water used in this study is that sea water with PH 7:05. Immersion the specimen is done in stages starting at 1 month, 3 months and 6 months. Absorption test is done using standard specimens. ASTM D570 with a length of 76.2 mm, 25.4 mm wide and 3.2 mm thick (Fig 2). After immersion and then drying in a drying oven to keep the temperature constant at 30°C. To determine the weight percentage of water absorption in the specimen, weighing done well before the specimen immersed.

ISBN : 978-602-99806-3-9

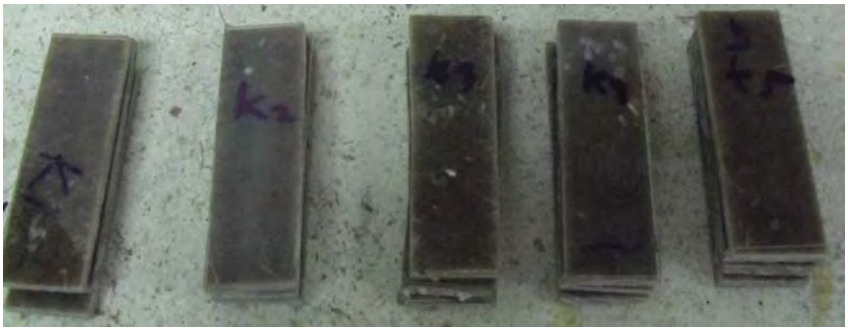


Figure 2. The shape of the absorption of the test specimen

2.4 Morphological tests

Morphological tests of the specimens were performed using Scanning Electron Microscope (SEM, JEOL JSM 6390 LV type) to view the microstructure of the specimens before immersion and after immersion. The Specimen to be investigated are the properties of micro-structure of a given layer of titanium which then inserted into the machine auto fine coater JFC 1600 for 1 hour until the correct coating level of all surfaces has been investigated. After all surfaces are coated with titanum and then the specimen is ready to be investigated on the testing machine of SEM. After all surfaces are coated with titanum then the specimen is ready to be investigated using SEM.

3. Results and Discussion

Table 2: Strength of the maximum bending composite kenaf fiber / polyester gel coat composition of 5 immersed in sea water.

Kod	Immersion time (month)							
	0		1		3		6	
	σ (MPa)	μ(mm)	σ (MPa)	μ(mm)	σ (MPa)	μ(mm)	σ (MPa)	μ(mm)
K1	43.13	2.00	31.26	1.47	17.39	1.44	16.68	1.33
K2	47.73	2.00	32.26	2.00	24.08	1.65	23.42	1.29
K3	42.54	2.22	26.19	1.59	21.62	1.72	19.75	1.40
K4	41.37	1.14	27.91	1.69	20.29	1.42	17.33	1.50
K5	41.90	1.88	23.79	1.60	20.44	1.62	19.28	1.34

From table 2 it can be seen that the value of percentage decrease in flexural strength, K2 is a mixture of gel coat composition of the best of the entire composition of the mixture because K2 has the smallest drop in stress strength up to 6 months of immersion. which only amounted to 50.94% when K3, K5, K4 and K1 respectively is 53.57% decrease in percentages, 53.98%, 58.11%, 61.32%. Before immersion K2 value is 47.73 MPa and after immersion for 6 months flexural strength values K2 is 23:42 MPa.

From Fig. 3 can be seen that the results obtained change between the decrease in flexural strength began immersion 1 month to 6 months for all compositions between K1, K2, K3 K4 and K5. This happens because of the presence of molecules of salt in sea water (particularly sodium chloride) can accelerate the spread of water absorbed in the composite material, therefore, the specimen absorb a higher water content. Besides that it can be seen from the graph that the impression of the gel coat composition does not significantly affect the results that obtained for flexural strength.

ISBN : 978-602-99806-3-9

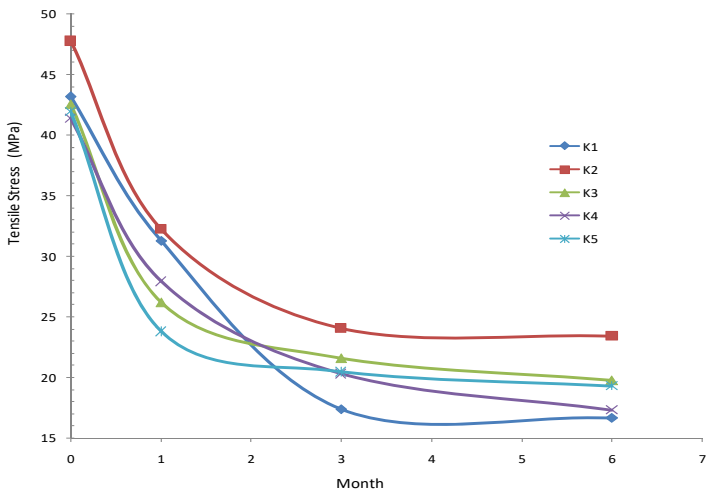
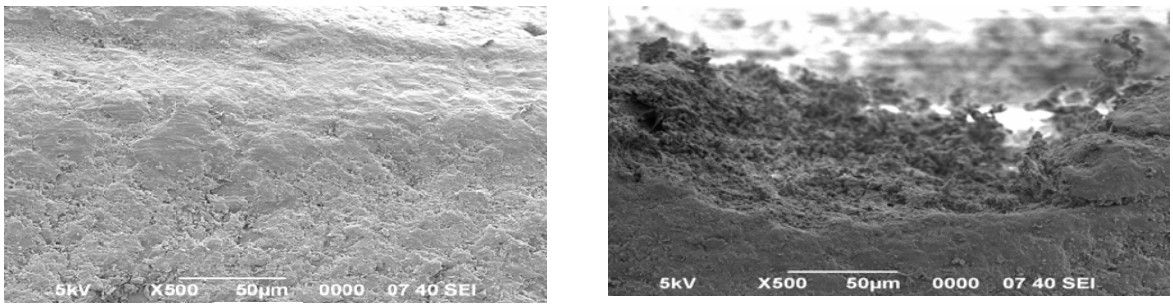


Figure 3. Differences decrease the maximum bending stress for K1 to K5 composite kenaf fiber / polyester before and after immersion in sea water for 6 months

Physically used kenaf fiber is very homogeneous but because kenaf fibers are cellulose, it creates a kenaf fiber that becomes stronger because cellulose is not strong enough to pull the OH hydroxyl groups present in the polyester ester compound. Nevertheless it can be seen that the percentage of stage K2 has the smallest decrease in flexural strength compared to the gel coat composition to another.

In addition, when viewed from the aspect of flexural strength it decrease as shown in figure 3 that the very large reduction in bending strength after immersion valid for a month. It is thus a paddock kenaf fiber is a cellulose fiber which when mixed with the ester compound is not very strong bond OH hydroxyl groups because compounds similar to cellulose ester compound. In theory if the same compound, the smaller reacting hydrogen bonds formed [14] .This will cause a weakness on kenaf fiber composites thus when immersed in water molecules it would easily fit that can lead to reducing the fiber strength. After the kenaf fiber reaches saturation stage, power will decline gradually as of immersion at 1 month to 3 months and to 6 months. It can also be proved by looking at the observations in Scanning Electron Microscopy as in figure 4a. And 4b and absorption of the test results.

In the absorption testing it can be obtained results as shown in Table 3. In Figure 6 it can be seen that in general for all concentration, gel coat on kenaf fiber composite specimen / polyester is increased in the increased percentage in weight before immersed up after immersion for 6 months at sea.



(a) (b)

Figure 4. (a). SEM results kenaf fiber composites before immersion in sea water, (b) SEM Results kenaf fiber composites after immersion in seawater

From Table 3 and Figure 5, it shows that the percentage increase in weight of K2 is smaller than the value of the overall increase in weight of the gel coat other concentrations. Starting from the prior immersed upto soaked for 6 months. After soaking one month, the percentage of gain K2 is 0.006%,

ISBN : 978-602-99806-3-9

while after soaking 6 months worth of percentages of weight gain K2 immersion becomes 0.040%. where the percentage increase in weight of the gel coat composition to the other until immersion of 6 months each K1, K3, K4 and K5 is 0.051%, 0.0501%, 0.050% and 0.050%.

Table 3: percentages of weight gain specimen composite gentian kenaf / polyester gel coat composition of 5 immersed in the sea

code	Month (%)		
	1	3	6
K1	0.011	0.046	0.051
K2	0.006	0.030	0.040
K3	0.015	0.033	0.051
K4	0.012	0.043	0.050
K5	0.016	0.036	0.050

In general, the enactment of the percentage increase in weight which caused by immersion that creates a composite gradually cracked and broken, Transportation water molecules through micro cracks become active. Water molecules are actively attacking the face, causing debonding of the fiber and the matrix [14]..

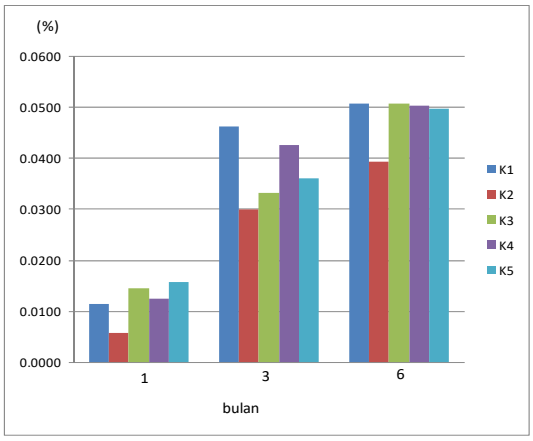


Figure 5. Differences percentage weight increase due to immersion water to the composition of the K1 to K5 composite kenaf fiber / polyester soaked in sea water after being soaked up to 6 months.

4. Conclusion and Discussion

Effect of the concentration of gel coat on the surface of the composite after immersion ranging from 1 month to 6 months will affect the mechanical properties such as flexural strength. It can be seen that the longer the immersion, the bending strength of the composite material kenaf fiber / polyester that was declining even from month 3 to month 6 was not too significant. The best Intensity flexural strength obtained on the composition of the gel coat with code 2 (K2 compared Reolosil QS 102: Resin SHCP 268BQTN was 0.3 kg: 10 kg). However, the effect of the gel coat is not too significant for the difference in flexural strength whether before immersion or after immersion. This is an evident from the results of the tests in which the values of the percentage decrease in the flexural strength is not too much difference between the composition of the K1, K2, K3, K4 and K5.

Decrease in flexural strength is directly proportional to the high absorption of the composite during immersion, the longer absorption that occurs then the flexural strength of specimens decreased too. It is influenced by the swelling surface through saturated saturation, resulting in damage to the surface and causing pervasive water in the composite structure.

ISBN : 978-602-99806-3-9

5. Acknowledgements

The authors would like to thank the Laboratory of Material Mechanical Engineering Polytechnic Ujung Pandang who have helped in pemngujian strength. The authors too wish to thank the Ibn Sina Institute of the Faculty of Mathematics and Natural Sciences Chemistry Program at UTM Malaysia in testing SEM.

References

[1] J. A. M. Mohd Edeerozey, Hazizan Md Akil, A.B. Azhar, M.I. Zainal Ariffin, Chemical modification of kenaf fibers. Materials Letters. 61 (2007) 2023 - 2025.

[2] C.I. Ogbonnaya , H. Roy-Macauley, M.C. Nwalozie , D. J.M. Annerose, Physical and histochemical properties of kenaf (Hibiscus cannabinus L.) grown under water deficit on a sandy soil. Industrial Crops and Products. 7 (2007) 9-18.

[3] N. R. Gita , S. Bambang, R. B. Catherine, Brian S. Baldwin , *Frost kill and kenaf fiber quality* Industrial Crops and Products. 19 (1999) 189 - 195.

[4] Hongqin Yu , Chongwen Yu, *Study on microbe retting of kenaf fiber*. Enzyme and Microbial Technology. 40 (2007) 1806 - 1809.

[5] J.J. Lips Steef, Goretti M. In˜ iguez de Heredia, G.M.Richard , Jan E.G. van Dam, *Water absorption characteristics of kenaf core to use as animal bedding material.* industrial crops and products. 29 (2009) 73 - 79.

[6] Sastrosupadi Adji , Santoso Budi, Sudjidro, *Cultivation of Kenaf (Hisbiscus cannabinus L.)*, M. Balittas (2004) 1 – 14.

[7] Sudjindro, Opportunities and Challenges of Natural Fiber Utilization of plants as raw materials in Indonesian Textiles, M. Balittas. (2004) 1 - 11.

[8] M.M. Davoodi, S.M. Sapuan, D. Ahmad, Aidy Ali, A. Khalina, Mehdi Jonoobi, Mechanical properties of hybrid kenaf/glass reinforced epoxy composite for passenger car bumper beam, Material and Design. 31 (2010) 4927- 4923.

[9] C.W. Chin, B.F. Yousif, Potential of kenaf fibres as reinforcement for tribological applications, Wear. 267 (2009) 1550–1557.

[10] S. Rassmann, R.G. Reid , R. Paskaramoorthy, Effects of processing conditions on the mechanical and water absorption properties of resin transfer moulded kenaf fibre reinforced polyester composite laminates, composite :Part A. 41 (2010) 1612 – 1619.

[11] T. Nishino, K. Hirao, M. Kotera, K. Nakamae, H. Inagaki, *Kenaf reinforced biodegradable composite,* Composites Science and Technology. 63 (2003) 1281–1286.

[12] S. Rassmann, R.G. Reid , R. Paskaramoorthy, Effects of processing conditions on the mechanical and water absorption properties of resin transfer moulded kenaf fibre reinforced polyester composite laminates, Composites: Part A. 41 (2010) 1612–1619.

[13] S. Shinichi , C. Yong , F. Isao , Lightweight laminate composites made from kenaf and polypropylene fibres. Polymer Testing. 25 (2006) 142 - 148.

[14] H. Anuar, A. Zuraida, Improvement in mechanical properties of reinforced thermoplastic elastomer composite with kenaf bast fibre. Composites: Part B. 42 (2011) 462 – 465.

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

On the classical aspects of electrons tunnelling through a quantum dot via a driven lattice gas model in one dimension

[1]Hammada*, [2]Muh. Yamin, [3]Yusran, [4]Nur Wahyuni

[1]Department of Physics Education, Widya Mandala Catholic University, Surabaya, 60114, Indonesia

[2]Department of Physics Education, Faculty of Mathematics and Natural Sciences, Universitas Negeri Yogyakarta, Karangmalang Complex, Yogyakarta, 55281, Indoneisa

wipsarian@uny.ac.id

Abstract. A theoretical study of classical aspects, i.e.: density, current density, and average speed of electrons tunnelling through a quantum dot (QD) via a simple driven lattice gas model have been carried out. The study is conducted by considering a resemblance between the components of the QD with the components of the totally asymmetric simple exclusion process (TASEP) that consists of only a single site and open boundary conditions. The former consists of a source, an island, and a drain, which corresponds respectively to the left reservoir (i = 0), site i = 1, and the right reservoir (i = 2) of the latter. Explicit expressions of the density, current densities, and average speed for electrons tunnelling through the QD in the classical regime are obtained. At the steady state, the density of electrons tunnelling through the dot is 0.5 and the current density becomes $v/2$, where v is the speed of the electrons. Furthermore, the speed of the electrons may be obtained as functions of temperature and the difference between gate and source-drain potentials. For very low temperatures, the speed of electrons rapidly goes to zero pointing to the occurrence of Coulomb blockade.

1. Introduction

Nowadays, nanomaterial such as quantum dot (QD) have attracted much attention because of their superior electronic, optical, and magnetic properties due to confinement effects [1,2]. A confinement of an electron in all its three spatial coordinates is designated as a QD. A QD is a mesoscopic system which resembles an atom although it is tens or hundreds times bigger than an actual atom, e.g. the Zeeman Effect and discrete energy levels [3], hence entitling the QD as an artificial atom [4]. Another interesting feature is that its physical properties depend on the voltage applied to the dot, whereas an atom depends upon its valence electrons. The QD has been a subject of various applications including optical and optoelectronic devices [5,6], quantum computing [7], DNA testing [8,9], three dimensional (3D) imaging [10], and displays [11,12].

There are two mechanisms used in QD, namely Coulomb blockade (Figure 1A) and single electron tunnelling (SET) [Figure 1B] [13,14]. Coulomb blockade occurs when the electrons inside the dot create a strong Coulomb repulsion preventing other electrons to enter the dot. SET is a tunnelling mechanism where a single electron at a time may tunnel through the dot which occurs by varying the gate voltage, V_g. We may think of three components for the aforementioned mechanisms, i.e. a source, an island, and a drain (Figure 1). The source and drain are reservoirs of electrons which are going into and out of the dot (island), respectively. The island is where the electron is trapped inside the dot. The source and drain are associated to their respective electrochemical potentials, i.e.: μ_{source} and μ_{drain}. Both chemical

ISBN : 978-602-99806-3-9

potentials are connected through the source-drain potential, V_{sd}, that is, $eV_{sd} = (\mu_{source} - \mu_{drain})$, where e is the electron unit of charge. The Coulomb blockade and SET are realized by differences in values between μ_{source}, μ_{drain}, and $\mu(N)$, where the latter is the chemical potential of N electrons inside the island.

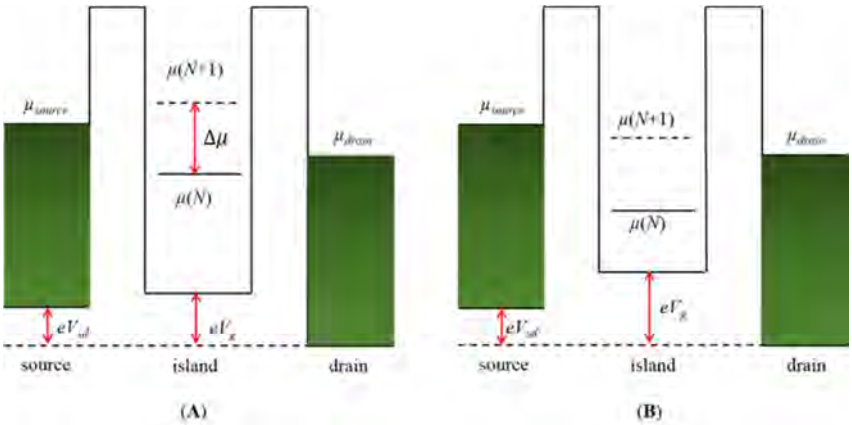


Figure 1. The energy diagram of a QD. (A) is the Coulomb blockade and (B) is the SET.

A standard mathematical model which can be utilized to study many physical properties of dynamical systems is the totally asymmetric simple exclusion process (TASEP) in one dimension (1D). This is a simple driven lattice gas model where hard-core particles occupying a discrete lattice sites, $i \in L$, may jump to their respective right-nearest neighbour sites, $(i + 1) \in L$, provided that the right-nearest neighbour sites are not occupied by any other (hard-core) particle. The jumping of particles is defined by hopping rules, which usually takes the sequential or parallel up-dating dynamics. The TASEP is also equipped with boundary conditions, which may be open or periodic. Furthermore, the model is a renowned particle hopping model [15] which is employed to investigate various transport phenomena, such as protein synthesis [16], motor protein in organism [17], the track of a group of insects [18], and road traffic congestions [19].

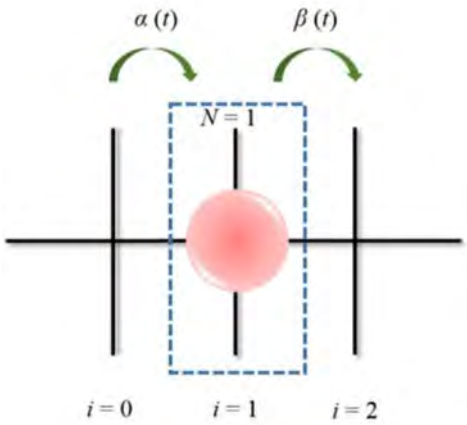


Figure 2. The TASEP that consists of only a single site, i.e.: $N = 1$.

The dark vertical lines are lattice sites labelled by $i = 0, 1, 2$. Site $i = 0$ and $i = 2$ are reservoirs of particles where a hard-core particle (pink coloured dot) jump into and out of the system, $i = N = 1$ (blue dashed rectangular lines), respectively. A hard-core particle may enter site $i = 1$ with an input rate of $\alpha(t)$ and exit the site with an output rate of $\beta(t)$ [green arrows].

ISBN : 978-602-99806-3-9

Here, the TASEP which consists of only a single site (Figure 2) is utilized to study the dynamics of electrons tunnelling through the dot in the SET. This may be considered as the simplest arrangement of the model where only one site is used, i.e.: $i = N = 1$, with N is the total number of sites. The single site is attached to two reservoirs at each end of the site which indicates an open boundary condition. The left (right) reservoir, viz.: $i = 0$ ($i = 2$) allows particles to jump to (out of) the system (site $i = 1$) with input rate $\alpha(t)$ [output rate $\beta(t)$].

In this case, we present an application of TASEP consisting of only a few sites, e.g.: $1 \leq N \leq 3$ which is rarely investigated other than being used to confirm physical theories, let alone applied to model a physical system. It is necessary to emphasize here that this study offers an alternative approach in investigating classical aspects of the dynamics of a mesoscopic system, i.e. QD, through a simple classical dynamical model. However naive it may be, this study brings a new perspective in the relationship between dynamical models providing insights of one model (SET) through the other (TASEP with a single site), or vice versa. The results of explicit expressions for the average speed, density, and current densities of electrons tunnelling through the dot are worth scientific exploration and have not been reported before. This study enriches the many methods in describing the dynamics of electrons inside QD.

2. The Relationship

We may observe a physical resemblance of the TASEP with a single site and the two mechanisms in QD (Table 1). The system (site $i = 1$) of the TASEP represents the dot (island), the reservoirs of the TASEP at site $i = 0$ and $i = 2$ represent the source and drain, respectively.

Table 1. A connection between the components of the TASEP with a single site and QD.

No.	TASEP with a single site	connection	QD
1.	0	$\Longleftrightarrow$	source
2.	1	$\Longleftrightarrow$	island
3.	2	$\Longleftrightarrow$	drain
4.	a particle occupies site $i = 1$	$\Longleftrightarrow$	an electron inside the dot
5.	a particle jumps through site $i = 1$	$\Longleftrightarrow$	an electron tunnelling the dot

The single particle occupation in site $i = 1$ of the TASEP is due to the hard-core inter-atomic potential between particles. This potential is obtained via a purely infinite repulsive potential between the centres of two particles until a certain inter-atomic distance. Beyond this distance, the particles are non-interacting. Hence, no other particle may occupy site $i = 1$ if the site is occupied by a particle. However, the nature of the Coulomb blockade and SET is completely different from that of the hard-core potential. In the QD, the movement or confinement of an electron is caused by chemical potential differences between the source, island, and drain, through the applied voltages. However, the two models look similar in the sense that there is only a single particle (electron) that may enter or exit the site (dot). Hence, the confinement (tunnelling) of a single electron in the dot is somewhat similar to a classical particle occupying (jumping out of) the lattice sites in the TASEP. Therefore, a connection can be constructed between TASEP, Coulomb blockade, and SET.

The intended relationship is realized in two stages. First, a relationship between the hard-core lattice gas model [20], the Coulomb blockade, and SET is constructed. Here, two species of hard-core particles are used, i.e. monomer and dimer. A monomer is a particle that excludes its own site, whereas a dimer is a particle that excludes its own and its right-nearest neighbour sites. Thus, the monomer corresponds to an electron that is confined in the dot, while the dimer corresponds to an electron that is tunnelling into and out of the dot. The results are static densities of the monomer and dimer in terms of the applied voltages of the QD. A physical understanding of these densities may be acquired by connecting them to

ISBN : 978-602-99806-3-9

the TASEP with a single site in the second stage of the relationship. At this point, the monomer is associated to the particle occupying site $i = 1$ and the dimer is associated to the particle going into or out of site $i = 1$ of the TASEP. The densities of the monomer and dimer can then be associated to the density and current density of the TASEP, respectively [21]. Hence, giving the final results of the density of an electron confined in the dot and the current density of the electron tunnelling through the dot (Table 1).

3. Density, Current Density, and Average Speed of Electrons Tunnelling through a QD

The Following the above connection, we may obtain a continuity equation, i.e. [22]:

$$\frac{\partial \rho(t)}{\partial t} = J_{\mathrm{st}}(t) - J_{\mathrm{dd}}(t), \tag{1}$$

where $\rho(t)$ is the density of an electron in the dot at time t which gives the average occupancy of electrons in the dot,

$$J_{\mathrm{st}}(t) = \exp\left[\frac{e}{k_{\mathrm{B}}T}\left(V_{\mathrm{g}} - V_{\mathrm{sd}}\right)\right]\rho_{\mathrm{s}}(t)\left(1 - \rho(t)\right), \tag{2}$$

is the current density of the electron entering the dot from the source, $\rho_{\mathrm{s}}(t)$ is the density of electrons in the source at time t,

$$J_{\mathrm{dd}}(t) = \exp\left[\frac{e}{k_{\mathrm{B}}T}\left(V_{\mathrm{g}} - V_{\mathrm{sd}}\right)\right]\rho(t)(1 - \rho_{\mathrm{d}}(t)), \tag{3}$$

is the current density of the electron exiting the dot to the drain, and $\rho_{\mathrm{d}}(t)$ is the density of electrons in the drain at time t. It may be observed that the current densities of the electron depend upon V_{g} and V_{sd}. Furthermore, by setting the input and output rates as

$$\alpha(t) = \exp\left[\frac{e}{k_{\mathrm{B}}T}\left(V_{\mathrm{g}} - V_{\mathrm{sd}}\right)\right]\rho_{\mathrm{s}}(t), \tag{4}$$

and

$$\beta(t) = \exp\left[\frac{e}{k_{\mathrm{B}}T}\left(V_{\mathrm{g}} - V_{\mathrm{sd}}\right)\right]\left(1 - \rho_{\mathrm{d}}(t)\right), \tag{5}$$

respectively, we may modify equations (2) and (3) to become

$$J_{\mathrm{st}}(t) = \alpha(t)[1 - \rho(t)], \tag{6}$$

and

$$J_{\mathrm{dd}}(t) = \beta(t)\rho(t), \tag{7}$$

respectively. Equations (6) and (7) give a simpler form of the current densities of electrons that depend explicitly only on the density of electrons in the dot and the input and output rates. Here, the dependency

ISBN : 978-602-99806-3-9

of the current densities upon time, t, is through the density and the input and output rates. In order that the current density of electrons only depends upon the applied voltages, we may set $\rho_s(t) = 1.0$ and $\rho_d(t) = 0.0$. This indicates that at any time t, the source will always be filled with electrons and the drain will always be empty. Thus we may obtain the average speed of electrons tunnelling through the dot as

$$v = \exp\left[\frac{e}{k_B T}\left(V_g - V_{sd}\right)\right], \tag{8}$$

which is time-independent and depends upon the temperature and the difference between the applied potentials. Hence, equations (6) and (7) becomes

$$J_{st}(t) = v[1 - \rho(t)], \tag{9}$$

and

$$J_{dd}(t) = v\rho(t), \tag{10}$$

where now the time dependency of the current densities only comes from the density of the electron in the dot. Equations (1), (9), and (10) determine the evolution of the density of electrons in the dot. This indicates that the density of electrons at any time may be obtained via the current densities by formally solving equation (1).This may be attained by inserting equations (9) and (10) into equation (1), giving:

$$\frac{\partial \rho}{\partial t} = v[1 - \rho] - v\rho = v[1 - 2\rho]$$

or

$$\int \frac{\mathrm{d}\rho}{1 - 2\rho} = \int_{t_0}^{t} v \, \mathrm{d}t.$$

Solving the LHS of the above integral via a substitution method produces an explicit expression for the density as a function of time, viz.:

$$\rho(t) = \frac{1}{2}\left[1 - e^{-2v(t - t_0)}\right]. \tag{11}$$

Furthermore, substituting equation (11) back into Equations (9) and (10), yields

$$J_{st}(t) = \frac{v}{2}\left[1 + e^{-2v(t - t_0)}\right], \tag{12}$$

ISBN : 978-602-99806-3-9

and

$$J_{\mathrm{dd}}(t) = \frac{v}{2}\left[1 - e^{-2v(t-t_0)}\right]. \tag{13}$$

Equations (11), (12), and (13) are a set of explicit equations that describe the dynamics of the electrons moving through the dot.

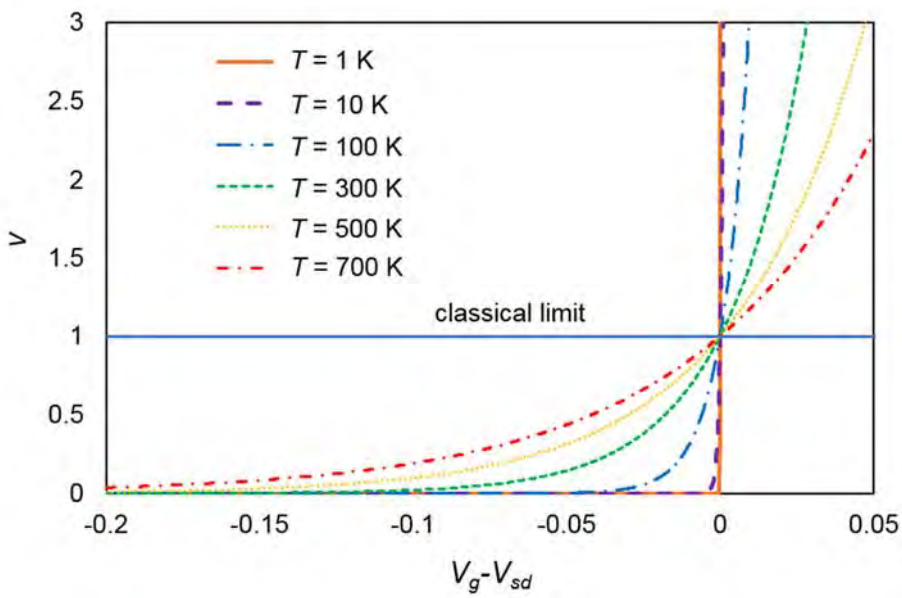


Figure 3. The average speed of electrons as functions of the applied potential differences, $V_g - V_{sd}$, at various temperatures, T.

First, we may plot the average speed of electrons in equation (8) against the difference of the applied potentials with temperature variations. This is given in Figure 3. The classical limit is obtained if the temperature is very high, i.e. $T \to \infty$, such that $v \to 1$, which is shown as a straight (blue) line. In this regime, the thermal fluctuations dominate over quantum events such that the speed of electrons is not affected by V_g - V_{sd}. As the temperature is decreased the speeds become an exponential form with respect to V_g - V_{sd} consistent with Equation (8) and passing through a vertical line of $V_g = V_{sd}$ at $v = 1$. For the region of $V_g < V_{sd}$, as V_g becomes smaller (compared to a constant value of V_{sd}) v reduce to zero indicating the occurrence of Coulomb blockade. Accordingly, the density and current densities of electrons in Equations (11) - (13) become $\rho = J_{st} = J_{dd} = 0.0$. This means that an equilibrium condition is achieved where an electron may not enter the island (dot). Moreover reducing the temperature increases the region of $V_g - V_{sd}$ where the Coulomb blockade may occur, hence shifting the 'switch' between Coulomb blockade and electrons tunnelling or vice versa to smaller values of $|V_g - V_{sd}|$. For very low temperature, the 'switch' is located at $V_g = V_{sd}$, i.e. for $V_g < V_{sd}$, $v = 0$ (Coulomb blockade), and $V_g > V_{sd}$, $v \to \infty$ (electrons tunnelling). For the region of $V_g > V_{sd}$ only electron tunnelling takes place as $v \neq 0$. Lowering the temperature in this region increases the speed of the electrons and at very low temperatures $v \to \infty$. However, as $v \to \infty$, the current densities tend to infinite as well (J_{st}, $J_{dd} \to \infty$), but the density remains finite ($\rho = 0.5$).

For some long evolution time, i.e. $t \to \infty$, Equations (11) – (13) may achieve a steady state condition where the density does not depend again upon time, i.e.: $\rho = 0.5$, and $J_{st} = J_{dd} = v/2$ does not vanish, as shown in Figure 4. This implies that at steady state the dot (island) has half a chance in average of being

ISBN : 978-602-99806-3-9

occupied by an electron or being empty. This is of course in accordance with the SET where electrons may alternately enter and exit the dot through the source and drain, respectively. Hence, the SET may be thought of being in a non-equilibrium steady state (NESS) condition with a non-vanishing current of $v/2$. It may also be observed in Figure 4(a) that increasing the speed of the electrons tunnelling through the dot causes the system to reach NESS faster.

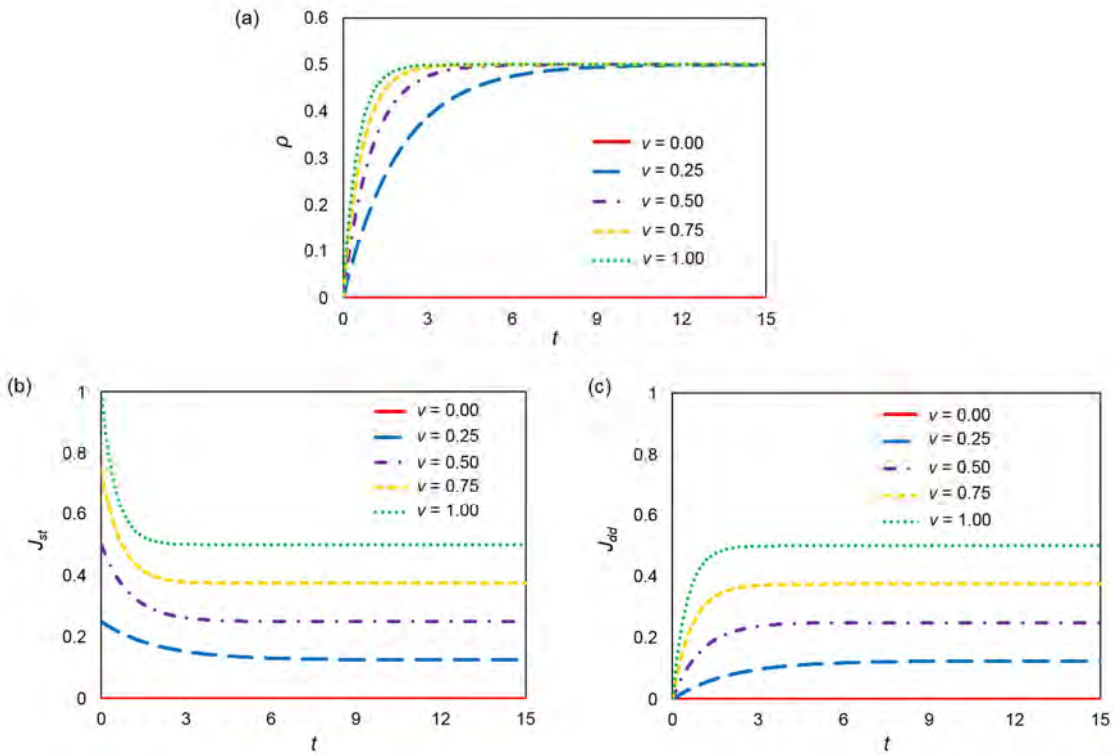


Figure 4. (a) The density of electron in the dot, ρ, (b) the current density of the electron entering the dot from the source, J_{st}, and (c) the current density of the electron exiting the dot to the drain, J_{dd}, as functions of time for various speeds, v.

4. Conclusion

Explicit classical expressions of the density, current densities, and the average speed of electrons tunnelling through a QD are obtained. This may be realized using a relationship between the TASEP with a single site and the QD through the hard-core lattice gas model. The density and current densities of electrons are obtained via the density and current density of the hard-core particles of the TASEP with a single site. In steady state, the Coulomb blockade is obtained when the average speed of the electrons is zero, i.e. for low temperatures, such that $\rho = J_{st} = J_{dd} = 0$. SET is an NESS which is attained for $\rho = 0.5$ and $J_{st} = J_{dd} = v/2$, respectively.

Acknowledgement

The authors would like to thank the Faculty of Mathematics and Natural Science of Universitas Negeri Yogyakarta for supporting this research.

ISBN : 978-602-99806-3-9

References

[1] Dosch H 2001 *Applied Surface Science* **182** 192 – 95 doi: 10.1016/S0169-4332(01)00426-3
[2] Chamarro M, Gourdon C, Lavallard P, Lublinskaya O and Ekimov A I 1996 *Phys. Rev. B* **53** 1336 - 42 doi: 10.1103/PhysRevB.53.1336
[3] Dias A C, Fu J, Villegas-Lelovsky L and Qu F 2016 *Phys: Condens. Matter* **28** 375803 DOI: 10.1088/0953-8984/28/37/375803
[4] Alivisatos A P 1996 *Science* **271** 933-37 doi: 10.1126/science.271.5251.933
[5] Song J, Li J, Li X, Xu L, Dong Y and Zeng H 2015 *Adv. Mater* **27** 7162-67 doi: 10.1002/adma.201502567
[6] Sugawara M, Hatori N, Ishida M, Ebe H, Arakawa Y, Akiyama T, Otsubo K, Yamamoto T and Nakata Y 2005 *Phys. D: Appl. Phys.* **38** 2126-34 doi: 10.1088/0022-3727/38/13/008
[7] Loss D and Di Vincenzo D P 1998 *Phys. Rev. A* **57** 120-6 doi: 10.1103/PhysRevA.57.120
[8] Goldman E R, Clapp A R, Anderson G P, Uyeda H T, Mauro J M, Medintz I L and Mattousi H 2004 *Anal. Chem.* **76** 684-88 doi: 10.1021/ac035083r
[9] Medintz I L, Uyeda H T, Goldman E R and Mattousi H 2005 *Nature Materials* **4** 435-46 doi: 10.1038/nmat1390.
[10] Michalet X, Pinaud F F, Bentolila L A, Tsay J M, Doose S, Li J J, Sundaresan G, Wu A M, Ghambir S S and Weiss S 2005 *Science* **307** 538-44 doi: 10.1126/science.1104274
[11] Jang E 2010 *Adv. Mater.* **22** 3076-80 doi: 10.1002/adma.201000525
[12] Altintas Y, Genc S, Talpur M Y and Mutlugun E 2016 *Nanotechnology* **27** 295604 doi: 10.1088/0957-4484/27/29/295604
[13] Alfarisa S, Dwandaru W S B and Darmawan D 2016 *Makara J. Sci.* **20** 28-32 doi: 10.7454/mss.v20il.5658.
[14] Grabert H and Devoret M H 1992 *Single Charge Tunneling-Coulomb Blockade Phenomena in Nanostructures* NATO Advanced Study Institute Series B: Physics (New York: Plenum Press)
[15] Septiana R, Indriawati A and Dwandaru W S B 2014 *Makara J. Sci.* **18** 79-85 doi: 10.7454/mss.v18i3.3719
[16] Zia R K P, Dong J J and Schmittman B 2011 *J. Stat. Phys.* **144** 405 doi: 10.1007/s10955-011-0183-1
[17] Chowdhury D, Schadschneider A and Nishinari K 2005 *Physics of Life Reviews* **2** 318-52 doi: 10.1016/j.plrev.2005.09.001
[18] Chowdhury D et al. 2007 *Traffic Phenomena in Biology: from Molecular Motors to Organisms* In: Schadschneider A, Poschel T, Kuhne R, Schreckenberg M, Wolf D E (eds) Traffic and Granular Flow ’05 (Berlin: Springer)
[19] Helbing D 2001 *Rev. Mod. Phys.* **73** 1067 doi: 10.1103/RevModPhys.73.1067
[20] Laufente L and Cuesta J A 2002 *J. Phys.: Condens. Matter* **14** 12079-97 doi: 10.1088/0953-8984/14/46/314
[21] Dwandaru W S B and Schmidt M 2007 *J. Phys. A: Math. Theor.* **40** 13209-15 doi: 10.1088/1751-8113/40/44/002
[22] Dwandaru W S B and Darmawan D 2016 *Advanced Studies in Theoretical Physics* **10** 23-32 doi: 10.12988/astp.2016.51098

ISBN : 978-602-99806-3-9

Strength and fatigue testing of orthotropic metal added sic using stir casting method

[1]Hammada*, [2]Muh. Yamin, [3]Yusran, [4]Nur Wahyuni

[1,2,3] Mechanical Engineering Department, Universitas Hasanuddin
[4] Mechanical Engineering Department, Politeknik Negeri Ujung Pandang
[1,2,3]Jl. Perintis kemerdekaan km 10, Makassar, Indonesia
[4]Jl. Perintis kemerdekaan km 10, Makassar, Indonesia

email : hammada.abbas@yahoo.com

Abstract. This study aims to determine the strength and fatigue of orthotropic metal plus SiC amplifier with variation of 5%, 10% and 15% SiC composition using stir casting method.
The research method used to test the composition, metallographic test, strength strength test and fatigue test on orthotropic metal plus SiC amplifier with variation of 5%, 10% and 15% SiC composition using stir casting method with casting temperature used 720 ° C.
Specific targets to be achieved produce materials that have high corrosion resistance, abrasion, tenacious and resilient.
Keywords: Orthotropic Metals, Strength, Fatigue.

INTRODUCTION

Orthotropic Metals are two or more metallic blends used to improve mechanical properties, capable of casting, capable of welding and corrosion resistance so as to be used for aerospace applications, marine engineering, automobiles and instrument engineering.

The more industries, especially the automotive industry, the competition is getting tougher to gain market share. To win this market share and competition, producers are competing to find materials that are relatively inexpensive, powerful, lightweight, and durable.

Materials in particular aluminum live 8% in the earth's crust. Worldwide demand for aluminum is growing 29 million tonnes per year. 22 million tons is new aluminum and 7 million tons of aluminum scrap recycled. It takes 14,000 KWh to produce 1 ton of new aluminum, otherwise it takes only 5% for recycling per tonne of aluminum.

Stir casting process is a casting method that aims to mix pure metal with composite, by melting the pure metal to liquid and then entering the composite in molten metal and stirring with a certain speed and time.

Nur eva (2012), in his research on the physical properties and mechanical properties of al-si-cu alloys by using sand molds, states that its tensile strength increases with decreasing stiffness values. Meanwhile, the impact value indicates including brittle aluminum group.

Hasan Fuadi (2013) in his research by stir casting method on aliphatic Al5Cu matrix composite with 5%, 10 and 15% SiC addition, showed increasing hardness properties and improved wear resistance, this was marked by decreasing wear rate with the addition of composition of SiC amplifier 5%, 10 and 15% .

Anastasia Sahari (2009), adds Mg to the hardness of Al2O3 and Al matrix composites, the result is an increase in optimum hardness of 1221 VHN achieved at 8% wt Mg increase and increased matrix interface reaction.

METHODOLOGY

1.1. Material

The materials used are used pistons made of Al-Si alloy plus SiC amplifier with variation of SiC composition 5%, 10% and 15% SiC, as shown in the picture below.

ISBN : 978-602-99806-3-9

Figure 1.1. Piston Used

1.2. Strength test with tensile test

Machine Universal tensile test is a tool for determining the magnitude of the stress and strain that occurs where the test object with loading is withdrawn until it reaches the broken / broken condition. The steps taken during this tensile test process are as follows:

1. Test preparation
   a. Preparing the test sample.
   b. Smoothing the surface of the sample specimen by using a sandpaper and a velvet fabric that is autosol.
2. Operation
   a. Place the specimen on a universal tensile test machine
   b. Set the desired load and position the dial indicator on a scale of 0.
   c. Turn on the Machine and at the same time pay attention to the indicator on the indicator dial.
   d. Note the assignment of variable values until the specimen is fractured.
   e. Turn off the engine and replace the specimen with the next specimen to be tested.
   f. Repeat steps (a) to step (d) up to all specimens to be tested.

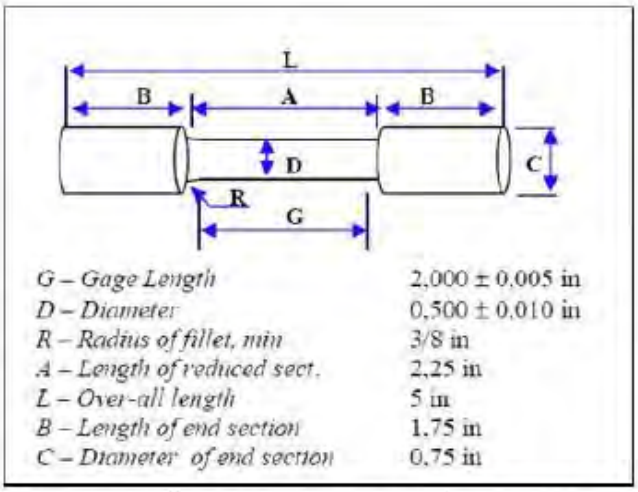


Figure 1.2. Model Sample specimen Tensile strength test ASTM E8

1.3. Fatigue Test with impact test

The impact testing work steps, as follows:

1. Specimens are placed horizontally
2. Both ends of the specimen are concentrated on a base.
3. Place the notch (notch) right in the middle with the direction of beating from the back of the takik.
4. The amount of energy impact (joule) can be seen on the scale of the testing machine.

ISBN : 978-602-99806-3-9

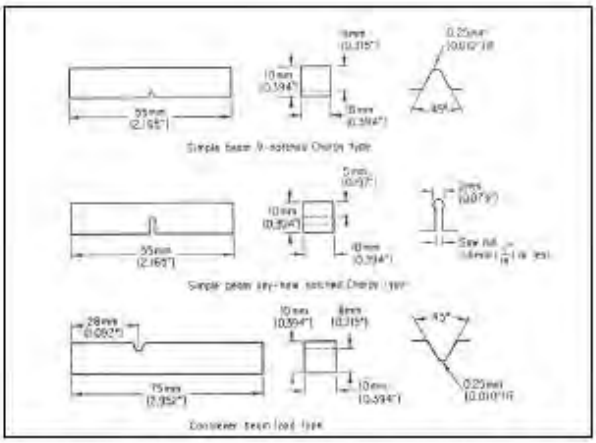


Figure 1.3. Impact Test sample model according to ASTM E23.56T.

RESULT AND DISCUSSION

2.1. Composition Test

Tabel 2.1.1. Results of Composision Tests SiC 5%

Table 5.21. SiC Composition Test Results 5%

Unsur	Sampel Uji	
	%	Deviasi
Al	81.16	0.0552
Si	16.6	0.122
Fe	0.766	0.0713
Cu	0.0963	0.0015
Mn	0.0393	0.0041
Mg	<0.0500	<0.0000
Cr	<0.0150	<0.0000
Ni	<0.0200	<0.0000
Zn	0.0264	0.0319
Sn	0.0522	0.0042
Ti	0.143	0.0192
Pb	<0.0300	<0.0000
Be	0.0002	0.0001
Ca	0.0037	0.0007
Sr	<0.0005	<0.0000
V	<0.0100	<0.0000
Zr	*1.03	*0.0315

Tabel 2.1.2. Results of Composision Tests SiC 10%

Tabel 5.2.2. Hasil Uji Komposisi SiC 10%

Unsur	Sampel Uji	
	%	Deviasi
Al	80.77	0.2501
Si	17.6	0.158
Fe	0.761	0.169
Cu	0.105	0.0026
Mn	0.130	0.0090
Mg	<0.0500	<0.0000
Cr	<0.0150	<0.0000
Ni	<0.0200	<0.0000
Zn	<0.0100	<0.0000
Sn	0.0632	0.0049
Ti	0.0602	0.0083
Pb	<0.0300	<0.0000
Be	0.0001	0.0000
Ca	0.0086	0.0007
Sr	<0.0005	<0.0000
V	<0.0100	<0.0000
Zr	*0.366	*0.0076

Tabel 2.1.3. Results of Composision Tests SiC

Tabel 5.2.3. Hasil Uji Komposisi SiC 15%

Unsur	Sampel Uji	
	%	Deviasi
Al	82.67	0.5341
Si	15.2	0.636
Fe	0.888	0.106
Cu	0.114	0.0015
Mn	0.193	0.0348
Mg	<0.0500	<0.0000
Cr	<0.0150	<0.0000
Ni	<0.0200	<0.0000
Zn	0.0643	0.0941
Sn	0.0550	0.0059
Ti	0.0827	0.0049
Pb	<0.0300	<0.0000
Be	0.0001	0.0001
Ca	0.0057	0.0001
Sr	<0.0005	<0.0000
V	<0.0100	<0.0000
Zr	*0.602	*0.0516

ISBN : 978-602-99806-3-9

In Table 2.1.1, Table 2.1.2, and Table 2.1.3, show the composition test results data. In the tables, the Al, Si, Fe, Cu, Mn, Zn, Sn, Ti, and Ca are the most dominant elements. While the elements Mg, Cr, Ni, Pb, Sr, and V are elements that can not be read because the value of the content is too small than the standard.

In Table 2.1.1, the 5% SiC composition test, Al 81.66% Element, Si 16.6%, Fe 0.766%, Cu 0.0963% and Mn 0.0393%, Ti 0.143%, Be 0.0002%, and Ca 0.0037%. Based on the percentage of constituent elements, this type of aluminum alloy is categorized into aluminum alloy Casting Alloy, with serial number A4019.

Al content of 81.66% indicates high alumina value. Si content of 16.6% where the content of Si> 12.6% in Al-Si alloys show a hypereutectic alloy. These conditions include categories of materials that have high temperature strength with a small heat-curable coefficient. It is suitable for piston products.

Fe content of 0.766% exceeds the nominal limit of carbon content of 0.6%, making the material 5% SiC composition has high hardness and tensile strength. Cu content of 0.0963% indicates a low grade of copper content of the nominal element content (5%), making 5% SiC composition material has good casting properties and low thermal conductivity. Be content (beryllium) of 0.0002% which is below Fe content and Cu content is also categorized good. The Zn element (zinc) is a volatile element when heated. Zn content of 5% composition material of 0.0264. Ca (calcium) content of 0.0037, is a catalyst for removing the bismuth content from lead, as well as to control the graphite carbon content in iron melting.

In Table 2.1.2, the results of the SiC composition test are 10%, El Al 80.77%, Si 17.6%, Fe 0.761%, Cu 0.105%, Mn 0.130%, Sn 0.0632%, Ti 0.0602%, Be 0.0001%, and Ca 0.0086 %. Based on the percentage of material preparation element with SiC composition of 10% shows hardness, tensile strength, high temperature strength and better casting properties compared to 5% SiC composite material.

In Table 2.1.3, the results of the SiC composition test are 15%, Elements Al 82.67%, Si 15.2%, Fe 0.888%, Cu 0.114%, Mn 0.193%, Zn 0.0643%, Ti 0.0827%, Be 0.0001%, and Ca 0.0057 %. Based on the percentage of material preparation element with SiC composition of 15% shows the hardness, tensile strength, high temperature strength and excellent cast properties compared to 5% SiC composite material and 10% composition material.

Based on the above information, Fe, Ni and Sn values below 1% indicate strength and corrosion resistance. Because the alumin content is dominant. Mn and Fe soften the metal granules so that the strength increases. Al and Sn denote corrosion resistance and wear resistance. Nickel also boosts strength and wear resistance. Increased carbon content in iron will lead to a significant increase in hardness and tensile strength.

2.2. Metallographic Test

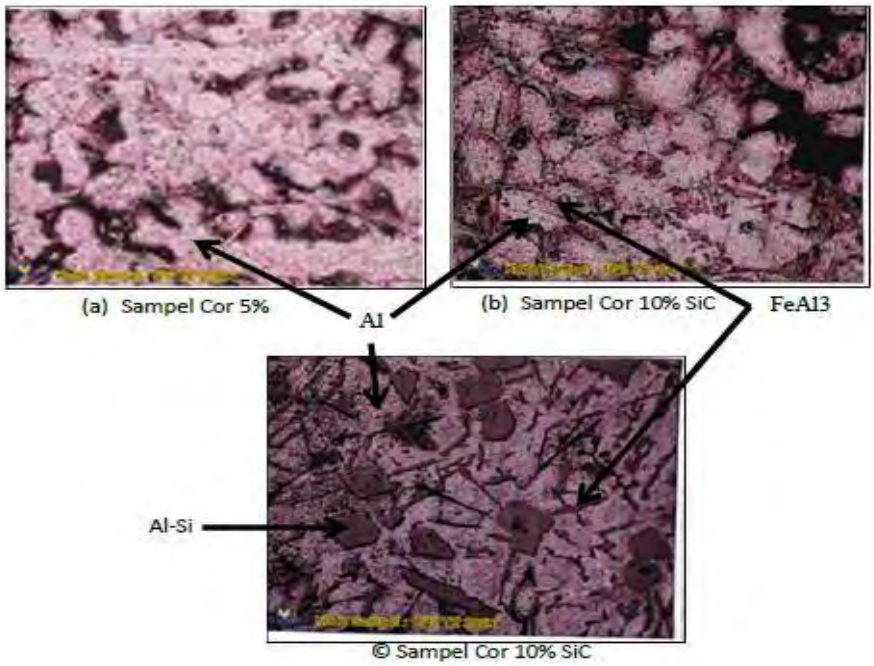


Figure 2.1. Metallografi Tests

ISBN : 978-602-99806-3-9

Based on the results of microstructure testing on recycled aluminum alloys using stri casting formed several phases, including Al phases, FeAl3 phases and AlSi phases. The characteristics of the phases are as follows:

1. The Al phase (light-colored) is the primary solid solution.
2. Fe-Al3 phase (grayish black). In the presence of this phase will increase the strength and hardness of aluminum alloy.
3. AlSi (light gray). This phase is formed because the percentage amount of silicon (Si) is greater than magnesium (Mg). It will generally increase the hardness level and can inhibit corrosion rate.

In aluminum alloys using casting stirrups, the distribution and shape of AlSi granular grain structures that tend to agglomerate with larger grain size and split granular distances, and FeAl3 phases formed have clumped grain structures.

2.3. Strength Testing

Tabel 2.3.1. Tensile Test Data on 5% SiC Cast samples

Data Pengujian								Rekayasa						Sebenarnya		Koef	Sejt Maks
AL	P (N)	P(Kg)		Ao	Lo	L	Δ	S	e	Q		E	Ur	σ	ε	R	σ
0.5	1000	101.937		6.0	50	50.50	5.94	16.989	0.010	0.010		1698.947	0.085	17.159	0.010	0.382	16.229
1	1400	142.712		6.0	50	51.00	5.88	23.785	0.020	0.020		1189.263	0.238	24.261	0.020	0.382	22.012
1.5	1650	168.196		6.0	50	51.50	5.83	28.033	0.030	0.029		934.421	0.420	28.874	0.030	0.382	25.273
2	2050	208.970		6.0	50	52.00	5.77	34.828	0.040	0.038		870.710	0.697	36.222	0.039	0.382	30.698
2.5	2750	280.326		6.0	50	52.50	5.71	46.721	0.050	0.048		934.421	1.168	49.057	0.049	0.382	40.368
3	2950	300.714		6.0	51	54.00	5.67	50.119	0.059	0.056		852.022	1.474	53.067	0.057	0.382	42.626

Tabel 2.3.2. Tensile Test Data on 10% SiC Cast samples

Data Pengujian								Rekayasa						Sebenarnya		Koef	Sejt Maks
AL	P (N)	P(Kg)		Ao	Lo	L	Δ	S	e	Q		E	Ur	σ	ε	R	σ
0.5	850	86.646		6.0	50	50.50	5.94	14.441	0.010	0.010		1444.105	0.072	14.585	0.010	0.382	13.794
1	1450	147.808		6.0	50	51.00	5.88	24.635	0.020	0.020		1231.736	0.246	25.127	0.020	0.382	22.798
1.5	2000	203.874		6.0	50	51.50	5.83	33.979	0.030	0.029		1132.631	0.510	34.998	0.030	0.382	30.633
2	2500	254.842		6.0	50	52.00	5.77	42.474	0.040	0.038		1061.842	0.849	44.173	0.039	0.382	37.436
2.5	2950	300.714		6.0	50	52.50	5.71	50.119	0.050	0.048		1002.379	1.253	52.625	0.049	0.382	43.304

Tabel 2.3.3. Tensile Test Data on 15% SiC Cast samples

Data Pengujian								Rekayasa						Sebenarnya		Koef	Sejt Maks
AL	P (N)	P(Kg)		Ao	Lo	L	Δ	S	e	Q		E	Ur	σ	ε	R	σ
0.5	750	76.453		6.0	50	50.50	5.94	12.742	0.010	0.010		1274.210	0.064	12.870	0.010	0.382	12.171
1	1550	158.002		6.0	50	51.00	5.88	26.334	0.020	0.020		1316.684	0.263	26.860	0.020	0.382	24.371
1.5	2250	229.358		6.0	50	51.50	5.83	38.226	0.030	0.029		1274.210	0.573	39.373	0.030	0.382	34.463
2	2950	300.714		6.0	50	52.00	5.77	50.119	0.040	0.038		1252.973	1.002	52.124	0.039	0.382	44.175
2.5	3900	397.554		6.0	50	52.50	5.71	66.259	0.050	0.048		1325.178	1.656	69.572	0.049	0.382	57.249
2.8	4100	417.941		6.0	50	52.80	5.68	69.657	0.056	0.053		1243.872	1.950	73.558	0.054	0.382	59.533

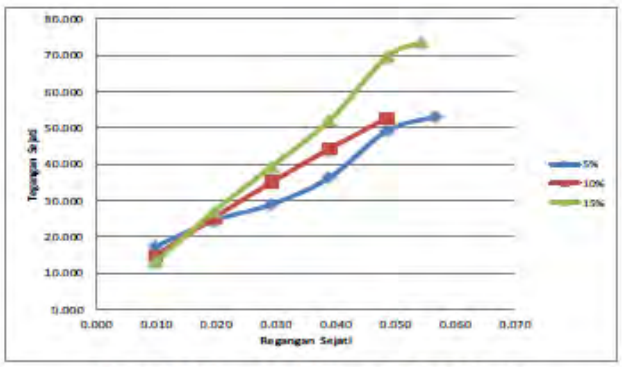


Figure 2.2. Graph of Voltage vs Real Strain

ISBN : 978-602-99806-3-9

The ability of the material to withstand the tensile load given and the extent to which the material is increasing in length is said to be the tensile strength. In this case, the tensile strength is commonly known as Ultimate Tensile Strength or maximum tensile stress.

In Table 5.3.1, the tensile test data on the material with 5% SiC addition indicates the maximum tensile stress of 42.626 kg/mm^2, the load P = 300,714 kg and the length increase of 3 mm.

In Table 5.3.2, the tensile test data on a material with a 10% SiC addition indicates at load P = 300,714 kg, its maximum tensile stress is 43.304 kg/mm^2 and an increase in length of 2.5 mm.

In Table 5.3.3, the tensile test data on the material with the addition of SiC 15%, shows at the load P = 300,714 kg, the maximum tensile strength of 44.175 kg/mm^2 and the length increase of 2 mm.

The above data show at the same load, the material with SiC composition 15% has a higher maximum tensile stress when compared with 5% SiC composite material and 10% SiC composition material. Its long increments are rapidly shrinking or shrinking when compared to the long increments in 5% SiC composite materials and 10% SiC compositions materials.

Inferential, the greater the addition of SiC composition to the material, the tensile strength also increases as well.

In table 5.3.3, it can also be seen that the higher data loads imposed on the material, the higher the maximum tensile stress. And the material also quickly shrink and break.

This is confirmed by the graph shown in Figure 2.3, where the color of the green line as the material composition with the top 15% composition is followed by the material of SiC composition of 10% as the color of the red line, and the bottom (blue line color) is the material with SiC composition 5%.

The three materials of this varied SiC composition use the same pour temperature that is a casting temperature of 720 ° C.

2.4 Fatigue Test (impact method with V shape)

Tabel 2.4. Impact Testing Results

Data-Data Awal					
Variabel	Simbol	material			Satuan
		5%SiC	10%SiC	15%SiC	
Jari-jari Bandul	R	0.95	0.95	0.95	Mtr
Simpagan awal Bandul	α	90	90	90	Derajat
Grafitasi	g	9.81	9.81	9.81	M/S2
Massa Bandul	m	2.2	2.2	2.2	Kg
Usaha Kalibrasi	U_k	0	0	0	Joule
Energi Bandul	U	20.5029	9.1424	9.1424	Joule
Simpagan Bandul Setelah dilepas	β	85	87	88	Derajat
Tinggi Bagian Takikan	P_{anjang}	0.011	0.011	0.011	Meter
Lebar Bagian Takikan	L_{ebar}	0.011	0.011	0.011	Meter
Luas Penampang Benda Uji	A	0.000121	0.000121	0.000121	M2
Data Hasil Perhitungan					
Variabel	Simbol	Material			Satuan
		5%SiC	10%SiC	15%SiC	
Tinggi Beban Sebelum dilepas	H1	0.950	0.950	0.950	M
Massa Bandul	m	2.2	0.9809968	0.9809968	Kg
Tinggi Beban Setelah Dilepas	H_2	0.958	1.000	0.983	M
Tinggi Beban Perhitungan	H_s	1.908	1.950	1.933	M
Usaha Mematahkan Spesimen	U_s	41.18	42.08	41.72	Joule
Kekuatan Impact	U_1	340366.78	347758.84	344802.86	Joule/M

Based on Table 5.4, the largest impact strength is found on the material of the composition of 15%, ie 344802.86 Joule / M. The impact strength on the 10% composition material was 347758.84 Joule / M and the lowest impact strength was found in the 5% composite material, 340366.78 Joule / M. The greater the percentage of SiC used in the material, the energy used to break the material is relatively low. This is seen, with the 5% UC Si composition employed for 20,5029 Joules. In the material the composition of SiC is 10% and the material is 15% uniform composition, ie U = 9.1424 Joule.

ISBN : 978-602-99806-3-9

CONCLUSION

1. The result of orthotropic strength test of metal plus SiC amplifier with variation of 5%, 10% and 15% SiC composition using stir casting method, obtained better strength result on SiC composition 15% ie 59.333 N. The above data show at the same load, the material with SiC composition 15% has a higher maximum tensile stress when compared with 5% SiC composite material and 10% SiC composition material. Its long increments are rapidly shrinking or shrinking when compared to the long increments in 5% SiC composite materials and
10% SiC compositions
materials.

2. The result of orthotropic fatigue test plus SiC amplifier with variation of SiC composition 5%, 10% and 15% using stir casting method, the largest impact strength is found on the material of the composition of 15%, ie 344802.86 Joule / M. The impact strength on the 10% composition material was 347758.84 Joule / M and the lowest impact strength was found in the 5% composite material, 340366.78 Joule / M. The greater the percentage of SiC used in the material, the energy used to break the material is relatively low. This is seen, with the 5% UC Si composition employed for 20,5029 Joules. In the material the composition of SiC is 10% and the material is 15% uniform composition, ie U = 9.1424 Joule.

BIBLIOGRAPHY

[1] Anastasia, S., Anne, Z., Eddy, S., S., 2009, Effect of Mg on Violence Composite Ceramic Matrix Al2o3 / Al, MAKARA, SAINS, VOL.13, NO. 1, APRIL 2009: 39-44
[2] Azis Nur Eva, Masyrukan, Agus Hartyanto, 2012, Analysis of Physical Properties and Aluminum Aluminum Alloy AL -Si- Cu by using Sand Mold, Department of Mechanical Engineering, Muhammadiyah University of Surakarta.
[3] Hasan Fuadi, Anne Zulfia, Yusuf Afandi, 2013, Matrix Composite Fabrication Metal Al5CU / SiC with casting and characteristic methods, Department of Metallurgical and Materials Engineering, Faculty of Engineering, University of Indonesia.
[4] Surdia, T., Chijiwa, K., 1976, Metal Casting Technique, P.T. Pradnya Paramita, Jakarta. Toto, 2009, Preparation of piston with metallurgy casting process powder, http://digilib.unimus.ac.id/download.php%3Fid%3D15186.

Proceeding International Joint Conference on Science and Technology (IJCST) 2017
ISBN : 978-602-99806-3-9

Adsorption of Manganese (MnII) from aqueous solutions by using modified Kaoline-surfactan as adsorbent

A Putra[1], B Arifin[2], Marwan[3], Suhendrayatna[4], Syafruddin[5]
[1,5]Department of Chemical Engineering, Lhokseumawe Polytechnic State
Jalan Medan Banda Aceh Km 280 Lhokseumawe, Indonesia
[2,3,4]Department of Chemical Engineering, Syiah Kuala University Darussalam Banda Aceh, Indonesia

[1]putraalf@yahoo.com

Abstract. The Study about, kaoline adsorbent modified with a surfactant (organokaoline) to absorb metal ions Mn (II) in aqueous solution. Modifications were used the 3 (three) types of surfactants, anionic, cationic and ampholitic with surfactant concentration were used 45%, 60% and 75% respectively of the total weight of 300 grams adsorbent. The contact time of variation between 10-90 minutes with stirring speed of 50, 70 and 90 rpm respectively. Mn metal concentration analysis done by Atomic Absorption Spectrometer (AAS) (Shimadzu UV-1800) whereas the determinations of the characteristics for wavelengths before and after treatment are used Spectrophotometer Fourier Transform Infra Red (FTIR) IR Prestige-2, and organokaoline surface morphology using SEM. The results of the study organokaoline successfully reduce Mn metal ions in water till 95% of the initial concentration of 10 mg/L. Testing FTIR spectra showed differences as well as the SEM test looks morphology before and after the absorption of the metal ion Mn.

1. Introduction

The metals ion present in the aquatic system through the rocks and soil, and of various human activities that could potentially produce the metal as waste [1], so that the water resources polluted by metal ions. In addition, many water companies take raw materials from groundwater and river water suspected to have been contaminated to be processed into clean water and drinking water. One of the ground water problem is the existence of heavy metals from [8] various industries such as the metal industry, manufacturing, electroplating, mineral and industrial battery. The existence of such metals in a number of large concentrations can cause health problems and damage to ecosystems [2]. Good water quality is essential to the lives of living beings, whereas a clean and healthy water is needed by humans for health and daily usage requirements. While the metal ions such as cadmium, chromium, zinc, manganese and iron are often encountered in water [3]. One of the dangerous heavy metals contained in the ground water is Manganese (Mn) in the form of ions.

The negative effect of human health is manganese can affect the respiratory tract and brain, in addition to the cause Parkinson, lung embolism, and bronchitis, for a long time due to the accumulation in the body causing impotence. Based on the United States Environmental Protection Agency (USEPA) [19]. The concentration of manganese in the water allowed a maximum of 0.05 mg / L and safe for consumption. The existence of manganese in the water due to the disposal of industrial waste will have an impact on the environmental damage therefore the need for proper processing before being discharged into the environment. Reduced levels of manganese in the water can be done by physical and chemical means such as adsorption, chemical precipitation, ion exchange, membrane infiltration and

ISBN : 978-602-99806-3-9

extraction solvent. Drop off all of the existing methods are not efficient because it is too expensive and generate new waste such as chemical use in detecting and eliminating levels of Mn, especially at low concentrations in living memory [7]. One alternative water treatment cost is to use natural materials as adsorbents like caolin use.

Kaolin itself has been widely used as adsorbent such as adsorption of lead, zinc and cadmium by modifying kaolin and polyphosphate [4], the impurity Gas Absorption [5], kaolin to absorb arsenic [6] and Modification Polyphosphate with kaolin to absorb ions Pb (Son, 2015). The process adsorbs itself very effective in absorbing metal Mn, using natural materials which have been modified such as the absorption of Pb in water solutions using kaolin, and metal kaolin , using the Natural zeolite [9], using clay as adsorbent [10], sulfate and Phosphatet [3], removal of Zn, Cd and Mn From aqueus solutions [20], Modified Bentonite with Titanium dioxide [11], the use of adsorbent orange peel in absorbing Cu and Fe [12], and the use of carbon nano adsorbent active in absorbing Cu (IV) [13].

The elimination of metal ions using kaolin are based on ion exchange mechanism. The existence of negative ions due to the ratio between silica and alumina (Si/Al) which are relatively small and also the presence of oxygen and hydroxyl groups on the surface of the kaolin. Kaolin is still similar to the zeolite and betonite, zeolite and bentonite but better absorption rate or higher than the kaolin especially when compared with active carbon and therefore required an effort to improve the absorption of kaolin. One of the efforts to increase the absorptive capacity of kaolin as an adsorbent can be done by modifying the use of organic compounds such as surfactants. Surfactants have several types of anionic and cationic Surfactant a long chain organic compound that consists of two parts, namely the head and tail. The head is positively charged and hydrophilic, while the tail is not charged and hydrophobic. Surfactants can form micelles; monolayer or bilayer on a kaolin surface modification depends on the concentration of surfactant used.

Applications Kaolin modified with surfactants (Organokaolin) to absorb the metal ion Mn (II) the information is still limited. The aim of this study was to study the ability of absorption of kaolin and increase the absorption of kaolin modified with a surfactant in the metal absorb Mn (II) in water. Modification of kaolin with a surfactant intended to bind the surfactant to the surface of hydrophobic kaolin. Adsorption of the surfactant on the surface of kaolin to involve interaction with the surface of the molecule and between molecules. This interaction can affect surfactant material is formed, the material is determined by the concentration of surfactant. Higher concentration of surfactant then the greater the interaction between molecules so that the material is formed to be increased. The material is formed to determine the nature of the kaolin surface adsorbs anions bound and more [6].

2. Experiment method

2.1. Material

In this research, the materials used are surfactants Alkyl Benzene Sulfonate (ABS) for the group which is negatively charged, distilled, MnCl2.4.H2O, KOH and HNO3 is used in the activation process using alkaline and acid to eliminate the levels of metals and organic compounds contained kaolin for increase the absorption rate as well, pure kaolin [14]. All the chemicals used were obtained commercially from Waco ltd and Aldrich. Manganese stock solution with a concentration of 50 mg/L, prepared using MnCl2.4.H2O dissolved into distilled water as much as 0.1802 gram, then dilution up to 10 mg/L

2.2. Instruments

Analysis of Mn assays used Absorption Atomic Spectrometer (AAS) (Shimadzu UV-1800) whereas the determination of the characteristics for wavelengths before and after treatment are used Spectrophotometer Fourier Transform Infra Red (FTIR) IR Prestige-2. PH levels using a pH meter Hanna Instruments, while the stirring speed used Shaker Incubator Pyrex, to see the pores in the adsorbent used SEM JEOL JSM-6510 LA.

2.3. Preparation of adsorbent kaolin-surfactant modifications.

ISBN : 978-602-99806-3-9

Kaolin do physical activation for 2 hours with temp. 105OC, chemical activation using H2SO4 and KOH for 2-3 hours, neutralized to pH 7, dried and stored in a desiccators. Activation kaolin modified with an anionic surfactant with a surfactant usage ratio 45%, 60%, 75% of the total weight of 300 grams. Kaolin mixture of surfactants (Organokaolin stirred using Incubator Shaker for 2 hours with stirring speed of 90 rpm and 50.70 and the contact time between 10-90 minutes. The precipitate is filtered and washed kaolin to pH 7, then dried and stored in a desiccators. The precipitation is carried out during 4 hours before being stored in a desiccators before use.

2.4. The process of adsorption

The Metal Ion of Manganese (Mn) was adsorb using organokaoline do with variations and different conditions. Organokaoline used 2 grams, was not it water containing metal mn (II) of 200 ml and a concentration of 10 mg/L. The contact time varied from 30 to 90 min, pH 6.8 - 7.2 with the process occurs at room temperature (25^0C). Batch experiments performed using an 250-ml Erlenmeyer tube was closed using aluminum foil to avoid contact with air. All of the sample is inserted into the Shaker Incubator with a stirring speed of 90 rpm.

In the adsorption process, 2 g organokaoline and 200 ml of water the peat with the initial conditions, especially the content of Fe, Mn and organic compounds known included in a 250 ml flask, is contacted for 90 minutes with a stirring speed of 90 rpm using the Shaker Incubator. The samples were analyzed using Atomic Absorption Spectrophotometer (AAS) before and after treatment. Sample covered with aluminum foil to avoid contact with the outside air. The supernatant was then collected and examined using Atomic Absorption Spectrometer (AAS) (Shimadzu UV-1800). Testing is done by triple (repetition 3 times) and taken the average price. Differences in initial and final conditions are calculated, so that the efficiency obtained Mn decreased levels of metal ions in water. The percentage of allowance for metals Mn (R) in a solution of water and the amount of ion Mn (II absorbed in the adsorbent (qe) was calculated with the following equation:.

$$R = \frac{Co-Ct}{Co} X\ 100 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(1)$$

$$Q_e = \frac{Co-Ct}{} X\ V \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(2)$$

Where Qe is the number of ion Mn (II) was absorbed by organokaolin adsorbent (mg/g). and C0 and Ct is the ion concentration of Mn (II) (mg/L) prior to the beginning of the adsorbent and after absorption. V is the solution volume (ml) and m is the weight of adsorbent (g) [15].

3. Result and Discuss

3.1. FTIR spectra analysis

In this study, the spectra of FTIR for organokolin that have been activated and organokaolin that has absorbed Mn metal ions can be seen in Figure 1. This tool can also distinguish various functional groups, due to the vibration of functional groups have bonding in the molecule different [16]. Infrared spectrophotometer analysis was done to evaluate the characteristics in kaolin adsorbent modified with a surfactant. Changes in the structure of the Si-O-Al stretching organokaolin kaolin which has been activated or before the adsorption loss of the peak at 750-752 nm indicating the changes due to the presence of metal Mn and the emergence of the O-H vibration deformation. The existence of Mn metal influence on spectra, organokaolin containing Mn metal ion spectra generated more noisy (more wavy) compared with organokaolin that have not absorb metal. This indicates that the metal ion Mn affect organokaolin wave, because the spectra are very sensitive if conditions change e.g. temperature, concentration and the presence of other compounds that change in spectra can be detected using FTIR. These results are consistent with research conducted by Prof. Tsenkova, where the presence of metal in the water provides water spectra changes significantly. [16]. Changes others that happened was in the structure of Si-O deformation at a wavelength of 850 nm, 970 nm and 1100 nm where changes occur very significantly with the presence of the metal manganese in the adsorbent organokaolin, that alter the

ISBN : 978-602-99806-3-9

structure of vibration in organokaolin that has absorbed metals Mn into O-H octahedral. The results of this used FTIR nearly equal to that produced by Fairoos who adsorbs Ni ions in solution using a nano-composite [18].

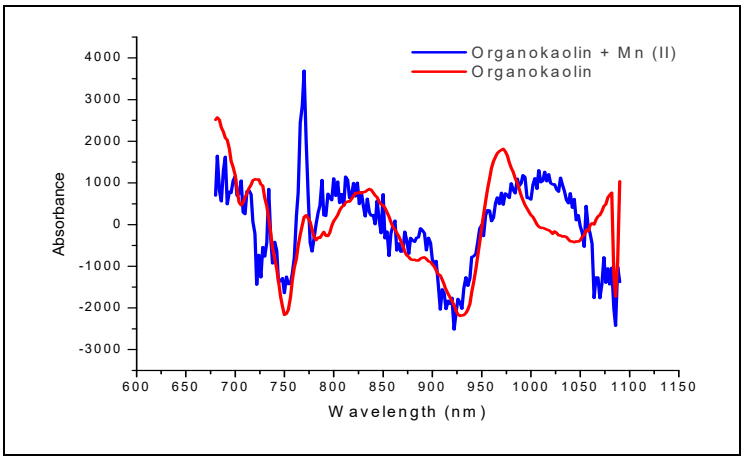


Figure 1. Spectra of Organokaolin + Mn and Organokaolin

3.2. Effect of contact time

Decreasing the concentration of Mn using kaolin modified adsorbent with a surfactant indicates allowance Mn metal in the water after the adsorption process. This process is greatly influenced by the contact time between organokaolin and Mn metal ions in water, the behavior of metals decrease with contact time can be seen from figure 2 below.

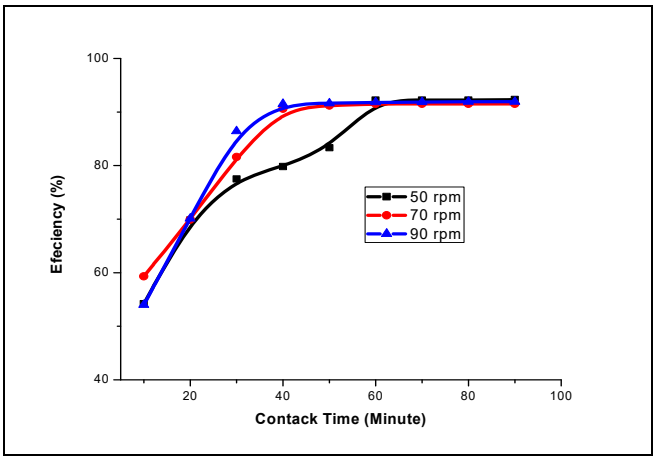


Figure 2. The effect of contact time on the absorption of Mn (II) using Organokaolin

From Figure 2 shows that the increase in efficiency of metal uptake Mn (II) in water or a decrease in metal content of Mn (II) increased with increasing contact time. This indicates that Mn metal contained in the effluent are absorbed gradually increases with increasing contact time. Increasing contact time affect the increased efficiency of the allowance for Mn metal in the waste water. Increasing the efficiency of an adsorbent is attributable to the performance of the GCC work longer so that more metal ion Mn belt adsorbent stretcher, while the influence of stirring speed very significant increase in the allowance for metals occur in adsorbent which has not been activated. This shows that the performance

ISBN : 978-602-99806-3-9

of the adsorbent is highly dependent on the movement of molecules around it, so that with the acceleration of stirring it easier for adsorbent (organokaolin) in the capture or bind metal ions Mn in water. At the contact time reached 60 minutes, visible uptake of metal ions in water has a maximum Mn, from chart 3 shows that after maximal conditions despite the addition of up to 90 minutes when done has been a constant condition,. This condition shows that organokaolin when contacts between 60-90 minutes can no longer absorb metal ions Mn due to the adsorbent has been experiencing burnout. Similar results were also obtained by Rachel, et.al who get the optimum time in absorption of Mg metal (II) by using activated carbon [15] and Fairoos using nano composites absorb metal ions Ni [18].

3.3. Effect of surfactant concentration

Modification of kaolin and surfactant aims to bind the surfactant to the surface of hydrophobic kaolin. Adsorption of the surfactant on the surface of kaolin to involve interaction with the surface of the molecule and between molecules. This interaction can affect surfactant material is formed, and the material is determined by the concentration of surfactant [6]. To determine the type of surfactant and the doses used in lowering the concentration of Mn ions in the water can be seen in Figure 3 below:

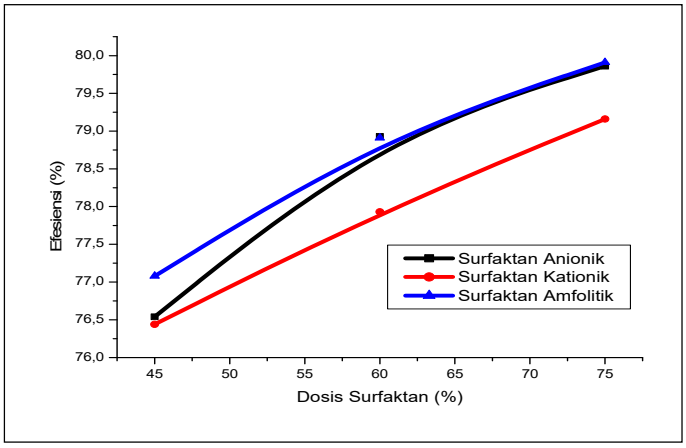
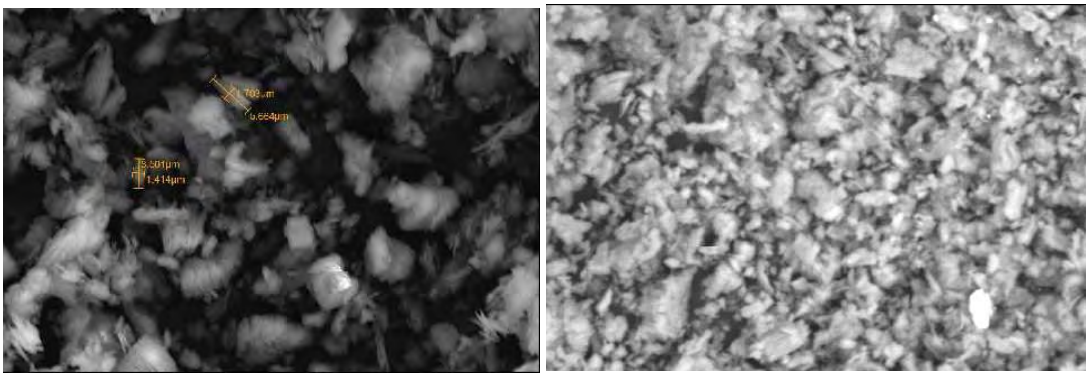


Figure 3. Effect dosis and types of surfactant on performance organokaoline

Surfactants are used there are three types of each anionic, cationic and ampholytic. Modification or adding of numbers of surfactant doses of 45, 55 and 75% respectively have a significant influence on the absorption of Mn metal in water. Increasing the number of surfactant doses proportional to the increase in efficiency or absorption organokaolin absorb metal ions Mn. This is caused by the ability of the surfactant to interact on the surface of the adsorbent, thereby increasing porosities adsorbent to absorb metals Mn, besides surfactant also layers (multilayer) a lot and capture metal ions Mn through ionic bonds contained in that layer. From Figure 4 shows that the type of surfactant on the performance of organokaolin in lowering levels of Mn metal, where the presence of ampholytic better when compared to the other two types of surfactant. The ability of surfactant higher aggregation number, that number when forming micelle surfactant. Micelle surfactant if this is soluble in water, the hydrophobic portion facing the micelle core and the hydrophilic part draw water phase. The presence of positive and negative charges on the surface of the adsorbent will affect disepersi when the surfactant is attached to the kaolin. This dispersion of power will be stronger / faster when both ions are owned by active amphoteric surfactants perform movements, resulting attract each other hydrophobic moieties are also great. These attractive forces tend to be owned by the amphoteric surfactant that is if we compare with cationic and anionic surfactants.

ISBN : 978-602-99806-3-9

3.4. Scanning Electron Microscope (SEM)
To see the morphology of the surface of the adsorbent organokaolin before and after the process of the adsorbent can be seen in Figure 4 below.



(a) (b)

Figure 4. Organokaoline (a) prior to the adsorption process (b) after the process of adsorption

Organokaolin surface before the adsorption process is done seen a lot of pore cavities. Meanwhile, on the observation organokaolin after Mn metal adsorption process the cavities are already squeezed and have small pores. Voids and pores are formed due to the absorption of Mn metal in this organokaolin.Hal indicate that the ability of the adsorbent organokaolin absorb Mn metal ions in water.

4. Conclusion
As a conclusion of this study, Organokaolin which is a modification of kaolin with a surfactant managed to increase absorption of the adsorbent and reduces the Mn ions in aqueous solutions up to 95%. FTIR analysis showed a significant difference between the spectra before and after the adsorption process Mn, seen the transfer of spectra and spectral locations that contain metal ions Mn more noisy. Tests using SEM showed morphological changes on the surface organokaolin before and after the absorption of Mn metal surface denser and disappearance of cavities in organokaolin prior to the adsorption process.

References:
[1] El-Bady,M.S.M., Maetwalli,H.I.,Melegy,A.A.,Samy,Y (2016), Heavy metals contamination in the coastal area between Burg El-Burullus and Baltim, Northern Nile Delta Egypt, *International Journal of Chem Tech Reasearch*, 9(12) 51-60
[2] Khobragade, M.U.,Pal,A.,(2014), Investigation on the adsorption of Mn(II) on surfactant-modified alumina: Bacth and column studies, *Journal of Environmental Chemical Engineering,* 2 2295-2305
[3] Vujakovic, A. Dacovic,(2003), A. on Surfactant and Modified Minerals. *Journal of Chemistry 68(11): 833-841. Adsorption of Anorganic Contaminant.*
[4] Amer,W.,Khalili,F.,Awwad,A., (2010). Adsorption of Lead, Zink and Cadmium ions on Polyphosphate-Modified Kaolinite Clay. *Journal of Environment Chemistry and Ecotoxicoligy, (2): 1-8*
[5] Halim, A.,Nassrullah.,(2013), Preparation and Formation of Zeolite 5A from Local Kaolin Clay for Drying and Desuphurization of Liquefied Petroleum Gas ,*Iraqi Journal of Chemical and Petroleum Engineering Vol.14 No.1*
[6] Kumar, (2007), Modification of Clinoptilolite by Surfactants for Molibdate Adsorption from Aqoues Sollution. *Journal of Science 3(14): 239-245.*
[7] Putra, A., Lestari,N.,Meilina,H. (2015), Penyerapan Ion Timbal Dalam Air Dengan Menggunakan Modifikasi Kaolin-Surfaktan Sebagai Media Penyerap *Bioporal Industri* 6 (2) : 81-87

ISBN : 978-602-99806-3-9

[8] Ghogomu,J.N.,Noufame,T.D.,Ketcha,M.J.,Ndi,N.J.(2013), British Journal of Applied Science & Technology 3(4): 942-961
[9] Erdem,E.,Karapinar,N.,Donat,R.,(2004), The Removal of Heavy Metal Cations by Natural Zeolits, *Journal Colloid Interf.Sci.* 280 309-314.
[10] De Fonseca, M.G.,De Oliveira,M.M.,Araki,L.N.H., (2006), Removal of Cadmium, Zink, Manganese and Chromium cations from aqueous solutions by clay mineral, *Journal Hazard Mater,* 137 288-292.
[11] Iriany,. kenrick,.Alvian,.Maulida,(2016), Effect of Modified Bentonite-Titanium Dioxide as filler on Mechanical Properties and Water Absorption of Unsaturated polyester Resin (UPR) Composite, *International Journal of Chem Tech Reasearch* 9(12) 565-569.
[12] Tadepalli,S.,Murthy,K.S.R.,Rakesh,N.N.,(2016), Removal of Cu(II) and Fe(II) from Industrial Waste Water Using Orange Peel as Adsorbent in bacth mode operation, *International Journal of Chem Tech Reasearch* 9(5) 290-299.
[13] Manivannan,P.,Arivoli,S.,Mohammed, (2015) Adsorption Studies on Chromium(VI) removal from Aqueous Solutions using Activated Hibiscus sabdariffa Stem Nano Carbon, *International Journal of Chem Tech Reasearch* 8 (12) 662-673.
[14] Velumani.K.,Kumar,P.E.,Sivakumar,V.,(2016), Novel Adsorbent Prepared from Passiflora foetida seeds for the adsorption of Nickel(II) in aqueous Solution, *International Journal of Chem Tech Reasearch* 9 (7) 574-586.
[15] Rachel, N.Y., Nsami,N.J., Palacide,B.B., Douda,K., Vivtoire,A.A., Benadette,T.M., Mbadcam,K.J., (2015) Adsorption of manganese(II) Ions from Aqueous Solutins onto
[16] Granular Activated Carbon (GAC) and Modified Activated Carbon (MAC), *Inernational Journal of Innovative Science Engineering and Technology,* 2 (8) 606-614.
[17] Tsenkova,R (2007), Aquaphotomics: Extended water mirror approach reveals peculiarities of prion protein alloforms, *NIR News, **18**, 14-17.*
[18] Fairooz,N.Y.,(2016), Adsorption of Nickel Ions Ni(II) from aqueous solution by using the Nb205/CdSnano composites, *International Journal of Chem Tech Reasearch* 9(12) 495-507.
[19] United States Environmental Protection (USEPA), (2013), Secondary drinking water regulation: Guidance for Nuisance Chemicals.
[20] El-Sayed,G.O.,Dessouki,H.A.,Ibrahiem,S.S.,(2011), The Malaysian Journal of Analytical Sciences, Vol 15 No 1: 8 – 21.

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

Analysis of the effect of initial moisture content variation on organic waste characteristics using biodrying process

G A Kristanto[1], R P Shofriyah[2]
[1,2]Environmental Engineering Study Program, Civil Engineering Department, Universitas Indonesia Kampus Baru UI Depok, Depok 16424, Indonesia

[1]gakristanto@gmail.com
[2]regia.shofriyah@gmail.com

Abstract. The use of solid waste as an alternative energy can be a solution in demanding for environmental sound energy. However, this is limited by its high moisture content, especially in organic waste. This high moisture content decreases the heat value of the waste. Biodrying is a method of utilizing microbial activities assisted by air injection to decrease the moisture content. This study discussed the effects of wastes' initial moisture content on biodrying process. Food waste and garden waste were used as feedstock. This experiment used 3 reactors with volume of 168 dm^3. The initial moisture content of each reactors were varied into 51,07, 63,96, and 71,06 (%wt/w), and the air flow rate were 10 L/min.kg. After 21 days, it was shown that moisture among 3 reactors were significantly different with final moisture content were 21,92, 29,12 and 38,38 (%wt/w) while the volatile solids were identic. Also, FAS and heat value increased while C:N ratio decreased after the process. Different initial moisture content caused different duration of time needed to dry the organic waste until the moisture reaches <20% to use as an RDF. Reactor 1 took 22 days, reactor 2 took 25 days, and reactor 3 took 27 days.

1. Introduction

The production of energy from waste is not a new concept since various energy conversion technologies are available. However, they are based on the physical and chemical properties of the wastes both the type and quantity of the available waste feedstock and the form of energy required [1]. The availability of wastes which are easy to find and affordable make wastes one of the solution to meet the demand of alterative energy and to reduce the waste generation in landfill, at once.

The heat value of waste is affected by several factors, one of them is moissture content. For optimizing heat value of waste, several methods can be implied in many ways. One of the method is biodrying.

Biodrying, as the name implies, is a drying technique that relies on biological activities of microorganisms such as bacteria and fungi to reduce the moisture content of wet biomaterial waste [2]. Biodrying method assisted by the aeration system will provide mass and energy airflow to reduce the moisture content and to distribute the excessive heat transfer so that the heat will spread evenly across the entire surface. Moisture content is one of the most important parameter in biodrying because it affects the complexity of biochemical reactions which are related to microbial growth and biodegradation of organic waste that occur during the process [3] [4]. The bog organic fraction composition will speed up the biodrying process [5].

Generally, typical domestic wastes have a moisture content ranging from 15 – 40% [6]. Indonesia, a country with 2 seasons will certainly have a various moistre content of waste. The moisture content of municipal solid waste ranging from 70 – 80% [7] with 2-year old waste is 79,01% and 4-year old waste is 78,88% [8]. Other data showed that moisture content of waste in Jakarta is ab

ISBN : 978-602-99806-3-9

out 47,97% [9] and other studies mentioned moisture content of waste in TPA Cipayung, Depok is about 64,74% [10]. These differences in moisture contents are due to the different the season during the sampling occur and the rain intensity in several regions of Indonesia are different.

The initial moisture content is important because if it is too high, it will limit oxygen transport and microbial activities hence hindered and invalidated biodrying process [11]. On the other hand, if initial moisture content is too low, micorbial activities will be slow due to the lack of moisture which results in reduced drying performance.

Research on biodrying has been occured since approximately 15 years. According to the Villegas an Huilinir's [12], initial moisture content had a stronger effect than air flow rate by affecting temperature and increasing water removal. Another research conducted by Ma *et al*., (2016) mentioned that in biodrying process, initial moisture content showed significant influence based on statistical analysis.

This study will analyze the effect of initial moisture content variation to temperature, volatile solid, the change of moisture content during the 21 days of biodrying process. Three laboratory scaled reactors are used. Free air space (FAS), C:N ratio, and heat value parameters will be measured to compare the changes during biodrying process. At the end of the study, the 3rd order line equations were used to calculate the drying duration to reach final moisture content less than 20 (%wt/w) as an RDF standard.

2. Method and material

2.1. Feedstock preparation

Samples consist of organic waste with composition of garden dan food waste as feedstock. To obtain initial moisture content's variation, the percentage of garden waste (dried leaves and green leaves) and food waste were set so that the initial moisture content for each reactors are 50,71%, 63,96%, and 71,06%. Each reactor consists of 17 kg of mixed organic wastes.

2.2. Experiment and process operation

Biodrying is a combination of physico-chemical process with aeration system. There were three similar laboratory scaled reactors made from polystyrene as an insulator to diminish the heat loss during the biodrying process Three type of feedstock with different initial moisture content are used. Reactor 1, 2, and 3 consecutively had the initial moisture content of 50,71%, 63,96%, and 71,06%. The dimension of each reactor was 70 cm x 50 cm x 40 cm and the thickness of the styrofoam was 2-cm. The reactor was sealed by covering with the 2 cm sponge at the top of the reactor to avoid heat loss and condensation. The bottom of the reactor was made perforated so the leachate would drip to the leachate box of polystyrene foam with the dimension of 70 cm X 50 cm X 20 cm. At the top of the cover a thermocouple ETI Type K was installed and connected to thermologger ETI ThermaData logger type T. Aeration system was conducted by Multipro Mini Air Compressor MC-101-MPSG with capacity 80 L/min. The air hoses were perforated to distribute the oxygen. The air flow rate was set to 10 liter/minute and regulated by flow meter to adjust the incoming air supply before finally connected to the compressor. The compressor is set to be turned on every 15 minutes and then turned off for the next 30 minutes.

ISBN : 978-602-99806-3-9

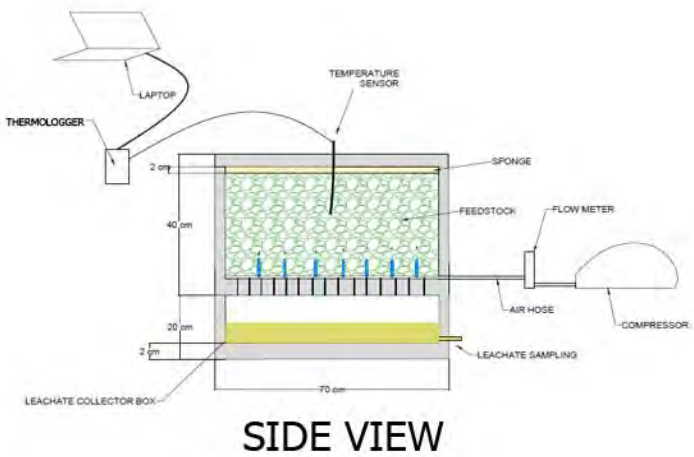


Figure 1. Reactor Design

2.3. Sample analysis

Several parameters will be analyzed during this study which are include C, N, free air space (FAS) and heat value. The temperature data were recorded every hour, while moisture content and solid volatile were analyzed by using Standard Method 2540 G with duplo system. C and N are analyzed using SNI 06-6989.28-2005 (Carbon) and Standard Method (1980) (Nitrogen), the heat value was measured using ASTM D5865-2004.

Data will be analyzed through statistical test which were ANOVA (Analysis of Variance) to analyzed the significance of the three reactors which was preceded by normality test, Pearson test was also used to know correlation between parameter and also regression test was used.

3. Result and discussion

3.1. Feedstock charcterisics

The initial and final feedstock characteristics are presented in Table 1 and 2:

Table 1. Initial feedstock characteritics

Characteristics	Reactor 1	Reactor 2	Reactor 3
Initial Moisture Content (%)	50,71	63,96	71,06
Volatile solid (% TS)	89,44	88,68	86,63
C (%)	76	70,6	79,2
N (%)	2,92	2,52	2,87
C/N Ratio	26,07	28,02	27,64
FAS	87,85%	85,84%	81,95%
NHV (kkal/kg)	1509	1386	1421

The premilinary characteristic test results in Table 1 showed the C/N ratio were in tha range suggested in biodrying process. C/N ratio was used by microbes to synthesize proteins, the required C/N ratio is about 20 – 30 to ensure that microorganisms have a balanced nutrient for their metabolic activities [2].

The free air space (FAS) with green leaves, dry leaves and food waste as feedstock had value in the range of 80% ensuring system with aerobic condition.

The initial heat value before the biodrying process, at reactor 1 showed the highest NHV value of 1509 kcal / kg. This result is ini line with previous study which mentioned LHV values of leaves waste ranging from 906.08 - 2000 kcal / kg [6].

ISBN : 978-602-99806-3-9

Table 2. Final feedstock characteritics

Karakteristik	Reactor 1	Reactor 2	Reactor 3
Initial Moisture Content (%)	21,92	29,12	32,39
Volatile solid (% TS)	75,532	75,274	76,721
C (%)	64,8	66,2	72,2
N (%)	2,79	2,45	2,77
C:N Ratio	23,21	27,07	26,09
FAS	95,12%	93,81%	91,61%
NHV (kkal/kg)	2707	2860	2793

The FAS after biodrying process were increased for each reactor indicating expansion of the space inside the feedstocks for air to flow. This is similar to the research conducted by Ma *et al*., (20116), the FAS value increased to 93.53%, 94.03%, and 92.62% influenced by the extent of water removal compared with organic degradation.

Carbon concentration decreased significantly in reactor 1 as 11,2% sincecarbon is used by microorganisms to form cells in the form of skeletons of all organic molecules carried by organisms to form an energy [13].

Nitrogen value decrease significantly in reactor 2 as 0,15% since nitrogen is required for the synthesis of amino acids, purines, pyrimidines, some carbohydrates, lipids, and enzyme cofactors. Amino acids, purines and pyrimidines are growth factors [13].

All of three reactors have C/N ratio between 20-30 so that the biodrying process can be lengthen for more than 21 days to obtain the expected final moisture content.

The NHVs are continuously increase during the biodrying process. The largest increase in NHV occurred in reactor 2 with an initial moisture content of 63.96% due to the high water removal at reactor 2 that is equal to 34,84%. Some researchers such as Velis et al. (2012) concluded that biodrying can increase LHV from 30% - 40% or even more by reducing the moisture.

3.2. Temperatur profile

Biodrying is a combination of physico-chemical process with aeration system. There were three similar laboratory scaled reactors made from polystyrene as an insulator to diminish the heat loss during the biodrying process Three type of feedstock with different initial moisture content are used. Reactor 1, 2,

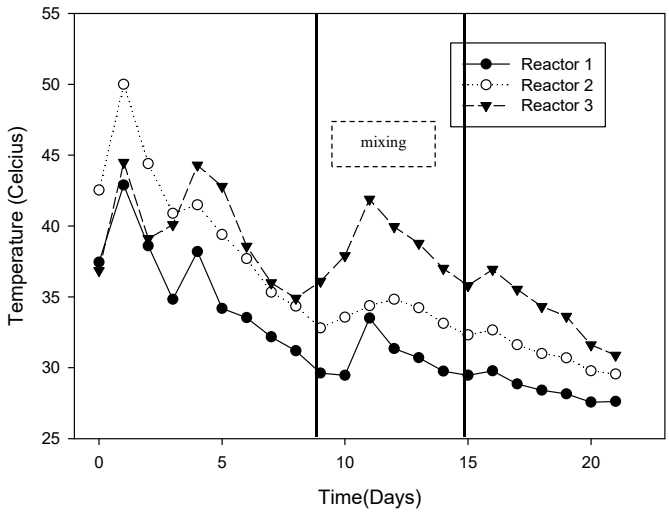


Figure 2. Temperature profile of each reactor

The ANOVA test results showed that the temperature profile among three reactors were significantly different. Reactor 1 with initial moisture content 50,71% reached the highest temperature on day-1 which

ISBN : 978-602-99806-3-9

was about 43^{0}C then decreased and increase again on day-4 which was about 38^{0}C. After the 4th day, the temperature decreased so wastes are mixed on the 9th day hence the temperature increase again in the 11th day. The second mixing conducted on the 15th day however the temperature only slightly increased and then continuously decreased until the 21st day at 27,62^{0}C.

At reactor 2 with initial moisture content 63,96%, the highest temperature reached on day-1 was 50^{0}C. Feedstock was mixed on day-9. On day-10, the temperature increased again until day the 12th. The second mixing was done again on the 15th day. The temperature has increased slightly and then continues to decrease until the 21st day (Figure 2).

The temperature in reactor 3 which initial moisture content was 71.06% had a different temperature profile compare to the other 2 temperature profiles. The highest temperature reached on day-1 which was about 44.5^{0}C then decreased. Mixing was done on day 9. On day-10, the temperature increased again until the 11th day which was about 41.9^{0}C. The second mixing was done on the 15th day and the temperature only slightly increased and then decrease until the 21st day. In reactor 3, the temperature was ranging from 44,50^{0}C - 30,88^{0}C.

Overall, the highest temperature reached by reactor 2, which is 50^{0}C and the lowest temperature occured in reactor 1 which is 27,57^{0}C. In the first 4 days, the temperature would be at its highest point. This similar result occurred in previous research of feedstock used, as explained by Ma *et al*., (2016) if the food waste is used in the biodrying process it will show that the direct temperature rises drastically without going through the lag phase and has the second (from day 1 to day 4.5) and the temperature will decrease until the first mixing.

Higher biodegradable organic content will produce higher heat and temperature, which will also result in the degradation of organic matter [14]. The temperatures from day 1 to day 4 were high due to the hydrolysis stage and microorganism growth entering the exponential phase in which microoganism grows and multiplies itself constantly [13]. Non-elevated temperatures indicated that overall biological stability has been achieved after biodrying and microorganism activity has been retained, while temperatures have fallen due to the solubility of decomposing organic materials [15].

3.3. Moisture content

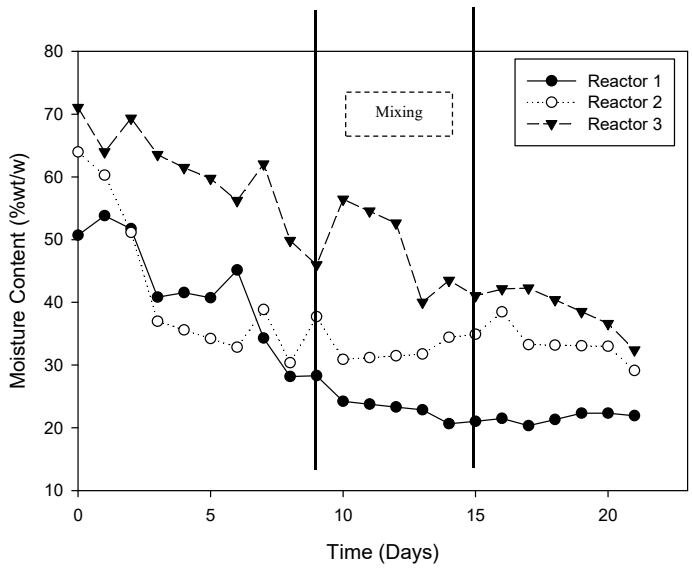


Figure 3. Moisture content profile of each reactor

The moisture content profile among three reactors were significantly different. Reactor 1 had a considerable decreased until day-to-10 with the final moisture content was 21.92% and water removal which was 28.79%. Reactor 2 had a significant decrease in the first 8 days with moisture content after 21 days reached 29.12% with water removal was about 34.84%. While, the condition of reactor 3 had the highest water removal which was 38,68% with the final moisture content reached 32,38%. The water removal caused by heat from waste through biodrying processes is not constant, but depends on the

ISBN : 978-602-99806-3-9

growth of microorganisms. The growth depends on the presence of water on the waste as happened in the composting **[16]**

In Figure 3, reactor 1 with initial moisture content 50.71% representing the reactor had a final water content of close to 20% among other reactors which is a parameter for an RDF. This might be happened because reactor 1 has the lowest initial moisture content of 50.71%. However, when returning to the main concept of biodrying which means biological-drying, then reactor 3 with the initial moisture content 71.06% had the highest water removal percentage which was about 38.68%..

Previous studies have been conducted on moisture reduction on biodrying. Zhang *et al*., (2008) conducted a study with the initial feedstock moisture content of 72%, then after the biodrying process it reached 50.5. Not much different from the research done by Shao *et al*., (2010) showed a decrease in moisture content from the biodrying process with an initial value of 73.0% to 48.3% after 18 days. Velis *et al*., (2009) did the same thing for 7 - 15 days and obtained water removal results of 25 - 30%. The same thing happened to reactor 1,2, and 3, until day 15, water removal ranging from 29% - 30%. The biodrying process will be slowing down when the moisture content was below 35% **[16]**. The statement is evident in the conditions of reactors 2 and 3 which had a small percentage of water removal when the moisture content reached 35%. In addition, the moisture content of microorganisms is well within the range of 40% -70% to maintain the active metabolic function of microorganisms because cell walls must remain permeable to the flow of nutrient-readily soluble nutrients by osmosis **[17]**. The process of removing moisture content was done in 2 (two) stages. First, water was evaporated from the biomass surface to the air sublayer that flows through the bed voids, then water vapor was carried from around the surface of the waste surface by convection airflow. This also made the sponge on the top of insulation became wet caused by evaporated water vapor **[18]**

3.4. Volatile solid

The volatile solid (VS) content in the biodrying process becomes an important parameter in conditioning the feedstock as an RDF. This is because the higher VS reduction can lead to lower energy content and resulting in lower quality for RDF **[15] [19]**.

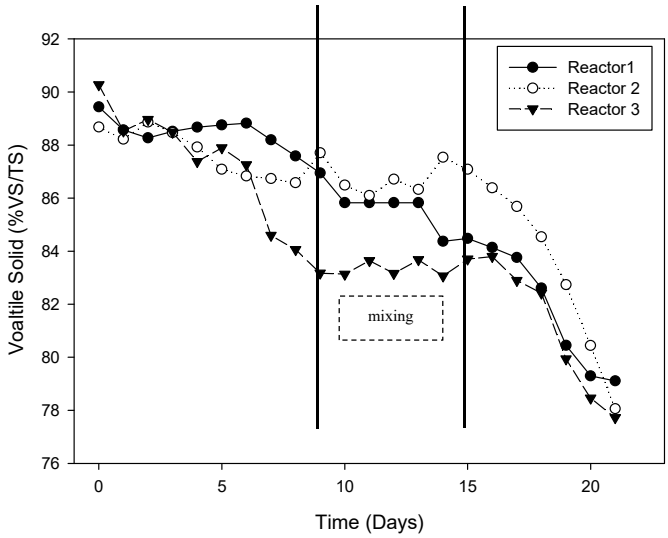


Figure 4. Volatile solid profile of each reactor

The results of the ANOVA test showed that the volatile solid profile among three reactors were identical (Figure 4). Reactor 1 had a volatile solid content of 89.44% on day 0 and on day 21 the volatile solid output in reactor 1 was 79.10%. So, the difference of volatile solid content in reactor 1 was 10,33%. In the reactor 2 volatile solid content was 88.68% on day-0. Volatile solid content were continuously decrease until the 21st day. The difference of volatile solid reduction in reactor 2 is 10,62%. While for reactor 3, initial volatile solid content was 90,27%. As reactor 3, volatile solid content showed decreasing trend until 21st day and reached 76,72%. So, the difference of volatile solid reduction in reactor 3 was 13,55%.

ISBN : 978-602-99806-3-9

Figure 4 shows that after the 15th day, the volatile solid content of all three reactors were highly decreased while the objective of biodrying is to keep the volatile solid content. The overall reactor shows that the volatile solid reduction ranging from 13% - 15% under different initial moisture content conditions and constant airflow. The difference in volatile solids reductions is similar with Villegas (2014) research with a reduction of volatile solid ranging from 1-19%.

3.5. The duration of biodrying process to an RDF

This study was conducted for 21 days, and all wastes in the three reactors have not reached the standard of moisture content for the RDF that is <20 (% wt /w). The equations have been developed using 3rd order line equation showed in table 3 to predict the final day that waste can reach 20% of the standard moisture content.

Table 3. Equation of 3rd Order for Moisture Content

Number	Line Equation	R^2
Reactor 1	$y = 0{,}0046x^3 - 0{,}0294x^2 - 2{,}8415x + 54{,}032$	0,9442
Reactor 2	$y = -0{,}0111x^3 - 0{,}4533x^2 - 6{,}2296x + 64{,}037$	0,9734
Reactor 3	$y = 0{,}0033x^3 - 0{,}1264x^2 - 2{,}9566x + 70{,}727$	0,9122

By using the 3rd order line equation with the values of R^2 are more than 0,9 which mean the influence between independent variables to the dependent variables are getting bigger, so the time which are required for final moisture content reach <20 (%wt/w) showed in table 5,

Table 0. estimated drying duration

Number	Days	Final Moisture Content (%wt/w)
Reactor 1	**22**	**19,83**
Reactor 2	**25**	**18,17**
Reactor 3	**27**	**18,09**

Those 3 reactors showed different duration, beacuse the higher the initial moisture content, the higher the amount of water removal that affect the duration of drying time. So, in order to reach <20 (%wt/w), biodrying procsss should be continued.

4. Conclusion

This study showed that initial moisture content generates significantly different temperature profiles for all three reactors. The highest temperature reached by the initial moisture content of 63.96% by 50^0C. The moisture content among three reactors were significantly different with the initial moisture content of 71.06% had the highest water removal percentage of 38.68%. The initial moisture content showed an identical volatile solid reduction among the reactors. The higher the initial moisture content will affect the higher volatile solid consumption caused by the increased activity of microorganisms.

The biodrying process gave different results on the heat value among three reactors. The highest NHV (Net Heating Value) reached 2860 kcal / kg was in reactor 2 with the initial moisture content of 63.96% which also became the largest percentage of increasing after 21 days of biodrying process which was about 107%.

The whole reactors have not reached the RDF parameter, with the calculation of equations of 3rd order equation, it was found that reactor 1 took 21 days, reactor 2 took 25 days and reactor 3 took 27 days to reach moisture content less than 20 (% wt/w).

Acknowledgement

This research was fully supported by PITTA (*Publikasi Internasional Terindeks Tugas Akhir*) University of Indonesia who has provided financial support from the experiment study until the conference session

ISBN : 978-602-99806-3-9

and also the reviewer from Internastional Joint Conference on Science and Technology (IJCST) to make this paper better.

References

[1] T. Hamad, A. Agll, Y. Hamad and J. Sheffield, "Solid waste as renewable source of energy: current and future possibility in Libya," *Case Studies in Thermal Engineering Vol.4,* pp. 144-152, 2014.

[2] S. Sadaka, K. VanDevenderm, T. Costello and M. Sharara, "Partial Composting for Biodrying Organic Materials," *Agriculture and Natural Resources,* pp. 1-4, 2011.

[3] L. Cai, T.-B. Chen, D. Gao, G.-D. Zheng, H.-T. Liu and T.-H. Pan, "Influence of forced air volume on water evaporation during sewage sludge bio-drying," *Water Research,* vol. 47, pp. 4767 - 4773, 2013.

[4] J. Ryckeboer, D. D. Clercq, J. Mergaert, J. Coosemans, K. Vaes, H. Insam, S. Klammer and J. Swings, "A survey of bacteria and fungi occuring during composting and self-heting process," *Annals of Microbiology,* vol. 53 (4), pp. 349 - 410, 2003.

[5] F. Tambone, B. Scaglia, S. Scotti and F. Adani, "Effects of biodrying process on municipal solid waste properties," *Bioresource Technology,* vol. 102, pp. 7443 - 7450, 2011.

[6] G. Tchobanoglous, *Integrated Solid Waste Management,* New York: Mc. Graw Hill, 1993.

[7] Sudradjat, Mengelola Sampah Kota, Jakarta: Swadaya.

[8] G. A. Kristanto, H. Rialdi and I. Gusniani, "Nitrogen removal from landfill leachate via ex-situ nitrification and in-situ denitrification in laboratory scale reactor," *Procedia Engineering,* vol. 171, pp. 425-433, 2017.

[9] D. K. K. Jakarta, "karakteristik Sampah Jakarta," Jakarta Open Data, Jakarta, 2011.

[10] A. Juwita Sari, "The Potential of Solid Waste in TPA Cipayung as Refuse Derived Fuel (RDF) Raw Material," UI, Depok, 2008.

[11] S. Navaee-Ardeh, F. Bertrand and P. R. Stuart, "Development and Experimental Evaluation of a 1D Distributed Model of Transport Phenomena in a Continuous Biodrying Process for Pulp and Paper Mixed Sludge," *Drying Technology,* vol. 29, pp. 135 - 152, 2011.

[12] C. Huilinir and M. Villegas, "Simultaneous effect of initial moisture content and airflow rate on biodrying of sewage sludge," *Water Research,* pp. 1-11, 2015.

[13] Prescott, Harley and Klein, Prescott, Harley, and Klein's Microbiology, Seventh Edition, New York: Mc Graw Hill, 2008.

[14] B. Yang, L. Zhang and D. Jahng, "Importance of Initial Moisture Content and Bulking Agentfor Biodrying Sewage Sludge," *Drying Technology, 32,* pp. 135-144, 2014.

[15] F. Adani, D. Baido, E. Calcaterra and P. Genevini, "The influence of biomass temperature on," *Bioresource Technology,* pp. 173-179, 2001.

[16] Mendoza, Martinez, Prats, Izquierdo and Bovea, "Biodrying as a biological process to diminish moisture," *Environ Dev Sustain,* pp. 1013-1026, 2012.

[17] K. M. Frei, D. Cameron and P. R. Stuart, "Novel Drying Process Using Forced Aeration Through a Porous Biomass Matrix," *Drying Technology,* vol. 22, no. 5, 2004.

[18] A. Zawadzka, L. Krzystek, P. Storalek and S. Ledakowicz, "Biodrying of Organic Fraction of Municipal Solid Wastes," *Drying Technology,* vol. 28, pp. 1220 - 1226, 2010.

[19] Velis, Longhurst, Drew, Smith and Pollard, "Biodrying for mechanical-biological treatment of wastes: A review," *Bioresource Technology,* vol. 102, pp. 2747-2761, 2009.

ISBN : 978-602-99806-3-9

[20] T. C. Ogwueleka and F. Ogwueleka, "Modelling Energy Content of Municipal Solid Waste," *Iran. J. Environ. Health. Sci. Eng.,,* pp. 263-264, 2010.

[21] B. Adhikari, A. Tremier, S. Barrington and J. Martinez, "Biodegradability of Municipal Organic Waste:," *Waste Biomass Valor Vol. 4,* pp. 331-340, 2013.

[22] I. Petric, A. Sestan and I. Sestan, "Influence of Initial Moisture Content on the Composting of Poultry Manure with Wheat Straw," *Biosystems Engineering,* vol. 104, no. 1, pp. 125-134, 2009.

[23] C. Cimpan and H. Wenzel, "Energy implications of mechanical and mechanical–biological treatment," *Waste Management,* pp. 1648-1658, 2013.

Proceeding International Joint Conference
on Science and Technology (IJCST) 2017
ISBN : 978-602-99806-3-9

Effect of cellulase addition on leachate recirculation for leachate qualities using bioreactor landfill method

G A Kristanto[1], R P Sari[2]

Environmental Engineering Study Program, Civil Engineering Department, Universitas Indonesia Kampus Baru UI Depok, Depok 16424, Indonesia

[1]gakristanto@gmail.com
[2]rahmipuspita17@gmail.com

Abstract. Lignocellulose material which consists of three main components, including cellulose, hemicellulose, and lignin, is known for its difficulty to be degraded using biological process using biological process. Cellulase has proven to catalyze the degradation of celullose by enzymatic hydrolysis. However, the addition of cellulase might affect leachate qualities that was generated from landfill. The aim of this research is to analyze the effect of cellulase addition on leachate qualities. Two 1.5 m-height bioreactors were provided for two different treatments including (1) leachate recirculation with cellulase addition (2) leachate recirculation only as control. The addition of cellulase at 15 x 106 U/tonne was resulting in lower concentration for COD (29,100 mg/L in cellulase addition and 31,900 mg/L in control), TS (17,800 mg/L and 22,100 mg/L, respectively), TDS (15,900 mg/L and 19,800 mg/L, respectively). This was likely caused by acceleration of hydrolysis using enzymatic process. However, BOD value higher when cellulase addition was conducted (16,100 and 11,600 mg/L, respectively) because the addition of cellulase supported formation of glucose, therefore escalated BOD value. pH value was increasing over time towards neutral, indicating landfill had been heading toward methanogenic phase. From the experiment, it can be concluded that addition of cellulase has impacts towards leachate qualities.

1. Introduction

Solid waste is all wastes derived from human and animal activities which are usually solid and disposed of because they are mostly considered as useless and undesirable [1]. Due to the increasing population, it directly increases the amount of waste generation. Approximately 1.3 billion tons of waste are generated annually across the world, this volume is expected to increase until 2025 to reach 2.2 tons [2]. If the amount of waste continues to grow and not accompanied by adequate waste treatment will cause serious problems. Wastes have caused problems such as supporting global warming because solid waste emits carbon dioxide along with degradation, waste also can degrade water body quality, release toxic gases, and leachate can contaminate groundwater [3]. Waste problem in Indonesia, especially in big cities, is one of the most challenging urban issues for the government [4]. Indonesia's waste problem is caused by many factors such as high waste generation that estimated to increase by about 2-4 percent per year, poor quality of waste management, limited land for landfill, lack of funds for waste management and bad waste management institution [5].

One of the problems of waste management in Indonesia is limited space of landfill. In big cities, landfill must be closed when it has exceeded the capacity, but the closure is not accompanied by new land clearing for landfill due to land availability, community prohibition, and land price [6]. Indonesia is still too dependent on landfill. Approximately 69% of the waste ends up in the landfill with a total of 200

ISBN : 978-602-99806-3-9

landfills in Indonesia, with poor conditions. A good landfill using sanitary landfill technology is only 10 percent of the total landfill in Indonesia [7].
The composition of waste landfill in Indonesia mostly consists of organic waste. TPA Cipayung in West Java consists of 54.014% [8]. Organic waste consists of the main components of lignocellulose. The existence of lignocellulose in waste affects biodegradability in anaerobic systems [9]. Lignocellulose material is a hard-to-break polysaccharide due to its chemical stability, insoluble in water or organic solvents such as acids or weak bases [10]. Lignocellulose has evolved for degradation resistance and this resistance comes from the crystalline form of cellulose, lignin hydrophobicity, and cellulose wrapping by the lignin-hemicellulose matrix [11]. Lignocellulosic materials consist of mainly 3 types of polymers that is cellulose, hemicellulose, and lignin [12].
The degradation of lignocellulosic waste and the products produced by the process are carried out by the activity of various enzymes, especially cellulase [13]. Cellulase is an enzyme that converts one of the components of Lignocellulose, which is cellulose into glucose. The addition of enzymes and leachate recirculation simultaneously can be applied as a TPA treatment [14]. Leachate recirculation has received more attention because it is easy to apply on small and large scale due to accelerated degradation so as to reduce landfill land requirements [15].
However, the addition of cellulase might affect leachate qualities that was generated from landfill. The aim of this research is to analyze the effect of cellulase addition on leachate qualities by analyzing leachate quality parameters for 90 days (BOD, COD, TS, VS, TDS, and TSS) which generated from lab-scale bioreactor landfills that was provided for this purpose.

2. Methods

2.1. Bioreactor landfill

Batch test were conducted for 90 days to observe the effect of cellulase addition into leachate recirculation (1) and leachate recirculation only on leachate quality. Two air-tight bioreactors from Polyvinyl Chloride (PVC) cylinder were provided for this purpose. The dimensions of the columns were as follows: thickness = 9,2 mm, internal diameter = 299 mm and height = 1,85 m (volume = 0.13 m3). The reactor consisted of four kinds of pipes. One port (bottom) served as leachate collection pipe while the other two ports (top) served as a leachate recirculation pipe and gas collection pipe, respectively. Five ports on each sides were served as sample collection pipes. To prevent clogging, 15 cm depth gravels were filled at the bottom reactor. 53 kg waste was compacted to 500 kg/m3 density and was filled on top of gravel for 150 cm height. Rest of the reactor space was filled with cover soil to prevent gas leak.
Leachate recirculation flow rate is 5 Liter/tonne waste as suggested by Environment Agency (2009) for recirculation that was conducted using batch system and categorized as low recirculation rate. Therefore, 265 ml leachate from leachate collection tank was recirculated for 11 times into bioreactor on 90 days period using batch system.
Water addition was conducted to represent the amount of water that percolated through landfill Determination of water addition based on rainfall condition of Depok City taken from Rain Station of FT UI Depok, West Java, Indonesia with average rainfall 0.086 dm / day. Therefore the addition of water is 0.6 L / day.
Cellulase addition was carried out simultaneously with leachate recirculation using batch system [14]. The amount of cellulase added is equivalent to 15 million U / tonne waste was suggested to be added along with leachate recirculation [16]. The cellulase was added into reactor, hence was named Reactor A and reactor without cellulase addition was named Reactor B. The cellulase was produced from cultivation and extraction from *Trichoderma reesi*. The cellulase used is a CEL 150 with an activity of 1,500,000 U / gram was purchased from Sinobios, Shanghai. Therefore, the amount cellulase added for 53 kg waste sample were 0.53 gr.

ISBN : 978-602-99806-3-9

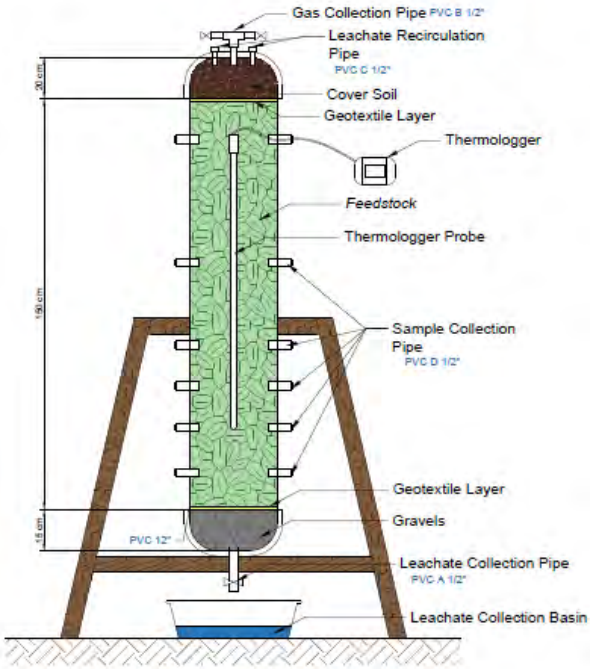


Figure 1. Bioreactor landfill cross section

2.2. Feedstock

Whole 100% organic waste samples were collected from TPS Kemiri Depok, West Java. Both bioreactors contained 53 kg waste samples and its density was assumed as 300 kg/m3 as density before treatment in landfill [1]. Manual compacting was conducted until 500 kg/m3 was reached as an ideal density in landfills [1]. Waste samples were shredded to particles in 5 – 10 cm.

2.3. Analysis method

Leachate was collected from leachate collection at the bottom of bioreactors. To obtain representative leachate characteristic, leachate was characterized in terms of pH, biochemical oxygen demand (BOD5), BOD/COD Ratio chemical oxygen demand (COD), total solid (TS), total dissolved solid (TDS), total suspended solid (TSS), and volatile solid (VS). BOD analysis was conducted using titrimetric method which determined the amount of oxygen loss through the biological decomposition inside winkler bottle.

Table 1. Analysis method

Leachate Quality Parameter	Method	Standard
pH	pH meter	-
BOD5	Titrimetric	SNI 6989.72:2009
COD	Spectrophotometric	SNI 6989.2:2009
TS	Gravimetric	SNI 06-6989.26-2005
TDS	Gravimetric	SNI 06-6989.27-2005
TSS	Gravimetric	SNI 06-6989.3-2004
VS	Gravimetric	SNI 06-6989.26-2005

COD was determined with HACH DR 2000 Spectrophotometry COD test kits (500–10,000 mg/L). In Total Solids (TS) analysis, leachate samples were dried in an oven at 105^0C for 3 hours and weighted. Dried samples then were dried in a furnace at 550^oC for 1 hour and weighted for Volatile Solids (VS) analysis. Total suspended solids (TSS) were conducted by filtering a certain amount of leachate through glass micro fibre filter paper (200 nm). The filter was then dried in an oven at 105° C for 1 hour and weighted. The liquid that percolated through the filter was collected at a known amount for total suspended solids (TDS) analysis. The filtrate was dried in an oven at 180^oC for 1 hours and weighted.

ISBN : 978-602-99806-3-9

3. Results and discussion

3.1. pH

pH value in leachate depends on activities occuring inside. It is caused by the processes of aerobic, acidogenesic, acetogenesic, and metanogenesic, which affect the composition content of leachate such as volatile fatty acid and asetic acid. [17]. Typical leachate usually had pH value between 4.5 to 9 [18]. pH value of leachate is also usually affected by landfill age, in which leachate from new landfill usually more acidic (below 6,5). As for leachate from older landfill, it was more alkaline (above 7.5). pH value range for Reactor A was between 5.5 – 7. As for Reactor B, it was between 5.6 – 7.3. It was suitable with pH value typical for new landfill is between 4.5 – 7.5 [1].

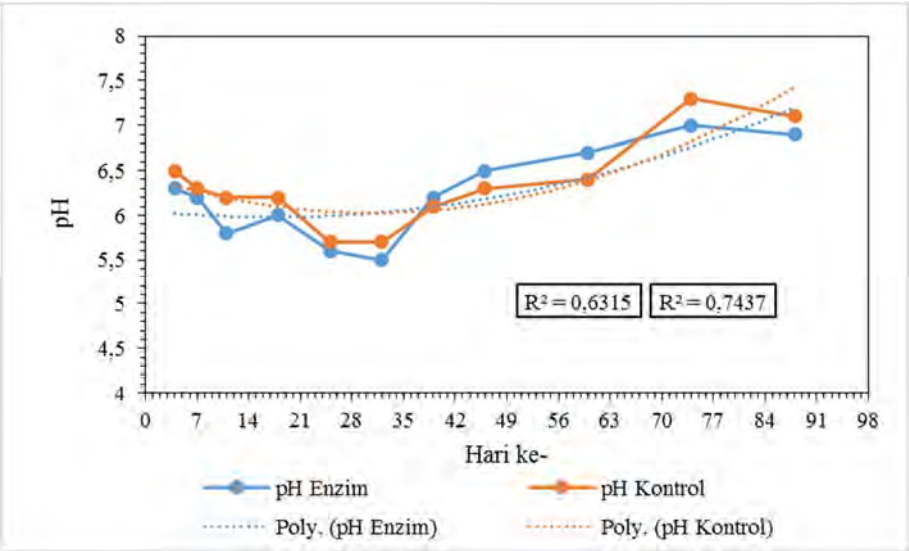


Figure 2. pH during the experiment

pH value on acidogenic stage was influenced by the concentration of volatile fatty acid (VFA). On the fourth day to thirty-second day, the pH values for both reactors was decreased. It was caused by the high production of Volatile Fatty Acid (VFA) and partial pressure of CO_2 in acidogenic phase which usually have typical pH value of 4.5 – 6 [19]. pH value returned to increase towards neutral over time, which indicated that concentrations of VFA's free ions was decreasing [20]. It occurred in initial methanogenic phase, where acid converted into methane and caused formation of acid was decreased and pH value of leachate was increased to between 6.8 – 8 [1]. Therefore the increase of pH value indicated acidogenic phase moved into methanogenic.

3.2. Organics

3.2.1. BOD. Leachate from early acidogenic phase contains organic material biodegradable in high number. It occurred because in acidogenic phase the fermentation of complex organic component was occurred and produced VFA and amino acid [21]. Therefore, typical BOD on this phase is rather high (>10.000 mg/L). BOD value will decrease by time, because stabilization process of solid waste keep increasing [22]. The lower BOD value indicated that the remaining of the organic component only consisted of final products from degradation process [21].

ISBN : 978-602-99806-3-9

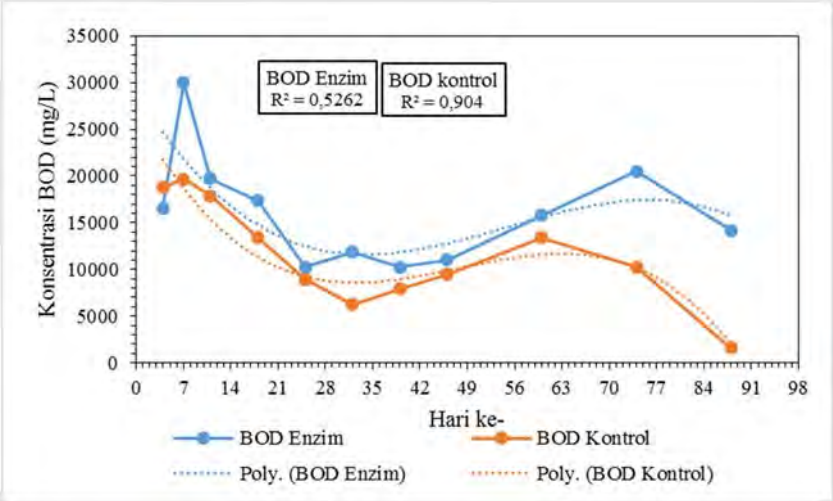


Figure 3. BOD during experiment

The reactor with cellulase addition (Reactor A) had higher BOD value than reactor without cellulase with 4542 mg / L difference. The BOD value describes the amount of organic biodegradable in leachate. Therefore BOD leachate in the Reactor A had higher biodegradibility than the Reactor B. Higher BOD value of the Reactor A was due to increased hydrolysis processes and the production of volatile fatty acids [23] The addition of cellulase has increased cellulose hydrolysis to glucose, so the glucose concentration in reactor with cellulase addition is higher than the Reactor B, thereby increasing the BOD value.

3.2.2. COD. In many cases COD concentration will increase on initial phase in a short time, and will decrease by time [24]. The decrease of COD Value can also be caused by faster solid waste's degradation in laboratory scale by using anaerobic landfill [25]

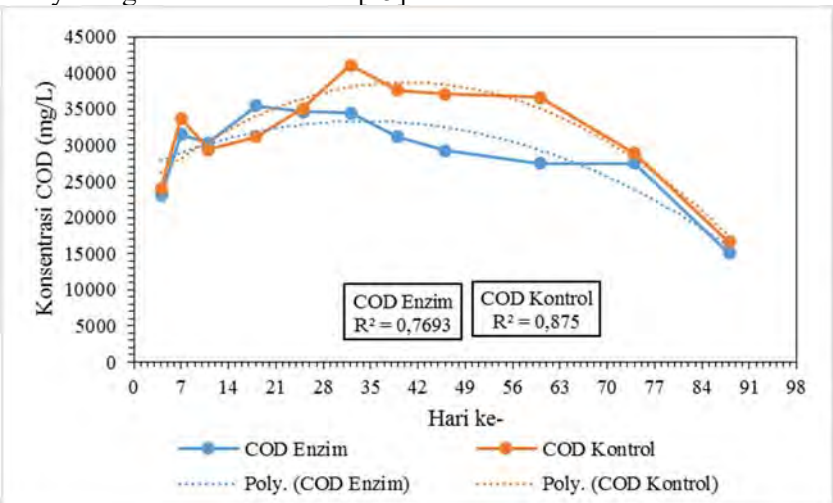


Figure 4. COD during the experiment

Maximum COD value was shown to occur early on Reactor A which reached its maximum value on the day-81 than Reactor B which occurred on the day-32. It was similar with the statement that cellulose hydrolysis influenced COD value [26]. Therefore the escalation of COD value on initial phase indicated that hydrolysis process occurred faster on Reactor A. pH value for Reactor A was decreased until the ninety-first day with the value of 15.100 mg/L.

Higher COD removal was resulted from Reactor A. It had 34% removal, higher than Reactor B which only had 30,1% removal. This may be caused by when decomposition of cellulose and hemicellulose started, COD and BOD value start to decrease [27]. This also suitable with the statement that the

ISBN : 978-602-99806-3-9

hydrolysis of cellulose influenced COD value [26]. So the bigger decrease of COD value was caused by decomposition process of cellulose and hemicellulose which became faster by using enzymatic process with cellulase.
Similar research was conducted by Frank, et. al (2016) with eighty-days of observation. From that research, he obtained COD value for Reactor A for about 1943 mg/L and Reactor B produced a higher COD value which about 2065 mg/L. For leachate COD removal, Reactor A had bigger removal value which is 42%. Higher than Reactor B which had a value of 35%. However, COD removal in this research was smaller than [28] research which obtained COD removal above 95% when recirculation of leachate was implemented.

3.2.3. BOD/COD ratio. Biodegradability of leachate varies over time in processes within the landfill. Changes in biodegradability of leachate can be evaluated using the ratio of BOD / COD [29]. The BOD / COD ratio is a good indicator in measuring the proportion of biologically degradable organic material in all organic materials. The BOD / COD ratio is also an indicator of phase change from acetogenic to methanogenic in the waste stabilization process [30].

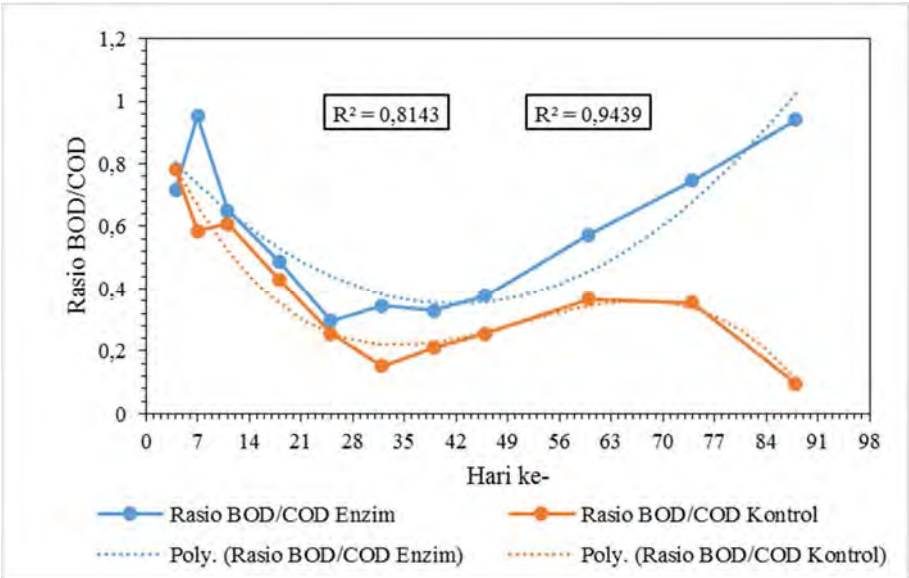


Figure 5. BOD/COD ratio during the experiment

The BOD / COD ratio for both reactors continued to decrease in halfway of bioreactor operation. The decrease in the BOD / COD ratio concludes that the remaining organic component is the final product of the degradation process [21]. Decrease in BOD / COD ratio occurred at the Reactor B until the last day with the number 0.09. A low BOD / COD ratio indicates a low biodegradation rate and contains less easily degradable organic material [31]. This is due to the content of cellulose and lignin which are difficult to degrade under anaerobic conditions [32].

3.3. Solids

The solid parameters measured in this study included Total Solid (TS), Volatile Solid (VS), Total Suspended Solid (TSS), and Total Dissolved Solid (TDS). All measurements were conducted using gravimetric method. The amount of total solids supposed to be equal with sum of total suspended solids (TSS) and total dissolved solids (TDS) [33]. However, this value couldn't be reached in this study, therefore these errors should be taken into consideration

3.3.1. Total solids (TS). TS value between Reactor A and Reactor B had significant differences after evaluated using statistical analysis. Lower TS values obtained by Reactor A, with 4,225 mg/L differences compared with Reactor B.

ISBN : 978-602-99806-3-9

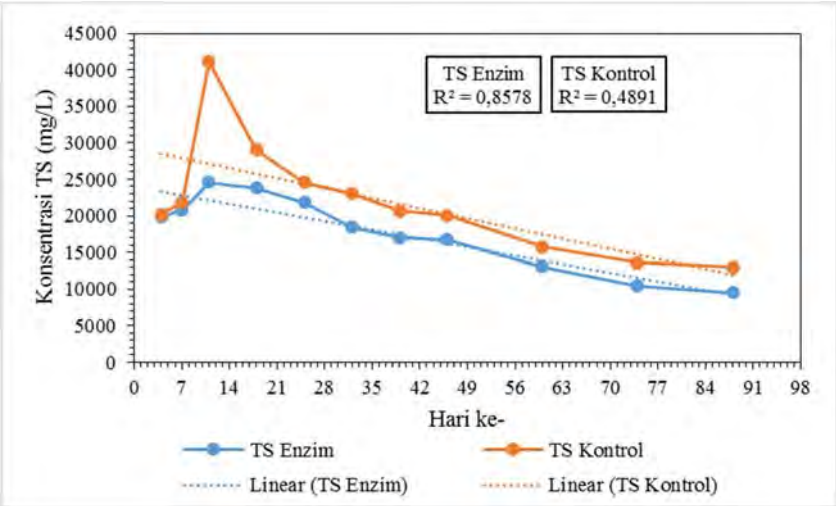


Figure 6. TS during the experiment

This was in contrast to the research of Frank, et al (2016) that has stated no difference in TS values in leachate when cellulase was added. Similar research stated that the concentration of TS values in leachate will decrease as the phase moved from asidogenic to methanogenic [34]. This indicated Reactor A has reached methanogenic phase earlier than Reactor B..

3.3.2. Volatile Solids (VS). VS removal for Reactor A and Reactor B is 45% and 21% respectively. This result was consistent with Frank et al. (2016) who have conducted similar research. The VS results were said to decrease in concentration and had small differences between the two reactors. Due to the biodegradable nature of waste, the organic component decreases faster than inorganic, therefore the VS value decreases over time [35]. Degradation process within bioreactor has led to decrease VS value caused reduction of organic in leachate. However, there was no difference in VS value between the two reactors.

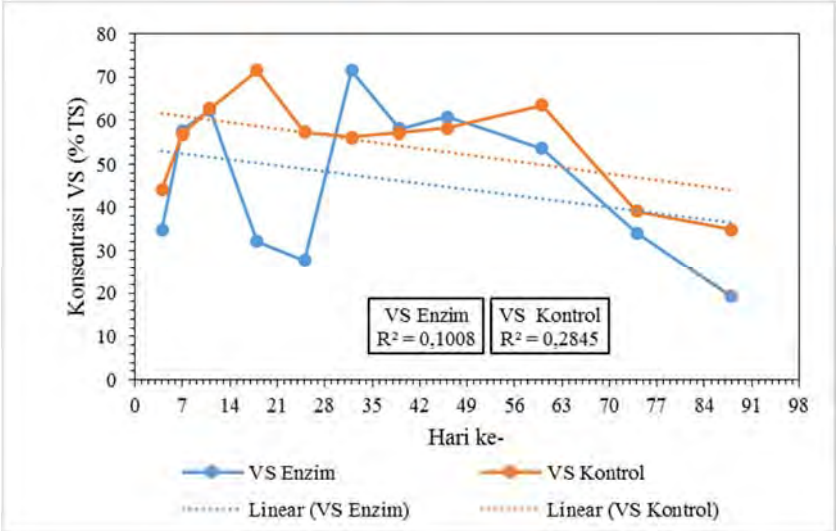


Figure 7. VS during the experiment

3.3.3. Total suspended solids (TSS). TSS removal for Reactor A and Reactor B were -650.6% and -373.6% respectively. This indicated escalation in TSS value before and after bioreactor landfill operation. This is in contrast to the results of the research by Frank et al. (2016), which stated decrease in TSS values in both reactor with or without cellulase addition due to the recirculation process. This may has been caused by leachate exposure to oxygen and lead to iron oxidation from Iron (II) to Iron (III). Hence forming colloidal iron hydroxide, which contributed to brown color in leachate samples and

ISBN : 978-602-99806-3-9

increased the value of TSS. Therefore while COD values decreased over time, TSS values continue to increase because of iron oxidation [34]. An increase in TSS value can also be caused by escalation of pH values which causes a decrease in the solubility for irons such as Sulfate Ferry [36].

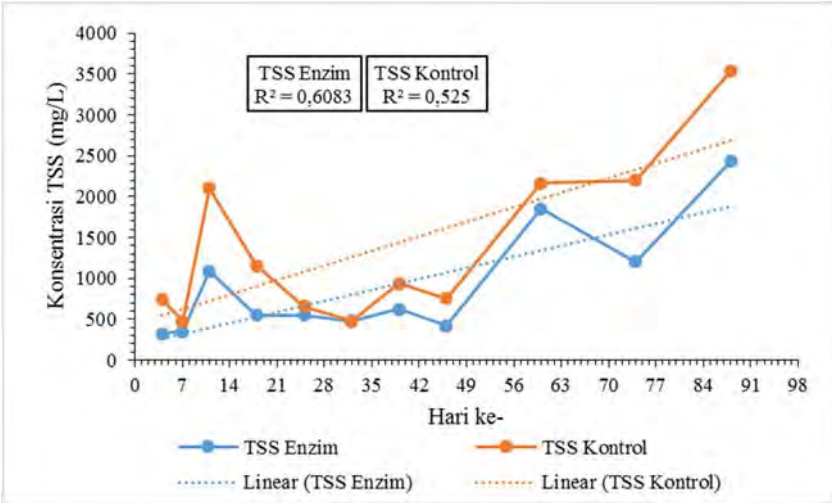


Figure 8. TSS during the experiment

The cellulase addition did not affect the TSS concentration [37], however in this study Reactor A had lower TSS concentration than Reactor B with difference of 485.18 mg / L. TSS consists mainly of leaf and wood particles, but in addition there are also soil particles [31]. TSS value in Reactor A is smaller than the Reactor B. This indicated addition of cellulase has supported hydrolysis of organic particles into water-soluble glucose.

3.3.4. Total dissolved solids (TDS). In general, for both reactors the TDS value continued to decrease constantly as the phase transfer from acidogenic to methanogenic.

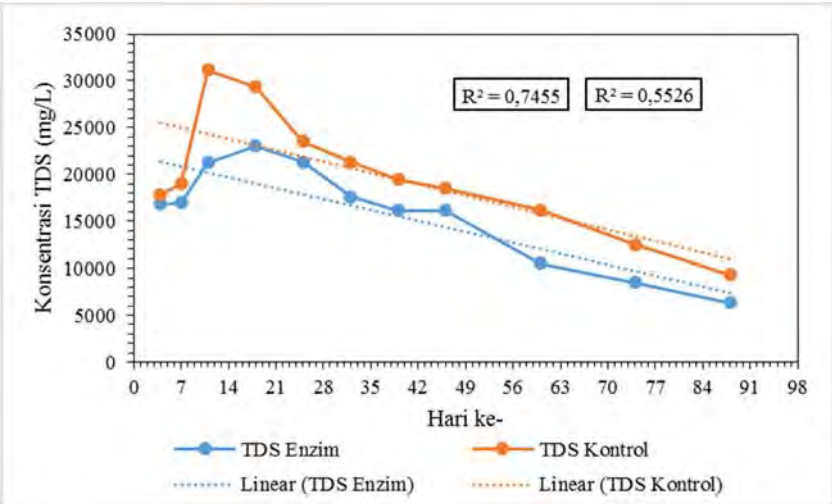


Figure 9. TDS during the experiment

This was occurring because low pH (acidogenic) has promoted heavy metal dissolution [34]. High metal solubility [38] and minerals such as Aluminum [39] at low pH cause high TDS. As the pH increases, the solubility of heavy metals and aluminum decreases.

ISBN : 978-602-99806-3-9

4. Conclusion

The addition of cellulase has influenced the concentration of pollutant leachate generated by waste. The values of COD, TDS, TSS, and TS had significantly lower caused by cellulase addition. This is because cellulase has accelerated the degradation process by hydrolyzing cellulose into glucose. BOD values are significantly larger when cellulase addition was implemented because glucose increases the load of BOD in leachate. There were no differences in pH and TSS after statistical tests.

Acknowledgement

The authors would like to thank Universitas Indonesia for financially supporting this study through the PITTA Grant

References

[1] G. Tchobanoglous, Integrated Solid Waste Management, New York: Mc-Graw Hill, Inc, 1993.

[2] J. Nyberg, The Global Garbage Crisis, No Time to Waste, Nairobi: UNEP, 2012.

[3] C. S. Cantoria, Understanding The Role of Solid Waste in Pollution, Troy: Bright Hub, 2010.

[4] E. Damanhuri, Some Principal Issues on Municipal Solid Waste Management in Indonesia, Bandung: Institut Teknologi Bandung, 2005.

[5] Kardono, Integrated Solid Waste Management in Indonesia, Jakarta: BPPT, 2007.

[6] G. A. Kristanto, H. Rialdi and I. Gusniani, "Nitrogen Removal from Landfill Leachate via ex-situ Nitrification and in-situ Denitrification in Laboratory Scale Bioreactor," *Procedia Engineering* , vol. 171, pp. 425-433, 2017.

[7] H. N. Jong, "Indonesia in State of Waste Emergency," The Jakarta Post, Jakarta, 2015.

[8] A. J. Sari, "Potensi sampah TPA Cipayung sebagai bahan baku refuse derived fuel," Universitas Indonesia, Depok, 2009.

[9] T. Richard, "Cornell Composting," 2016. [Online]. Available: http://compost.css.cornell.edu/calc/lignin.html.

[10] X. Jin, "Breaking Down Cellulose," *Standford University,* 2010.

[11] S. Morais, E. Morag, Y. Barak, D. Goldman, Y. Hadar, R. Lamed, Y. Shoham, D. Wilson and E. Bayer, "Deconstruction of Lignocellulose into soluble sugars by native and designer cellulosomes," *MBio,* 2012.

[12] P. Bajpai, Preatreatment of Lignocellulosic Biomass for Biofuel, Berlin: Springer, 2016.

[13] R. K. Sukumaran, R. R. Singhania and A. Pandey, "Microbial Cellulases - Production, Applicatons, and Challenges," *journal of Scientific & Industrial Research,* pp. 832-844, 2005.

[14] R. Frank, D. S, W. ST, V. R, T. C and C. F, "Evaluating leachate recirculation with cellulase addition to enhance waste biostabilisation and landfill gas production," no. Waste Management, 2016.

[15] W. Liu, Y. Liu, B. Zhu and X. Li, "Enhanced biogas production from a stimulated landfill bioreactor for the co-disposal of municipal solid waste and coal waste," *Waste Management,* pp. 1186-1194, 2014.

[16] P. H. J. M. A. S. M. Jayasinghe, "Enhancing gas production in landfill bioreactor: a flow-through column study on leachate augmentation with enzyme," *Toxic, Radioact,* pp. 253 - 258, 2012.

[17] B. Heck, N. Myers and D. Hargadine, "Hydrogeology and ground-water quaity condition at the Reno County Landfill, south-central Kansas," in *Water resources Investigations report*, Kansas, U.S Geological Resources, 1992, p. 56.

[18] T. H. Christensen, P. Kjeldsen and P. L. Bjerg, "Biogeochemistry," *Applied Geochemistry,* pp. 659-718, 2001.

ISBN : 978-602-99806-3-9

[19] K.-U. H. a. R. Stegmann, "Leachate management: leachate generation, collection, treatment and costs," *Leachte management,* 2014.

[20] E. Chian and F. DeWalle, "Sanitary landfill leachates and their treatment," *Journal of Environmental Engineering Division Vol. 102, Issue 2,,* pp. 411-431, 1976.

[21] J. Harmsen, "Identification of organic compound in leachate from a waste tip," *Journal of Water Research,* pp. 699-705, 1983.

[22] B. Bhalla, M. S. Saini and M. Jha, "Effect of age and seasonal variations on leachate characteristics of municipal solid waste landfill," *International Journal of Research in Engineering and Technology Vol. 02 Issue 8,* pp. 223-232, 2013.

[23] F.-S. Huang, J.-M. Hung and C.-J. Lu, "Enhanced leachate recirculation and stabilization in a pilot landfill bioreactor in Taiwan," *Waste Management and Research,* pp. 1-10, 2012.

[24] R. Rowe, "Leachate characterization for MSW landfills, Proceedings Sardinia," *Fifth International Symposium on Sanitary Landfill,* p. 327–344, 1995.

[25] D. Sponza and O. Agdag, "Impact of leachate recirculation and recirculation," *Process Biochemistry,* p. 2157–2165, 2004.

[26] P. Jensen, M. Hardin and W. Clarke, "Effect of initial biomass on cellulose hydrolisis by leachate communities," *International Journal Environment and Waste Management,* pp. 205-213, 2009.

[27] P. Kjeldsen, M. A. Barlaz, A. P. Rooker, A. Baun, A. Ledin and T. H. Christensen, "Present and Long-Term Composition of MSW Landfill Leachate: A Review," *Critical Reviews in Environmental Science and Technology,* pp. 297-336, 2002.

[28] Y. Lin, D. Wang and L. Wang, "Biological pretreatment enhances biogas production in the anaerobic digestion of pulp and paper sludge.," *Waste Manage,* pp. 800-810, 2010.

[29] E. C. Rada, I. A. Istrate, M. Ragazzi, G. Andreottola and V. Torretta, "Analysis of electro-oxidation suitability for landfill leachate treatment through an experimental study," *Sustainability,* pp. 3960-3975, 2013.

[30] A. H. Lee and H. Nikraz, "BOD:COD Ratio as an Indicator for Pollutants Leaching from Landfill," *Journal of Clean Energy Technology,* pp. 263-269, 2014.

[31] S. Kannepalli, P. F. Strom, U. Krogmann, V. Subroy, D. Gimenez and R. Miskewitz, "Characterization of wood mulch and leachate/runoff from three wood recycling facilities," *Journal of Environmental Management,* pp. 421-428, 2016.

[32] D. Komilis and R. Ham, "The effect of lignin and sugars to the aerobic decomposition of solid wastes," *Waste Management,* pp. 419-423, 2003.

[33] WHO, "Guidelines for drinking water quality, 2nd edition," June 2017. [Online]. Available: http://www.who.int/water_sanitation_health/.

[34] K. Kylefors and A. Lagerkvist, "Changes of leachate quality with degradation phases and time," *Proceedings of the Sixth International Landfill Sym-,* 1997.

[35] E. Chian and E. Dewalle, "Sanitary landfill leachate and their treatment," *Journal of Environmental Engineering Division,* p. 411, 1976.

[36] M. Garcia-Casal and M. Layrisse, "The effect of change in pH on the solubility of iron bis-glycinate chelate and other iron compounds.," *Arch Latinoam Nutr.,* vol. 6, p. 35, 2001.

[37] R. Frank, S. Davies, S. Wagland, R. Villa, C. Trois and F. Coulon, "Evaluating leachate recirculation with cellulase addition to enhance waste biostabilisation and landfill gas production," *Waste Management,* pp. 61-70, 2016.

[38] M. C. Chuan, G. Y. Shu and J. C. Liu, "Solubility of heavy metals in a contaminated soil: Effects of redox potential and pH," *Water, Air, and Soil Pollution,* pp. 543-556, 1996.

[39] UC DAVIS, Solubililty of Soil Component, Davis: University of California, 2010.

ISBN : 978-602-99806-3-9

[40] S. Morais, E. Morag, Y. Barak, D. Goldman, Y. Hadar, R. Lamed, Y. Shoham, D. Wilson and E. Bayer, "Deconstruction of Lignocellulose into soluble sugars by native and designer cellulosomes," *MBio,* 2012.

Proceeding International Joint Conference
on Science and Technology (IJCST) 2017
ISBN : 978-602-99806-3-9

Pomelo peels extract as green corrosion inhibitor for mild steel in hydrochloric acid 1 m

I Nurdin, Elwina[1], J S Maulana[2]
[1,2]Chemical Engineering Department Lhokseumawe State Polytechnic, 24301 Aceh, Indonesia

[1]irwan@pnl.ac.id; irwan_nurdina@yahoo.com

Abstract. The inhibiting action of pomelo *(Citrus maxima*) peels extract have been investigated as environment-friendly corrosion inhibitor of mild steel in hydrochloric acid 1 M using weight loss measurements method. The measurements were conducted at a various concentration of pomelo peels extract and immersion time. The effect of pomelo peels extract concentration and immersion time on the rate of corrosion and inhibition efficiency were investigated. The rate of corrosion was calculated by a weight loss of initial and after immersion of the samples. The mechanisms of corrosion inhibition were determined by adsorption mechanism of inhibitor. The results revealed that pomelo peels extract was an effective corrosion inhibitor for mild steel in hydrochloric acid 1 M solution. The rate of corrosion is decreasing with the increase of pomelo peels extract concentration. The inhibition efficiency was considered to increase with pomelo peels extract concentration to attain 92.2% at 1.6%. The mechanism of inhibition of corrosion is found to be due to adsorption of the extract of pomelo peels on the metal surface which is in conformity with Langmuir's adsorption isotherm.

1. Introduction

The corrosion protection of metals has received much attention globally due to massive losses of natural resources and finances due to corrosion. Mild steel is the most common form of steel because of its relatively low cost and material properties that are acceptable for many applications particularly in food, petroleum, chemical and electrochemical industries, and power production[1, 2].

The major problem of mild steel in many industries is its dissolution in the acidic medium where acids are broadly used for applications such as acid pickling, acid cleaning, acid descaling, and oil well acidizing [3, 4].

Corrosion inhibitors are commonly used in industry to control metal dissolution and reduce the corrosion rate in contact with the aggressive acid solution. Most acid inhibitors are organic compounds containing nitrogen, sulfur, and oxygen in their molecule [5-8]. The inhibition action is due to the formation of protection film on to the metal surface blocking the metal from the corrosive agents present in solution. A large number of scientific studies have been dedicated to the corrosion of mild steel and the use of organic compounds as corrosion inhibitors in acidic media [9-12]. Because most of these synthetic organic inhibitors are expensive and toxic to the environment, investigation and evaluation of naturally occurring substances (organic inhibitors) have continued to receive attention due to the presence of hetero atoms like nitrogen, sulfur, and oxygen in their structure.

The study of plant extracts as low-cost and ecofriendly corrosion inhibitors have been interested most researchers due to an environmental perspective. Green corrosion inhibitors have a promising future for the quality of the environment because they do not contain heavy metals or other toxic compounds. Also, they are a biodegradable and renewable source of materials.

ISBN : 978-602-99806-3-9

Numerous reports have been highlighted in the successful application of plant extracts as corrosion inhibitors for mild steel in different media [13-17]. Naturally occurring molecules exhibiting a strong affinity for metal surfaces are the focus of research oriented toward the development of environmentally friendly corrosion inhibitors; compounds showing good inhibition efficiency and low environmental risk. The efficiency of these organic corrosion inhibitors is related to the presence of polar functional groups with S, O or N atoms in the molecule, heterocyclic compounds, and pi electrons.

One of these natural compounds is fruits. Fruit is a rich source of chemicals such as vitamins, minerals, and phenolic compounds. Pomelo fruits are one of the traditional fruit of Asian region, particularly in South East Asia. Pomelo fruits growth and eats in almost all of the province in Indonesia. However, their peels have not been yet utilized. Since pomelo peels have high enough tannin, which is one of good inhibitor compound. Hence, the investigation of pomelo peels extracts as corrosion inhibitor would be giving alternative utilization of pomelo fruits.

The aim of this study is to investigate the efficiency of extract pomelo peels in inhibiting corrosion of mild steel in hydrochloric acid solution. Various concentration of pomelo peels extract and immersion time will be examined.

2. Methodology

The corrosion behavior of mild steel in hydrochloric acid was investigated by gravimetric method. The mild steel was purchased from the local supplier, while hydrochloric acid was purchased from Merck Chemical, and pomelo fruit was obtained from the local market in Lhokseumawe.

2.1. Specimen Preparation

Rectangular mild steel specimens with dimensions of 5x3x0.2 cm were used for corrosion investigation. The specimen's surfaces were abraded with silicon carbide abrasive papers ranging from 400 to 1200 grits. The sample was then degreased with acetone, washed in a stream of water and dried in the air and then immersed in the hydrochloride acid 1 M with the absence and the presence of inhibitor.

2.2. Inhibitor Preparation

Pomelo peels were collected from pomelo fruit. They were cut in a small piece and dried naturally in the atmospheric environment and then continue dried at 40ºC in the oven. Dried pomelo peels ground to powdered form and weighed 500 grams. The powders were immersed in 1000 ml ethanol 96% and maceration for 48 hours. The extract was filtered through Whatman filter paper. The filtrate was evaporated using rotary evaporator. The solutions were cooled and then stored. From the respective stock solutions, inhibitor solutions were prepared at the concentration ranging from 0.4 to 1.6 v%.

2.3. Measurement rate of corrosion

The gravimetric experiments were carried out according to the ASTM practice standard G-31 [18]. Before conducting the experiments, the pre-cleaned specimens were weighed on an analytical balance using 0.1 mg precision. The considered samples were immersed in the corrosive medium with and without inhibitors at various immersion time. At the end of the experiment, the specimens were removed from the corrosive medium and rinsed with water, cleaned with acetone, dried in hot air and finally weighed. The mean of weight loss values of three identical specimens was used to calculate the corrosion rate and inhibition efficiency of the inhibitor. Corrosion rate was calculated using the formula given in Eq. 1.

$$CR = \frac{K\,x\,W}{A\,x\,T\,x\,D} \qquad (1)$$

Where CR is corrosion rate in mm/y, K is a constant, 87600, W is mass loss in g, A is the area of immersed samples in cm^2, T is time of exposure in hour, D is density of mild steel specimen in g/cm^3.

ISBN : 978-602-99806-3-9

Inhibition efficiency and surface coverage (θ) were also determined using Eqs. 2 and 3.

$$\mathrm{IE} = \frac{\text{CR uninhibited} - \text{CR inhibited}}{\text{CR uninhibited}} \times 100\% \quad (2)$$

Where IE is inhibition efficiency (%), $CR_{uninhibited}$ is corrosion rate without using inhibitor and $CR_{inhibited}$ is corrosion rate with using inhibitor.

$$\theta = \frac{\text{CR uninhibited} - \text{CR inhibited}}{\text{CR uninhibited}} \quad (3)$$

Where θ is surface coverage, $CR_{uninhibited}$ is corrosion rate with the absence of inhibitor and $CR_{inhibited}$ is corrosion rate with the presence inhibitor.

2.4 SEM Analysis

The surface morphology of the mild steel before and after immersion in the acid solutions (with and without the extracts) was examined using a JSM-6510 LA, a JEOL analytical low vacuum scanning electron microscope.

3. Result and Discussion

The measurement of corrosion rate is conducted by weight loss method which has broad practical applications [19-21]. The rate of corrosion can be defined as the ratio of the weight loss of the samples to its area and the immersion time as given in Eq. 1. The advantage of this method is its relative simplicity and availability. Furthermore, the method uses a direct parameter for quantitative evaluation of corrosion i.e. mass loss of metal. The effect of the inhibitor on the corrosion rate of mild steel in HCl 1M without and with different concentration of pomelo peels extract is shown in Fig. 1. It can be seen that the corrosion rate decreases significantly with the increasing of inhibitor concentration. The rate of corrosion in the absence of pomelo peels extract is 8.87 mm/y at five days immersion time. While in the presence of 1.6% pomelo peels extract, the corrosion rate reduces to 0.69 mm/y. Decreasing of corrosion rate is due to the formation of the layer on the metal surface which covering the surface metal contact the metal with the corrosive environment [22, 23].

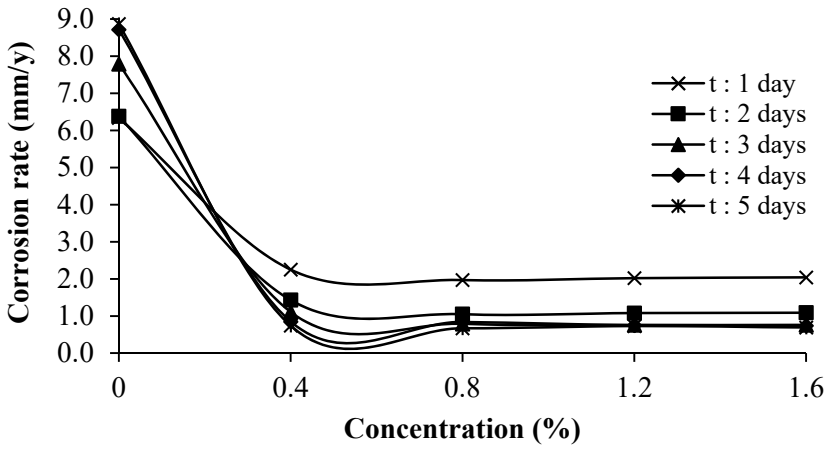


Figure 1. Effect of inhibitor concentration on corrosion rate of mild steel in HCl 1 M

The effect of immersion time on the corrosion rate of mild steel in HCl 1M at various concentration of pomelo peels extracts is presented in Fig. 2. It can be seen that in the absence of pomelo peels extract, the rate of corrosion increase with the increasing of immersion time. In the first day, the corrosion rate is 6.34 mm/y and then rise to 8.87 mm/y in the fifth day. This phenomenon occurred due to the intensive

ISBN : 978-602-99806-3-9

dissolution of metal in the corrosive media in the lapse time. On the other hand, with the presence of pomelo peels extracts, the corrosion rate decrease with increasing immersion time. The corrosion rate using pomelo extracts 1.6% are 2.04 mm/y and 0.69 mm/y at the first day and the fifth day, respectively.

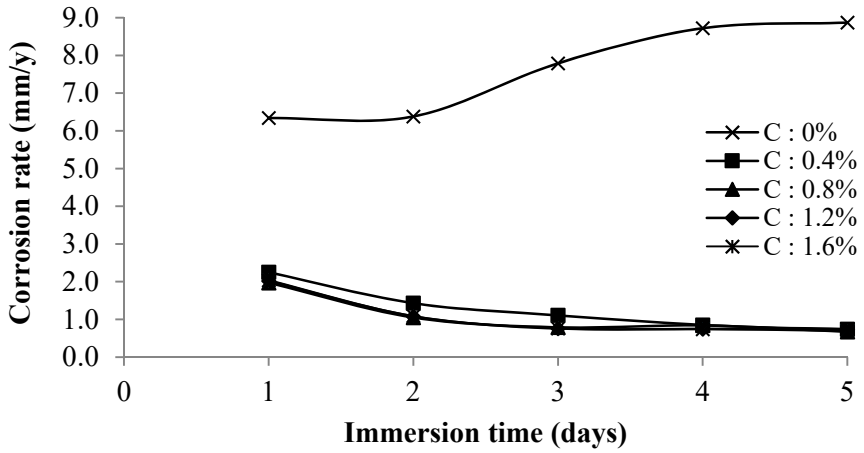


Figure 2. Effect of immersion time on corrosion rate of mild steel in HCl 1 M

The inhibition efficiency of pomelo peels extracts for mild steel in HCl 1M acid solution is presented in Fig. 3. The graph reveals that the inhibition efficiency of pomelo peels extract increase with the increase of concentration and immersion time. The highest value of inhibition efficiency is reaching of 92.22% at the concentration of 1.6% and immersion time five days. This phenomenon can be attributed to the increase of the surface covered, and that due to the adsorption of natural compounds on the surface of the metal, as the inhibitor concentration increases. The result is in good agreement with other's [14, 24].

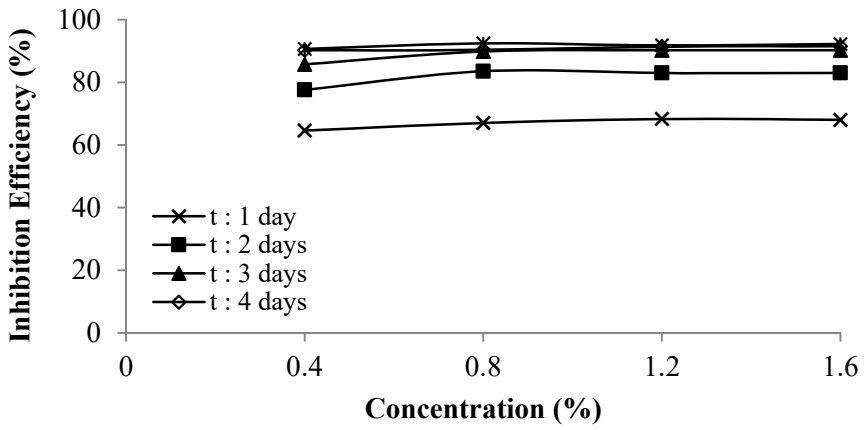


Figure 3. Inhibition efficiency of Pomelo peels extract on mild steel in HCl 1M

Adsorption isotherms are very important to understand the mechanism of inhibition corrosion reactions. The most frequently used isotherms are Langmuir [25, 26], Frumkin [27, 28], and Temkin [29, 30]. The Langmuir isotherm assumes that there is no interaction between adsorbed molecules on the surface. The Frumkin adsorption isotherm assumes that there is some interaction between the adsorbates, and the Temkin adsorption isotherm represents the effect of multiple layer coverage. Fig. 4 shows adsorption isotherm of pomelo peels extracts concentration. It can be seen from the graph that the curve obtained shows fit well with Langmuir adsorption isotherm. Hence, the adsorption of pomelo peels extracts on the surface of metal occurs in a single layer.

ISBN : 978-602-99806-3-9

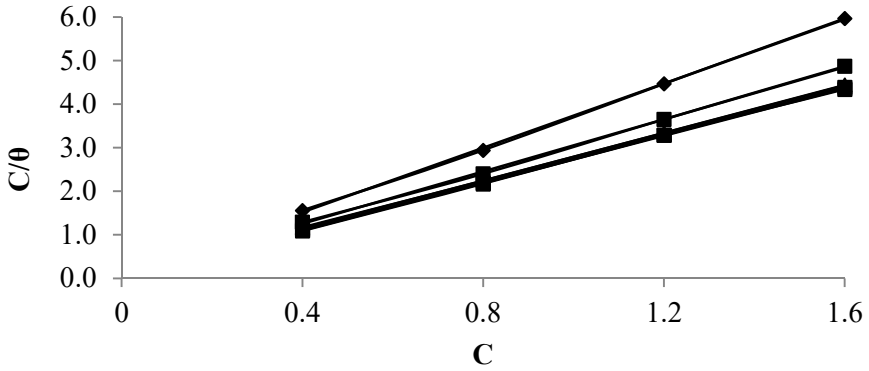


Figure 4. Mechanism of corrosion inhibition

Scanning electron microscopy (SEM) of the samples in the absence and presence of pomelo peels extract were shown in Fig. 5. Fig. 5(a) shows the cleaned sample of mild steel before immersion in HCl 1 M solution. It can be seen that the surface of metal has the smooth surface with some scratch due to polishing work. While in Fig. 5 (b) represent the corrosion of mild steel due to the interaction with HCl 1 M solution in the absence of inhibitor for one day. It shows that the rough surface on the surface of mild steel which means the metal is corroded. Furthermore, Fig. 5 (c) reveals the morphology of the mild steel surface which is immersed in HCl 1 M solution and inhibitor 1.6% for one day. It shows that there is a smooth surface on mild steel surface compare to with the absence of inhibitor. This result confirms that the extract prevents the corrosion of mild steel through adsorption of the inhibitors on the metal surface.

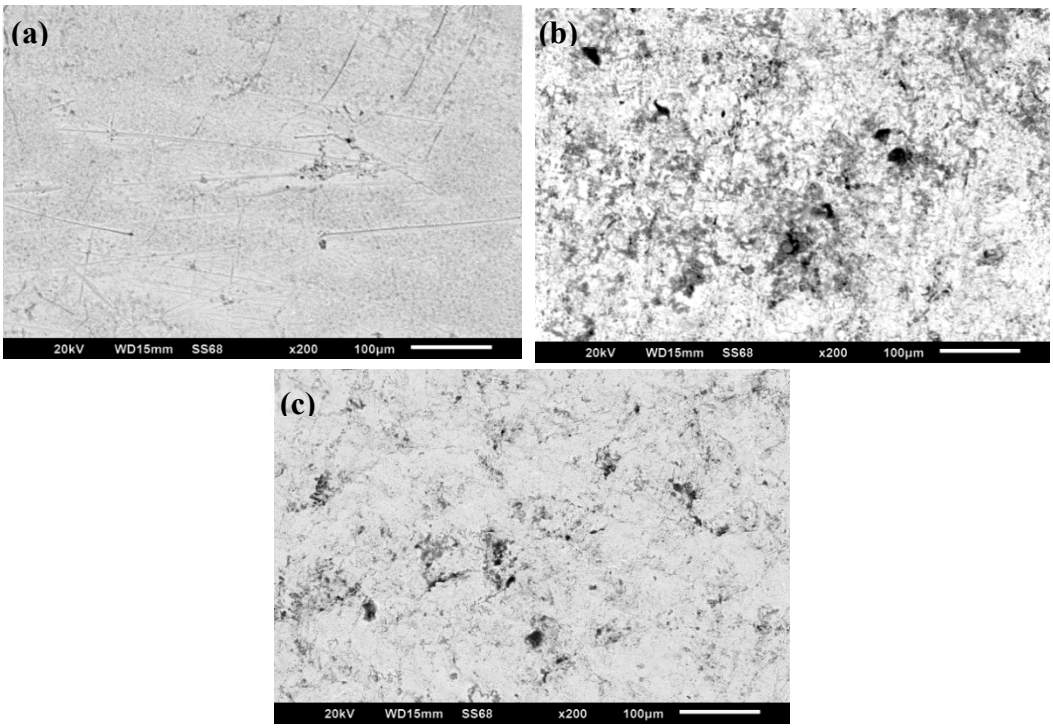


Figure 5. SEM image of samples

4. Conclusion

ISBN : 978-602-99806-3-9

The corrosion rate decrease with the increasing of pomelo peels extracts concentration. The inhibition efficiency of the pomelo peels extracts on corrosion inhibition increases with increase in the concentration of extract. The highest efficiency obtained at 1.6% extract concentration which is 92.22%. The mechanisms of inhibition follow Langmuir's adsorption isotherm. SEM study shows that the inhibitor covers the surface of the metal. The results of the studies confirmed that the pomelo peels extract have potential to prevent the corrosion of mild steel in the acidic environment.

References

[1] Slepski P, Gerengi H, Jazdzewska A, Orlikowski J, Darowicki K 2014 *Constr. Build. Mater.* **52** 482-7.
[2] Ghanbari A, Attar M 2015 *J. Ind. Eng. Chem.* **23** 145-53.
[3] Jin D, Zhou X, Wu P, Jiang L, Ge H 2015 *Renew. Energ.* **81** 457-63.
[4] Karzazi Y, El Alaoui Belghiti M, Dafali A, Hammouti B 2014 *J. Chem. Pharm. Res.* **6** 689-96.
[5] Issaadi S, Douadi T, Zouaoui A, Chafaa S, Khan M, Bouet G 2011 *Corr. Sci.* **53** 1484-8.
[6] da Rocha J C, Gomes J A d C P, D'Elia E 2010 *Corr. Sci.* **52** 2341-8.
[7] Amin M A, Khaled K, Mohsen Q, Arida H 2010 *Corr. Sci.* **52** 1684-95.
[8] Ahamad I, Prasad R, Quraishi M 2010 *Corr. Sci.* **52** 1472-81.
[9] Ebenso E E, Obot I B, Murulana L 2010 *Int. J. Electrochem. Sci.* **5** 1574-86.
[10] Döner A, Solmaz R, Özcan M, Kardaş G 2011 *Corr. Sci.* **53** 2902-13.
[11] Aljourani J, Golozar M, Raeissi K 2010 *Mater. Chem. Phys.* **121** 320-5.
[12] Ebenso E E, Arslan T, Kandemirlı F, Love I, Öğretır C l, Saracoğlu M, et al. 2010 *Int. J. Quantum Chem.* **110** 2614-36.
[13] Benali O, Benmehdi H, Hasnaoui O, Selles C, Salghi R 2013 *J. Mater. Environ. Sci* **4** 127-38.
[14] Krishnegowda P M, Venkatesha V T, Krishnegowda P K M, Shivayogiraju S B 2013 *Ind. Eng. Chem. Res.* **52** 722-8.
[15] Ekanem U, Umoren S, Udousoro I, Udoh A 2010 *J. Mater. Sci.* **45** 5558-66.
[16] M'hiri N, Veys-Renaux D, Rocca E, Ioannou I, Boudhrioua N M, Ghoul M 2016 *Corr. Sci.* **102** 55-62.
[17] Al-Senani G M 2016 *Int. J. Electrochem. Sci.* **11** 291-302.
[18] ASTM G 1990 G 31-72 *Standard practice for laboratory immersion corrosion testing of metals.*
[19] Muslim Z R, Abbas A A 2015 *Int. J. Basic Appl. Sci.* **4** 17-20.
[20] Zarrok H, Oudda H, Zarrouk A, Salghi R, Hammouti B, Bouachrine M 2011 *Der Pharma Chemica* **3** 576-90.
[21] Deyab M, El-Rehim S A 2013 *Int. J. Electrochem. Sci.* **8** 12613-27.
[22] Solmaz R 2014 *Corr. Sci.* **81** 75-84.
[23] Guo L, Zhu S, Zhang S, He Q, Li W 2014 *Corr. Sci.* **87** 366-75.
[24] Umoren S A, Solomon M M, Eduok U M, Obot I B, Israel A U 2014 *J. Env. Chem. Eng.* **2** 1048-60.
[25] Kosari A, Moayed M H, Davoodi A, Parvizi R, Momeni M, Eshghi H, et al. 2014 *Corr. Sci.* **78** 138-50.
[26] Mourya P, Banerjee S, Singh M 2014 *Corr. Sci.* **85** 352-63.
[27] Souza F S d, Gonçalves R S, Spinelli A 2014 *J. Braz. Chem. Soc.* **25** 81-90.
[28] El-Deeb M, Sayyah S, El-Rehim S A, Mohamed S 2015 *Arab. J. Chem.* **8** 527-37.
[29] Yurt A, Duran B, Dal H 2014 *Arab. J. Chem.* **7** 732-40.
[30] Odewunmi N, Umoren S, Gasem Z 2015 *J. Ind. Eng. Chem.* **21** 239-47.

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

Exploring students' perceptions of the use of blogs for learning Mathematics at the State Polytechnics Manufacture of Bangka Belitung

Parulian Silalahi
Politeknik Manufaktur Negeri Bangka Belitung, Jl. Airkantung Sungaliat Bangka

fransiskussil@yahoo.com

Abstract. The use of blogs in teaching and learning activities has become a new trend in education. Many researchers have reported the advantages of the use of blogs as for supporting student learning. Even though the potential of blog use to increase students' learning has been explored by many educators, research focusing on the use of blogs in vocational education context is still limited. Therefore, this study aims to explore the perseptions of students of the use of blogs as an educational tool in learning mathematics. For this study, survey research design was used and 57 students in the first year students from Electronics Department were involved in this study. The blogging survey instrument which measured the ability to make blog and perceived learning with blog was used to collect data. This data werw then analyzed. The results of this study revealed that the students' interests in the mathematics course increase. Furthermore, the students have positive attitudes towards the use of blogs in the mathematics learning.

1. Introduction

The ability to master math skills is a key indicator of students' potential at all levels of education [1]. At polytechnic level, mathematics is one of the most important basic courses. This is in line with the view of Gold and Devitt that engineering professionals require math in their work [2]. In addition mathematics is also indispensable in the community [3]. In mathematics learning, knowledge and math skills are very important. Mathematical knowledge and skills refer to a conceptual understanding of numbers, relationships, combinations, and operations. Mathematics also includes its forms and structure, reasoning, measurement, classification, and patterns. Mastery of knowledge and good math skills, will certainly help students in connecting ideas, develop logical and abstract thinking, as well as analyze, and understand the world around them.

Polytechnic education is a professional program at the university level which equip its graduates with skills, supported by basic knowledge and a strong discipline. It is expected that graduates can become professionals in their fields, particularly in commercial and industry field. Polytechnics in Indonesia generally have the same duties and responsibilities, generally, they produce qualified graduates who are expected to contribute to the development of the country through the mastery and application of science and technology as well as particular applied skills. Mathematics course is one of basic subjects that must be mastered by Polytechnic students. With sufficient mathematical knowledge, it is expected that Polytechnic graduates are able to support other science and apply it. Unfortunately students of Polytechnic of Bangka in electronics department are still experiencing difficulties in learning mathematics, especially first year students. Their understanding of basic mathematics concepts such as functions, vectors and some other concepts is still low.

Some possible causes of students' low mathematical knowledge and skills include: (1) low learning interest; (2) the mathematical material is a material that contains abstract concepts that are hard to

ISBN : 978-602-99806-3-9

remember and understand; (3) the learning strategy used does not eduquately facilitate the acquisition of understanding, (4) the utilization of information and communication technology (ICT) is still low.

Such conditions migh have negative impact on the quality of mathematics courses, especially in the electronics engineering department. Thus, it provides a challenge for educators to find solutions to deal with the problem. Educators should try to find ways and be responsible for their learners to create and maintain an environment that motivates learners to continue learning. Therefore, examining the way students learn needs to be done.

One of the solutions which is reviewed in this article is the use of ICT. One way is learning mathematics by using Weblog or blogs. Blog is a means of delivering information online which has basic internet features that can penetrate the boundaries of space and time. The delivery of information quickly, precisely and easily will certainly greatly support the learning activities. In the context of learning, blogs provide a good opportunity to engage students in a student centered cooperative learning environment, allowing opportunities for knowledge creation and sharing, creativity, reflection and debate, in this case referred to as open learning environments [4]. It has a powerful platform in mathematics classrooms allowing students and teachers to engage in rich conversations that support student learning [5]. Blogs offer various benefits in education, including higher education, among others: blogs can creates a community of learning outside the classroom, making the learning process student-centered and interactive [6]. Blogs provide a communication space; lecturers or teachers can use it with students when there is a need to share ideas and reflect on the work they are doing [7]. Students develop a better connection with their teacher and other students through blogging, which allows them to feel more comfortable on the blog and in the classroom [8].

Furthermore blogs allows students and teachers to collaborate outside the classroom and gives students access to curriculum content and support [9]. University students in the Cuhadar and Kuzu's study noted that they were able to reach course content on the blog for classes that they were unable to attend, therefore making the learning process more effective. Students also felt they interacted more with their teacher on the blog than they would in the regular classroom [8].

Moreover researcher suggests that blogs supports student learning. Knowledge is shared on the blog as students post their own thoughts and read the various perspectives of others [9]. Davi et al conducted a blogging study in five college classrooms. Students reported that they enjoyed blogging, because it exposed them to a variety of opinions and perceptions, thereby improving their learning [10]. Blogging can develop critical thinking skills as students must carefully reflect and evaluate their own work and the work of others [11]. Finally, blogs have the potential to benefit all students, even the inactive online learner who just reads the blog posts [12]. Duffy argues that the use of blogs can encourage students to be critical and have analytical thinking skills. Both are very important for the development of student learning [13]. The use of blogs has been proven to engage more students when lesson material is provided [10], as well as providing space for them to play a more active role in the learning process [14]. Furthermore Farmer et al, asserted that one of the most valuable aspects of using blogs is that they can provide an opportunity for students to interact with their peers [15]. Learning by providing opportunities for students to be more creative and innovative is the future direction of education in universities, both in academic education programs and vocational programs such as Polytechnics.

2. Methods

2.1. Purpose of the Study

Research on the use of blogs in polytechnics education and the effect of blogs on mathematics learning and teaching is still limited. The purpose of this study is to examine the ability of students to create blogs and to the participants' perception of mathematics learning through blogs. In this regard, the researcher designed a project to introduce students to blogs and to find ways to use blogs to supplement their learning experience. The overall purpose of this study was to investigate how students perceived mathematics learning through blogs.

ISBN : 978-602-99806-3-9

2.2. Participants and Context

At the time of this research project, the student participants were taking a compulsory mathematics course. This project was implemented in the ICT laboratory and classroom. The use of ICT laboratory aims to enable students to learn ICT especially in creating blogs. The researcher conducted a survey on the students' ability to create and use blogs prior to the study and found that not all students were familiar with blogs. At the end of semester the researcher investigated the Electronic Department students' perceptions of academic benefits of blogging, ease of use and intention to use blogs. The data in this study were collected 57 polytechnics students.

2.3. Data Collection

At the beginning of the research, the researcher gave a brief introduction about the study, which included the rationale of this research, procedures for conducting the research and participants' rights during the research process. Then, the researcher gave out consent form to invite the students to participate in the research. A total of 25 questions have been constructed by adapting Daud and Zakaria [16] and divided into two main categories: levels of skill of students in creating and using blogs, perceptions and intentions to use blog. The survey use Likert-scale questions; a five-point Likert scale was used where (1) represented "Strongly disagree", (2) "Disagree", (3) "Not sure", (4) "Agree" and (5) "Strongly Agree".

2.4. Pre-survey

A survey was used at the beginning of the research involving 57 participants. This survey was aimed at collecting information regarding participants' current blogging. Specifically, the researcher used the survey to understand the ability of students in creating blogs. Participants were invited to attend the training on how to create blog.

2.5. Post-survey

A post-survey was used at the end of the research. This survey focused on participants' attitudes toward the effectiveness of blogging in their mathematics learning. In this survey they were asked about how blogging influenced their mathematics learning regarding this blog learning program.

3. Results

During the the first-semester the students were instructed to get training session aimed to introduce students to blogs so that learners could create their own blogs and afterwards post and publish mathematics assignments. Before the training session started, the students answered the survey questionnaire about their ability to create blogs and their familiarity with the use of blogs. The ability of students in creating blog can be seen in in the following table 1:

Table 1. The ability to create and use blog

No	Indicator Components	Score					Mean	SD
		1	2	3	4	5		
I	**Ability to create and use blogs**							
1	I am skilled at searching and using blogs	2	12	29	13	1	2.98	0.84
2	I am skilled in choosing different templates When creating a blog	2	18	25	12	0	2.82	0.86
3	I am skilled in choosing the appropriate and interesting colors for the blog I created	1	19	14	22	1	3.05	0.94

ISBN : 978-602-99806-3-9

4	I am skilled in organizing lesson materials or assignments in my blog	1	21	21	12	2	2.88	0.73
5	I am skilled at uploading files on the internet like slide share	3	17	15	18	4	3.05	1.12
6	I am skilled in downloading files I save on slide share and I connect with my blog	3	22	16	14	2	2.82	0.91
7	I am skilled in choosing various images and putting them in my blog	2	20	16	16	3	2.96	1.03
8	I am skilled in creating menus in blogs	3	25	14	12	3	2.77	0.91
9	I am skilled in linking other blogs in my blog	4	26	17	8	0	2.44	0.73
10	I am skilled at using widgets in my blog	3	22	22	9	1	2.70	0.95
11	I am skilled in downloading youtube on my blog	2	24	23	8	0	2.65	0.87
12	I am skilled in posting on my blog	2	17	16	20	2	3.05	1.05
13	I am skilled at making polls or other people's comments on my blog	4	30	21	2	0	2.37	0.60
14	I am skilled at creating hyperlinks to other WEB sites that can expand my knowledge	5	33	16	3	0	2.30	0.69

Table 1 shows that students' level of skill at searching and using blog; only 1 student strongly agreed, 13 students agree, 29 students not sure, 12 students agree, and 1 student strongly disagree. The 14 items questioner reveals that the level of students in creating blogs is still low. Therefore training is needed to enhance the students' skill in creating blogs. In the training session, the students recorded their work on their blogs and uploaded relevant pictures, photographs, presentations and videos. Figure 1 below is one of the example of front page section of the blog site that was developed by a student.

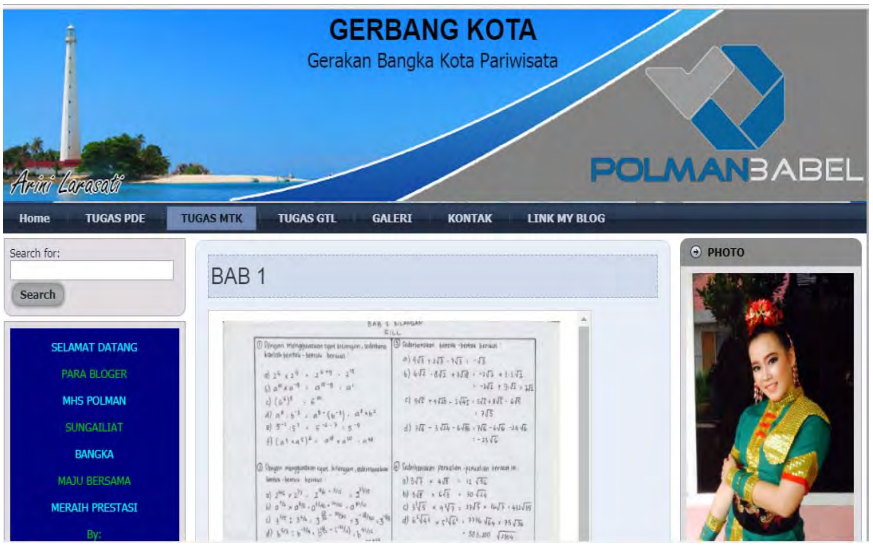


Figure 1. Example of student blog

ISBN : 978-602-99806-3-9

At the end of the semester, the students were asked to complete the second survey questionnaire concerning their perceptions of the experience in mathematics learning. The survey instrument was used in order to collect data on the students' blogging experience, which is related to their attitudes toward visit the blog, writing on blogs, providing constructive feedback on friends' blogs, and learning mathematics. There were 11 items in total on the survey instrument using a Likert Scale format where 1 stood for "strongly disagree", 2 "agree", 3 "not sure", 4 "agree" and 5 indicated "strongly agree". The results are presented in table 2 below:

Table 2. Students' perception of blogs

No	Indicator Components	Score					Mean	SD
		1	2	3	4	5		
II	**Perception of the blog**							
1	I love to visit the blog	0	2	8	39	8	3.93	0.82
2	I feel blogs are useful medium for teaching and learning	0	0	2	34	21	4.33	0.54
3	I feel blogs are able to promote collaborative learning	0	0	5	33	19	4.25	0.60
4	I feel it is very easy to create blog sites for purposes of learning	1	0	18	31	7	3.75	0.84
5	I am very excited to visit the blogs I created as well as my colleagues blog	0	0	28	25	4	3.58	0.63
6	I feel a lot of ideas in my mind to write in the blogs	0	2	26	22	7	3.60	0.73
7	I feel capable of providing constructive feedback or ideas on friends' blogs	0	3	28	21	5	3.49	0.78
8	I would like to contribute in sharing knowledge with colleagues through blogs	0	0	19	33	5	3.75	0.65
9	I feel confident to deepen the math lessons provided by using blogs	0	2	24	25	6	3.61	0.66
10	I feel that through discussion on blogs can enhance my interest in mathematics lessons	0	1	28	18	10	3.65	0.82
11	I feel that through the application of this blog, will improve my mathematics skills	0	2	25	21	9	3.65	0.83

Table 2 presents some findings found through the survey. 8 students strongly agreed that they love to visit the blog, 39 students agreed, 8 students not sure and 2 students disagreed. This data shows that most of the students perceived their experience and the blogs positively.

4. Conclusion

The survey demonstrates that the students responded positively to the blogging activities. Research data indicate that more than 82 % of the students agreed, stating that they love visiting the blog, more than 96 % of the students agreed, mentioning that blogs are useful for teaching and learning, overall, the average was more than 64 %. The following features of blogging activities seem to make them attractive and powerful media for mathematics learning: 1) blogs deepen students' mathematics lessons, 2) they enhance students' mathematics interest, 3) create students' work, and 4) blogs faciltate interactions and

ISBN : 978-602-99806-3-9

peer reviews through students tasks. Blogging creates more opportunities to write, as well as encourages self-reflection and critical thinking. Blogs extend the walls of the classroom, creating a learning environment in any place that has access to the internet. By integrating blogs into the classroom and incorporating electronic writing into classroom experience, students can enhance their understanding of mathematics.

Acknowledment
Special thank goes to all students participated in this research for their cooperation on providing information. Their invaluable ontributions are very much appreciated. We are also immensely grateful to Mr Sugeng Ariyono that support this international joint conference.

References
[1] Tang, H. E., Voon, L. L. & Julaihi, N. H. (2009). A case study of 'high-failure rate' mathematics courses and its' contributing factors on UiTM Sarawak diploma students. *Paper presented at the Conference on Scientific & Social Research*.
[2] Goold, E. (2014). "Mathematics: Creating Value for Engineering Students" 17th SEFI Mathematics Working Group seminar, Dublin, 2014
[3] Ernest, P. (2010). Add It Up: Why Teach Mathematics? *Professional Educator* 9**,** 44-47.
[4] Land, S.M.,Cognitive requirements for learning with open-ended learning environments, *Educational Technology Research and Development* 48: 61-78, 2000.
[5] Ciobanu, M. (2013). In the middle- from blogging to belonging to a math community. Ontario Mathematics Gazette, 52(1), 17-21.
[6] MacBride, R. & Luehmann, A. L. (2008). Capitalizing on emerging technologies: A case study of classroom blogging. School Science and Mathematics, 108(5), 173-183. doi: 10.1111/j.1949-8594.2008.tb17826.x
[7] Huette, S., Blogs in education, in Inside Oregon University Journal, spring volume 2006, 2006.
[8] Cuhadar, C., & Kuzu, A. (2010). Improving interaction through blogs in a constructivist learning environment. Turkish Online Journal of Distance Education, 11(1), 134-161. Retrieved from http://files.eric.ed.gov/fulltext/EJ886458.pdf
[9] Alterman, R., & Larusson, J. A. (2013). Participation and common knowledge in a case study of student blogging. International Journal of Computer-Supported Collaborative Learning, 8(2), 149-187. doi: 10.1007/s11412-013-9167-2.
[10] Davi, A., Frydenberg, M., & Gulati, G. J. (2007). Blogging across the disciplines: Integrating technology to enhance liberal learning. MERLOT Journal of Online Learning and Teaching, 3(3). Retrieved from http://jolt.merlot.org/vol3no3/frydenberg.htm
[11] Williams, J. B., & Jacobs, J. (2004). Exploring the use of blogs as learning spaces in the higher education sector. Australasian Journal of Educational Technology, 20(2), 232-247. Retrieved from http://ajet.org.au/index.php/AJET/article/view/1361/731.
[12] Deng, L., & Yuen, A. H. K. (2011). Towards a framework for educational affordances of blogs. Computers & Education, 56(2), 441-451. doi: 10.1016/j.compedu.2010.09.005
[13] Duffy, P.,Engaging the YouTube Google-Eyed generation:Strategies for using Web 2.0 in teaching and learning. *The Electronic Journal of e-Learning* 6(2), 119-130, 2008.
[14] Du, H. S., & Wagner, C., Learning with weblogs: Enhancing cognitive and social knowledge construction. *IEEE Transactions on Professional Communication, 50*(1), 1-12, 2007
[15] Farmer, B., Yue, A., & Brooks, C., Using blogging for higher order learning in large cohort university teaching: A case study. *Australasian Journal of Educational Technology, 24*(2), 123-136, 2008.
[16] Md Yusoff Daud dan Effandi Zakaria. 2012. Web 2.0 application to cultivate creativity in ICT literacy *Procedia Social and Behavioral Sciences. Published by Elsevier Ltd.*

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

The use of waste bone of skipjack fish (katsuwonuspelamis) to be gelatin in north Sulawesi province

Hens Onibala, Engel Pandey, Agnes Agustin and Febri Triani Singkuku
Faculty of Fisheries and Marine Science, Sam Ratulangi University
Email address: hens_onibala@yahoo.com

Abstract. Industrial processing of Skipjack fish in North Sulawesi has recently developed besides the processing of smoked fish, wood fish, etc. However, the fish waste is abundantly produced from the processing and thus, it still needs to be utilized more effectively. Skipjack fish is the most popular fish source with a production of 60.168 tons. As a result, the produced waste from industrial processing could reach ± 7460 tons/year. The purpose of this research was to determine the nutritive value of gelatin extracted from the waste bone of Skipjack fish. Meanwhile, this study used Complete Randomized Design with Statistic JMP shortcut software for ANOVA. Results showed that the highest rendemen value was 16.25% in gelatin with 5% HCL and the water content was 9.75%. The highest protein of the gelatin was 48.2% with the fat content of gelatin was 3% extracted from 1% HCL. The study concluded that the waste bone of Skipjack fish processed to be gelatin could be utilized as an additional food in food industry under the Indonesian Standard of food (SNI). Therefore, the processing of this industry could produce a lawful food which has a nutritious content and it might reduce environmental pollution.

Keyword : Gelatin, waste bone, additional food

I. INTRODUCTION

North Sulawesi Province has many fish processing industries, from traditional scale to modern scale, such as wood fish (katsubushi), smoked fish, and etc. Skipjack tuna production in north Sulawesi is 60.168 tons [1], and fish bone proportion to the fish body reaches 12.4% [2]. Hence, the solid waste production from the fish processing, such as fish bone, is estimated approximately 7,460 tons. If these wastes are not well used, it could give negative impact to surrounding human health. According to [3], bone waste is composed of collagen that will yield gelatin through hydrolysis. Gelatin can be utilized as stabilizer, gelling agent, binder, thickener, emulsifier, adhesive, and edible food coating.

The use of the fish waste as gelatin is expected to be able to raise its economic value, reduce environmental pollution, can become alternatively safe raw material of gelatin, and can reduce the dependence of Indonesian's industries upon imported gelatin. This study was aimed at knowing the nutritive value and the safety of gelatin product from the bone of skipjack tuna.

II. MATERIALS AND METHOD

A. Materials

This study used the fish bone of skipjack tuna (*Katsuwonuspelamis*) collected from UD. KaryaMandiriBersama, Bitung city, North Sulawesi Province, and smoked fish processing center in Manado city, North Sulawesi. Laboratory apparatus used were water bath, aluminium foil, erlenmeyer, beaker glass, pippet, filter paper, measuring glass, thermometer, cloth, oven, blender, pan, gas cooker, labeling paper, balance, and ruler. Besides, HCl and aquadest were utilized as well.

ISBN : 978-602-99806-3-9

B. Method

This study was carried out in the laboratory of Fisheries Product Handling Technology and Processing, Faculty of Fisheries and Marine Science, and laboratory of Pharmacy, Faculty of Natural Science, Sam Ratulangi University, Manado.

1. Gelatin processing. Fish bone gelatin processing step is demonstrated in Fig. 1. Fish bone was washed with water to take out flesh, dirt, and fat of the bone and degreased in the water pan at 80°C for 30 min. The clean fish bone was dried under the sunlight for 2 days and chopped into 2-3 cm size. Then, it was demineralized in 1%, 3%, and 5% HCl – containing Erlenmeyer, covered with aluminium foil, and labelled. The immersion was done for 36 hours. The bone was cleaned in running water and rewashed with neutral pH-distilled water, inserted in the glass beaker and moved into a water bath at 85± °C for 6 hours. Gelatin solution obtained was filtered through cotton-materialized cloth, and the extract was poured into a rectangular container. The extract was then inserted into an oven at 55°C for ±2 days. Gelatin sheet obtained was blended, put into a plastic sheet, and stored in a glass bottle.

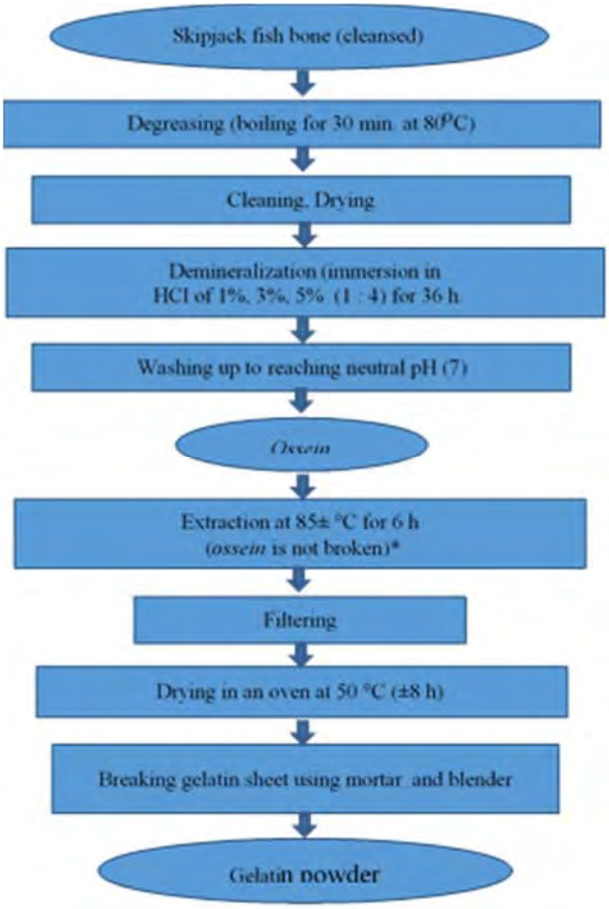


Figure 1. Gelatin processing of skipjack fish (Modified from Haris, 2008)

2. ***Gelatin analysis***

Gelatin produced in this study was analyzed as follows:

2.1.Rendemen. The analysis followed AOAC (1995). It was obtained from the ratio of dry weight of gelatin powder and net weight of clean dry fish bone using the following formula:

$$\text{Rendemen} = \text{Dry weight/weight of clean dry fish bone} \times 100\% \quad (1)$$

ISBN : 978-602-99806-3-9

2.2. Water content. Gelatin water content was calculated using AOAC (1995), with the following formula:

$$\text{Water content (\%)} = \frac{B-A}{\text{sample weight}} \times 100 \quad (2)$$

where A = cup weight + final sample (g) and B = cup weight + initial sample (g)

2.3. Fat. Testing fat content of the gelatin used AOAC (1995) with the following formula:

$$\text{Fat content (\%)} = \frac{\text{fat weight}}{\text{sample weight}} \times 100 \quad (3)$$

2.4. Protein. As much as 0.2 g of sample was put in a 30 ml-kjeldahl flask, then added with 1.9 + 0.1 g K_2SO_4, and 2.0 + 0.1 ml of concentrated H_2SO_4. The sample was then destructed for 1-1.5 hours until the solution turned to clear. The solution was cooled, added with 8-10 ml of NaOH-$Na_2S_2O_3$, and inserted into distillator.Under the distillator condenser was placed an erlenmeyer containing 5 ml of H_3BO_3 solution and several drops of red methyl indicator. The edge of condenser tube should be submerged in the solution to hold about 15 ml of distillate.The distillate was titrated with 0.02N HCl until the color turned to grey. Similar procedure was also done for the blank (without sample). The amount of sample titration (a) and blank titration (b) is expressed in ml of 0.02N HCl.

$$\text{N content (\%)} = \frac{(a-b)\text{N HCl} \times 14.007}{\text{sample weight}} + 100 \quad (4)$$

$$\text{Protein content (\%)} = \text{N content (\%)} \times 6.25 \quad (5)$$

2.5 Amino acid. Qualitative testing of amino acid was done by observing color change referring to [6].

2.6 Heavy metal. Heavy metal was qualitatively detected through color change following [7].

3. Data analysis

The study used complete randomized design and ANOVA was applied for data analysis. If there was significant effect, Least Significant Difference test was used. For this, JMP shortcut statistic software was utilized.

III RESULTS AND DISCUSSION

Rendemen

Rendemen is one of the important parameters in gelatin production. It is the ratio of gelatin powder dry weight obtained and cleansed dry fish bone.

The present study indicated that the highest gelatin rendemen was obtained through treatment of 5% HCL concentration, 16.25 % and the lowest in 1% HCl treatment, 2.5%. High rendemen under 5% HCl treatment could result from proper hydrolysis of the bone collagen to gelatin so that rendemen obtained was higher. In contrast, immersion of the skipjack tuna bone in 1% HCl did not make the collagen be well hydrolyzed so that only some rendemen was gained (Fig. 1)**.** If compared with freshwater fish, such as nile tilapia (*Oreochromisniloticus*) [4], rendemen of marine fish is better. It could result from their different bone structure.

ANOVA showed that gelatin rendemen of skipjack tuna bone was significantly affected by 1%, 3%, 5% HCl treatments ($P<0.05$). The Least Significant Difference test reflected significant difference as well.

ISBN : 978-602-99806-3-9

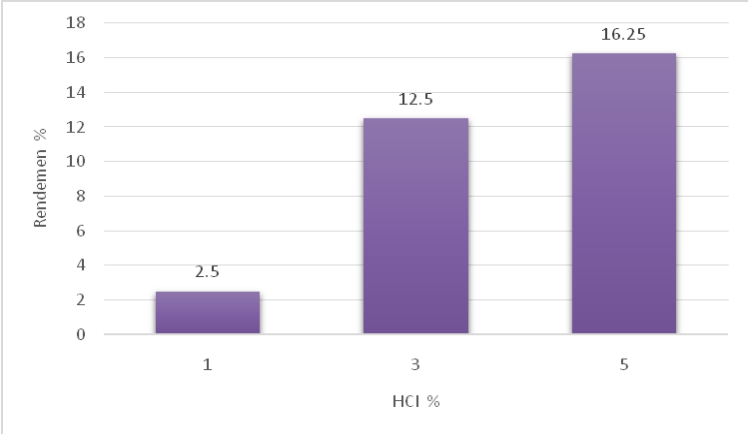


Figure 1. Gelatin rendemen of skipjack fish bone.

Water content

Water content is percent water content of a material based on fresh weight or dry. Water content of food material also determine the acceptability, freshness, durability, and can affect the appearance, texture, and the quality of food material. The highest water content of the gelatin was recorded in 3% and 5 % HCl treatment, 9.25% and 9.75%, while in 1% HCl the water content was 7.75%. Low water content could result from method application, drying time, low water content of the fish bone. Based on the Indonesia National Standard (SNI), the water content of gelatin is recommended 16% at maximum. Water content of skipjack fish bone extracted in HCl solution is presented in Fig. 2.

Compared with water content of freshwater fish bone, such as shark catfish, *Pangasius*, (9.26%) and nile tilapia (7.03%), the water content of gelatin is quite different from that of skipjack tuna that is still below commercial water content (12.53%). According to [8], high water content of the gelatin can reduce the gel strength, the viscosity, and the melting point of gelatin even though the decline is not significant.

ANOVA revealed that treatment of 1%, 3%, and 5% HCl immersion did not influence the water content of the skipjack fish bone gelatin obtained ($P<0.05$). It could be caused by gelatin feature of binding water, so that HCl treatment does not influence the water content of the gelatin.

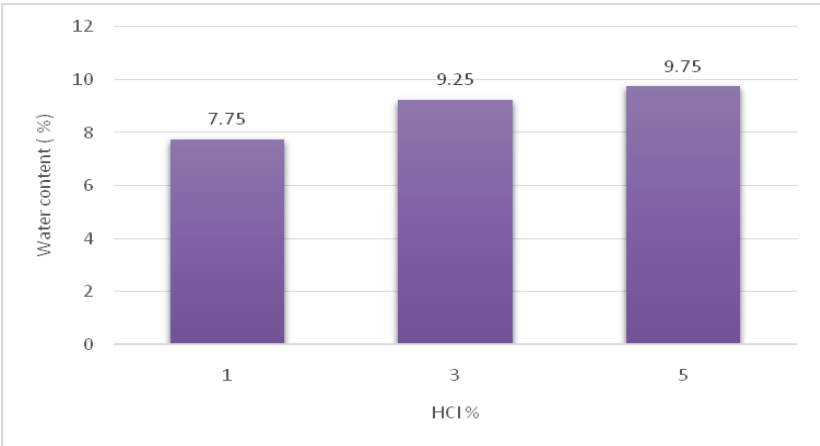


Figure 2. Gelatin water content of skipjack fish bone.

Protein

ISBN : 978-602-99806-3-9

Based on protein solubility, stromal protein can dissolve in acid/alkaline condition, and in fish, it occurs in the bone, skin, and scale called collagen. If the collagen is hydrolyzed it will produce gelatin.

The present study found that the highest protein content (48.2%) gained from collagen hydrolysis of skipjack fish bone used 1% HCl solution and the lowest protein content, 17.6%, was recorded in the treatment of 5% HCl (Fig. 3).

High protein content obtained in the treatment of 1% HCl solution is due to the collagen of skipjack fish bone being not well hydrolyzed so that less protein (collagen) contained is removed. It could be seen from hard structure of the fish bone after immersion process. In contrast, the use of 5% HCl treatment makes the collagen be properly hydrolyzed, and therefore, much protein is removed in washingphase after HCl immersion. It could occur since the skipjack tuna bone already turned very soft but not broken. Compared with protein in freshwater fish bone, that of marine fish bone is lower. It could result from different animal species (Ward and Court 1977).

ANOVA indicated that extraction and immersion of skipjack fish bone in 1%, 3%, and 5% HCl solution significantly affected the protein content of the gelatin from fish bone collagen hydrolysis ($P<0.05$). Least Significant Difference test also exhibited significant difference among treatments of 1%, 3%, and 5% HCl.

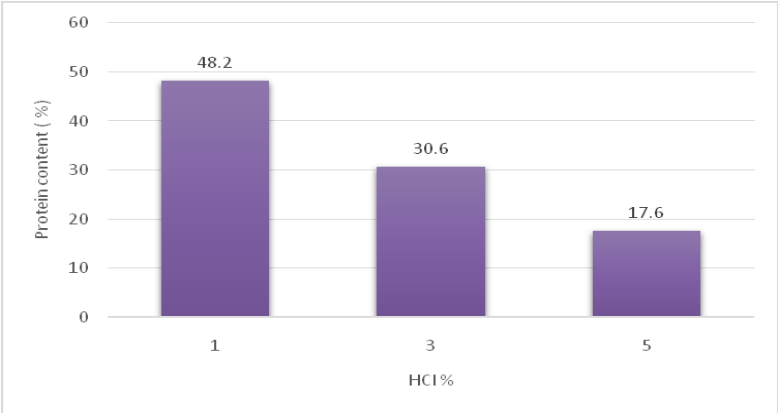


Figure 3. Gelatin protein content of skipjack fish bone.

Amino acid and heavy metal of gelatin

The smallest unit of protein is amino acid, and protein quality is highly determined by amino acid. There are two amino acids, essential and non-essential one. The former cannot be produced by human body, and the latter can be formed by human body.

Qualitatively, amino acid and heavy metals in the gelatin of skipjack fish bone are given in Table 1 and Table 2. There were 10 amino acids identified, but tryptophan was not identified (Table 1). The presence of amino acid, glycine and proline, can influence the quality of gelatin. According to [10], the higher glycine, proline, and hydroxyproline highly influence the gelatin quality and low content of these amino acids in the fish bone gelatin could result in low gelatin melting point. Heavy metal analysis also indicated no heavy metal content in the gelatin (Table 2).

Thus, the gelatin produced from bone waste of skipjack fish, particularly in UD. KaryaMandiriBersama, Bitung, and smoked skipjack tuna processing sites in Manado city, is safe to use as food material.

Table 1. Qualitative test of amino acid (Fessenden, 1994)

ISBN : 978-602-99806-3-9

No.	Amino Acid	Sample Concentration			Color
		1 %	3 %	5%	
1.	Aspartic acid	+	+	+	Clear
2.	Glutamic acid	+	+	+	Clear purple + precipitate
3.	Glycine	+	+	+	Dark purple
4.	Tyrosine	+	+	+	Clearlight blue
5.	Proline	+	+	+	Clear blue
6.	Phenylalanine	+	+	+	Purple
7.	Lysine	+	+	+	Clear
8.	Histidine	+	+	+	Clear
9.	Alanine	+	+	+	Light blue
10	**Tryptophan**	**-**	**-**	**-**	**No color change**

Table 2. Qualitative test of heavy metal (Fries, 1997)

No.	Sample concentration	Output	Remarks
1.	1%	-	No color changes
2.	3%	-	
3.	5%	-	

Fat

The present study revealed that amount of gelatin fat content was very few or even almost none (Fig. 4). High fat content, 3%, was gained from hydrolysis of skipjack fish bone collagen using 1% HCl solution and the lowest, 0.6%, was recorded in the use of 5% HCl solution. The lowest value of gelatin fat content of skipjack fish bone is lower than that in nile tilapia 1.36% reported by Harris (2008) and almost similar to that of commercial gelatin from snapper, 0.5%.

Moreover, sufficiently high fat content (3%) from hydrolysis 1% HCL could result from that the fat was not properly released yet at the degreasing process, and this condition would enable to affect the gelatin quality during the storage. Low fat content, 1.5 and 0.6%, respectively, at the treatment of 3% and 5% HCl could be caused by high fat content of the skipjack fish bone lifted to the surface and removed at the washing phase. HCl is a strong acid that can break fat in the skipjack fish bone. The lower the fat content of the gelatin is, the better the gelatin quality will be.

ANOVA also indicated that fat content of gelatin was not significantly influenced by immersion of the fish bone in 1%, 3%, and 5% HCl solution ($P > 0.05$). It could result from other factor in the fish bone gelatin production process.

ISBN : 978-602-99806-3-9

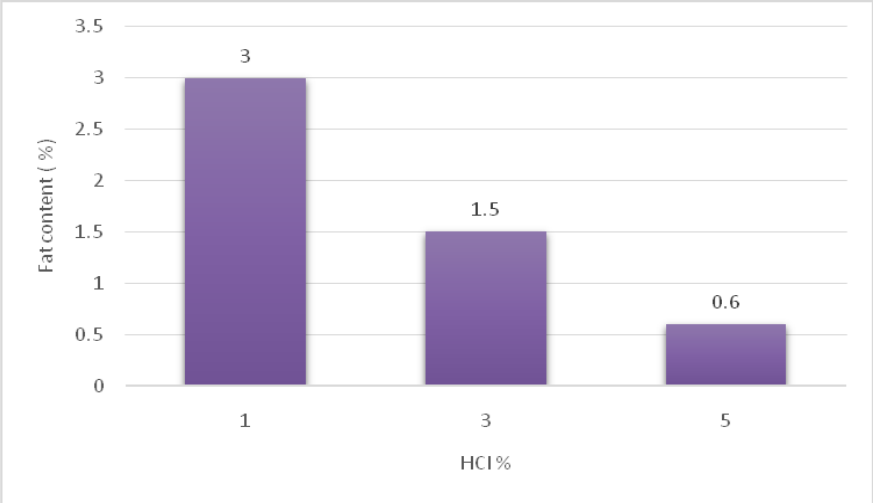


Figure 4. Gelatin fat content of skipjack fish bone.

IV CONCLUSION

The bone waste of skipjack tuna produced by fish industries in north Sulawesi could be taken to make gelatin due to its good nutritive value and safe to consume based upon Indonesia National Standard (SNI). Thus, the bone waste of the skipjack fish could be used as food additive for other products, such as fishball, sausage, and others in order to increase the fishermen's income and prosperity. This utilization could also reduce environmental pollution from fish industries.

ACKNOWLEDGEMENT

Authors would highly appreciate the Directorate of Research and Community Service, Directorate General of Research Strengthening and Research, Technology, and Higher Education Development for the 2017-Research Grant provided.

REFERENCES

[1] J.R. Leke, M. Najoan, J. Laihad, and S. Sarajar. Pengaruh Pengolahan Limbah Industri Pengolahan Ikan Cakalang (*Katsuwonuspelamis L*) Dan Implikasinya Dalam Pakan Terhadap Kualitas Internal TelurAyam Kampung **(**the effect of skipjack fish, *Katsuwonuspelamis L,* industrial waste processing and its implication in feed on the egg internal quality of wild chicken) 2012. 73-79.

[2] Marsaid and L. Atmaja. KarakterisasiSifat Kimia, FisikdanTermalEkstrak Gelatin Dari TulangIkan Tuna (*Thunnussp*) PadaVariasiLarutanAsamUntukPerendaman (Chemical, physical and thermalcharacteristics of tuna fish (*Thunnussp)* bone immersed in various acidic solutions). Seminar Nasional Kimia danPendidikan Kimia III. Program StudiPendidikan Kimia Jurusan FKIP. UniversitasSebelasMaret Surakarta. 2011.

[3] R.A. Rachmania, F. Nisma, and E. Mayangsari. 2013. Ekstraksi gelatin dari tulang ikan tenggiri melalui proses hidrolisis menggunakan larutan basa. (Extraction of mackerel bone gelatin through hydrolysis using alkaline solution). Jurnal Media Farmasi 2013, 10(2):18-28.

[4] M.A, Haris. Pemanfaatan Limbah Tulang Ikan Nila (*Oreochromisniloticus*) Sebagai Gelatin Dan Pengaruh Lama PenyimpananPadaSuhuRuang. (the use of bone waste of nile tilapia (*O.*

ISBN : 978-602-99806-3-9

niloticus) as gelatin and the effect of storage duration at room temperature). Skripsi. Program StudiTeknologiHasilPerikanan. 2008. FakultasPerikanandanIlmuKelautan. IPB.

[5] AOAC. Official Methods of Analysis of The Association of Official Analytical Chemist. Inc., Washington, DC. 1995

[6] R.J. Fessenden, and J.S. Fessenden. Kimia Organik(Organic chemistry). Jilid I, Edisi ketiga diterjemahkan oleh Aloysius Hadyana Pudjaatmaka dari Organic Chemistry, 4_{th} Ed., by Fessenden R.J., and Fessenden J.S., PenerbitErlangga Jakarta .1994

[7] J. Fries. Organic Reagent for Trace Analysis. JermanDarmstat. E. Merck. 1997. p. 79-83, 245-249

[8] S.D. Lestari. Analisis sifat kimia dan reologi gelatin kulit hiu gepeng (Alopiassp) dengan penambahan MgSO4, sukrosa, dangliserol (skripsi). (Analysis of chemical characteristics and rheology of shark (*Alopias* sp.) skin gelatin with addition of $MgSO_4$, sucrose, and glycerol) FakultasPerikanandanIlmuKelautan, InstitutPertanian Bogor. 2005

[9] A. Ward and A. Courts. The Science and Tecnology of gelatin. London: Academic Press. 1997

[10] M. Astawan and T. Aviana. Pengaruh Jenis Larutan Perendaman serta Metode Pengeringan terhadap sifat fisik, kimia dan fungsional gelatin dari kulit cucut (Effect of solution types and drying method on physical, chemical and functional characteristics of shark skin gelatin). JurnalTeknologidanIndustriPangan, 2003 vol. 14 (1) :7-12

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

Mix Design Stabilization of Concrete Paving Block (CPB) with Hydraulic Pressing Technology

Erno Widayanto[1,2],Agoes Soehardjono[2], Wisnumurti[2], . Achfas Zacoeb[2]

[1] Deparment of Civil Engineering, Faculty of Engineering, University of Jember, Jember 68121, Indonesia
[2] Deparment of Civil Engineering, Faculty of Engineering, University of Brawijaya, Jember 68121, Indonesia

Email : widayanto@ymail.com

Abstract. Concrete Paving Block (CPB) is a building material composition made from a mixture of portland cement, sand / aggregate and water and with or without other additives. As a choice of road construction, other than asphalt road and concrete. Paving is rich in colors and patterns for its applications. CPB deliberately designed with an attractive style to suit the tastes of the market and designed with the power that suits the needs. CPB compaction technology has been done in the community according to its funding capability. The simplest compacting technology to the most modern and expensive is manual compaction technology, vibration blocking technology, hydraulic pressure compaction technology and the most modern technology is vibropressing. The most modern technology certainly produces the best pressure quality. Two manual compaction technologies and vibrating blocks are very difficult to produce high quality while the compacting technology with hydraulic pressing is most likely to reach a quality close to modern technology. Therefore, in the following research is how to get the best CPB quality by using hydraulic pressing compaction technology using some methods. Stabilization of pressing technology on making concrete paving block used is mix design with variation of FAS, mix design with variation of fly ash and mix design with variation of ash content. from testing it was found that FAS above 0.5 has a compressive strength tends to decrease from all test behavior. Medium controlled Fas both fly ash and rock ash content, will tend to have a compressive strength that increases to levels of 20% of cement content. But the pressing technology on CPB making is still difficult to penetrate the strength figure of 300 kg / cm2.

Key words: Concrete Paving Block, a mixture

1. Introduction

Concrete Paving Block (CPB) A mixture of building materials made from a mixture of portland cement, sand / aggregate and water and with or without other additives. As a choice of road construction, other than asphalt road and concrete. Paving is rich in colors and motifs for its applications. CPB deliberately designed with attractive motifs to fit the market taste and designed with the strength that suits the needs. This paving pavement is perfect for: Park, Urban and Urban Roads, Parking Lots, Roads and Alleys. The use of CPB as a building cover material for the last 20 years is increasingly being used. Mass production techniques are getting better, so the production of Concrete Paving Block (CPB) is more easily available and makes the price of paving blocks more affordable by the community. So nowadays paving block usage is increasingly used for covering the surface of the yard and also as a cover material for the road surface.

ISBN : 978-602-99806-3-9

CPBs can be used anywhere with strengthen baseline soil requirements and in a flat surface for CPB installation. When paving has been installed it will have a strong enough resistance. CPBs can be formed to produce attractive effects either as lanes, terraces or mixed with other paving types to create a unique feature. Paving blocks are an alternative to be more traditional asphalt substitutes or road types than use macadam and looked better than macadam or concrete rebates. Currently paving blocks are even used in heavy load areas, such as parking lots, docks and public roads.

The need for high compressive strength is the absolute nature required by the CPB because as its function is bypassed by repetitive vehicle loads. Be the question why is the high compressive CPB required? This is important for concrete density completely because the air cavity reduces the strength of the concrete. For every 1% of air trapped, compressive strength drops between 5 to 7%. This means that concrete containing 5% air cavity simply because incomplete compaction can lose as much as one third of the strength. The air cavity increases the permeability of the concrete. Which in turn will reduce endurance. If the concrete is not solid and impermeable, it will not be watertight. Concrete needs to be compacted to get rid of trapped air cavities. The difference between air cavities and air bubbles should be recorded at this stage. The incoming air bubbles are relatively small and round, increasing the working ability of the mixture, reducing bleeding, and increasing frost resistance. air trapped on the other hand tends to be irregular in shape and detrimental to mix strength. It is to remove this air that the concrete must be well compacted. (Haseeb Jamal, 2014).

Based on SNI 03-0691-1996 CPB is a building material composition prepared from a mixture of portland cement or similar hydrolysis, water and aggregate materials with or without other materials that do not reduce the quality of concrete bricks.

The classification of paving according to SNI 03-0691-1996, consists of:
Quality concrete brick A is used for road
Quality concrete brick B is used for parking equipment
Quality concrete brick C is used for pedestrians
Quality concrete brick D is used for parks and other uses,

CPB should have a flat surface, no cracks and defects in the corners and ribs are not easily masted with the strength of fingers. The size of concrete brick 60 mm thick with a tolerance of + 8%, with physical properties as in table 1.

Table 1 Physical Properties

Quality	Strength(MPa)	
	Mean	min
A	40	35
B	20	17
C	15	12,5
D	10	8,5

Source : SNI 03-0691-1996 ICS. 91.100.30[6]

According to ACI (2013) compressive strength is the dominant measure of CPB performance in many countries. However, these compressive strength requirements seem to vary between those countries [4]. To facilitate different local conditions such as traffic loads, environmental aspects, weather and others. Table 2 briefly summarizes the differences in the compressive strength requirements of paving blocks in different countries.

Table 2. Strength Requirements of Paving Blocks in Various Countries

ISBN : 978-602-99806-3-9

Coutry	Compression strength (MPa)
United states	55
Norway	54
New Zealand	40
Japan	59
Italy	50
Germany	60
Denmark	52
Canada	50
Belgium	60
Australia	43
Hongkong	45

Source : Annual Transactions of IESL, The Institution of Engineers, Sri Lanka (2013)

Meanwhile, Indian standards for paving blocks suggest using different compressive strengths to meet different road traffic requirements, tabulated in Table 3.

Table 3 Recommended value of paving blocks for categories of traffic different according to Indian Standard (IS 15658: 2006)

Grade Designation of Paving Block	Specifead Compressive Strength of Paving Blocks at 28 Days(N/mm^2)	Traffic Category
M-30	30	Non Traffic
M-35	35	Light Traffic
M-40	40	Medium Traffic
M-50	50	Heavy Traffic
M-55	55	Very Heavt Traffic

Sumber : Annual Transactions of IESL, The Institution of Engineers, Sri Lanka (2013) [3]

In general, the quality of paving blocks produced with mechanical equipment has a high quality. The ingredients are mixed in certain comparisons according to designated and planned quality, then molded and compacted by various methods. Once opened from the mold it is stored in a place protected from direct sunlight and excessive wind gusts. In order for the results better be treated like a concrete with regular watering. After reaching the age of 28 days CPB can be tested its quality and ready to be marketed. Each variation is made with several factors of cement water. Treatment is performed by watering the paving surface until the age of 7, 14, and 21 days. From the manufacture of manual paving, the average test is obtained by the water factor of cement 0.40 with the compressive strength of 2,103 Mpa, the water factor of cement 0.45 with the compressive strength, the water factor of 2.589 Mpa cement, 0.50 with the compressive strength 2,939 Mpa, the water factor of cement 0.55 with the press force 3,574 Mpa and cement water factor 0.60 d compressive strength 4,092 Mpa [10]. In the process of making manual paving obtained maximum strength of 3,574 Mpa at fas 0,55. And this quality is still very far from expectations.

Almost for all purposes, concrete with minimal and sufficient cement factor to provide the specific workability required for perfect compaction without excessive compaction work is the best concrete (L.J Murdock and K.M. Brooks, 1979). The compressive strength of the concrete will increase according to the age of the concrete. Comparison of compressive strength of concrete at various age Rules of

ISBN : 978-602-99806-3-9

Reinforced Concrete Indonesia 1971. Type of cement effect on compressive strength of concrete, in accordance with the purpose of its use. The types of cement can be in accordance SK SK S-04-1989-F. The most influential aggregate properties of concrete strength are surface roughness. In the aggregate with a rough surface there will be a good bond between the cement paste and the aggregate.

Some physical and mechanical properties of paving blocks with fine aggregates (sand) are replaced by various percentages of crusher dust investigated. The test results show that the replacement of both aggregates by dust crusher by up to 50% by weight has negligible effect on any reduction in physical and mechanical properties while there is a savings of 56% of the money. Percentage of savings is less but very useful for mass production of paving blocks. will be more if the availability of sand at a longer distance. It also reduces the dumping load of dust crusher on earth which reduces pollution.The experimental environmental tests show that greater compression stress is given during the production process of increasing the compressive strength of dry concrete until it reaches optimum [9].

Compression strength increases with increasing compressive stress, applied during the compaction process. The increase in compression strength develops gradually until a convergence point is reached as obtained in the preliminary study. The explanation that at the time of mixing the process, the amount of water in the mixture can not be fully accessed for the cement hydration process. Much of the water is trapped in the pores and some of the free water is evaporated during the mixing process. Therefore, the compression pressure applied during production is predicted to force water out of the cavity and reach unlinked cement particles [7]. Therefore, in this study used some mixed stabilizers to fill the pores due to water trapped in the aggregate mixture.

2. Materials and Research Methodology

2.1 Materials

Material of paving block material in this research are Cement, Sand, Ash Stone, Waste Abu Batubara (Fly ash) and Water. In making paving block type of cement used is portland cement type. Portland cement is the most widely used hydraulic cement. In construction activities, portland cement is used in all types of structural concrete (eg bridges, walls, tunnels) and types of mortar (eg construction of dams, foundations, retaining walls). According to Indonesian Industrial Standard (SII) SII 0013-1981, the definition of portland cement is one type of hydraulic cement produced by clinker refinement comprising the main ingredient of hydrolysis of calcium silicate with gypsum.

Sand is a natural fine aggregate derived from volcanic eruptions, rivers or in soil. Sand has a granule with a size of 0.14-5 mm, and according to where the occurrence of natural sand is divided into sand dug, river sand, sand sand dunes brought to the beach. Sand is obtained by natural weathering (natural sand) or by breaking it (artificial sand). Fine grains of sand mixed with cement will fill the fine granular grain to get better results than the sand having coarse grains because the sand with coarse grains impact on the cavity between the grains wide enough so that the voltage can not spread evenly.

Stone ash, is one of the stone breaking waste that is easily found in stone breaking industries that have small grain size. Stone ash is a waste of stone breaking industry that is not small and not fully utilized. In the fraction of stone ash can be distinguished into two, ie stone ash obtained by a stone crusher or on a smaller scale of rock ash can be produced using a los angeles machine. The level of smoothness and gray ash roughness influenced by how to process it, ie from the process of collision to filtering through the sieve.

Fly ash is a factory waste from solid combustion of coal, has a fine size and has the most composition is silica. Fly ash contains heavy metals and is a hazardous and toxic waste. The chemicals contained in fly ash are affected by the type of coal and how it is stored in the landfill. Fly ash as factory waste is not like combustion gas, because it is a solid material that is not easily soluble and not volatile so difficult in handling. Fly ash will pollute the environment if the number is large and not handled properly, because the fly ash grains are very light and can fly in the air and inhaled by humans and can affect the condition of water and soil around it so that it can kill plants. Fly Ash used in this research comes from waste coal Basuki Rahmat Paper Factory (PKBR) Banyuwangi. In laboratory tests, PKBR

ISBN : 978-602-99806-3-9

fly ash falls into the F category, due to the silica oxide content; aluminum; and iron from fly ash produced more than 70%, so it has met the standard fly ash according to ASTM C 618-191.

Water is one of the vital materials in making paving block. Water function as paving block material can determine the quality in making paving block. The hydration process will occur when water mixes with cement. Excessive water will cause a lot of water bubbles after the hydration process is complete, while too little water causes the hydration process is not fully completed

2.2 Methodology

Several stages used in this research method is stage one, that is material research, with the intention to know the characteristics of materials used in this research, such as filter analysis, humidity, specific gravity, water absorption, volume weight, sand content to mud.

Fig.1 Material testing research activities

For the second stage is the manufacture of mix designs that consist of mixing variations of water content, mixing rock ash variations and mixing fly ash variations. In the last two mixing, each controlled the ratio of cement water and without control of water cement ratio. With the design as follows:

i. Mixed design for FAS variations (0.5, 1, 1.5, 2)
Treatment 1 Mixture: 1 Cement: 3 sand.
Treatment 2 Mixture: 1 Cement: 5 sand.
Treatment 3 Mixture: 1 Cement: 8 sand
Treatment 4 Mixture: 1 Cement: 11 sand

ii. Mixed design for stone ash variations with uncontrolled and uncontrolled Fas
Treatment 1 Mixture: 1 Cement: 0 Ash stone: 5 sand.
Treatment 2 Mixture: 1 Cement: 5% Ash stone: 5 sand.
Treatment 3 Mixture: 1 Cement: 10% Ash stone: 5 sand
Treatment 4 Mixture: 1 Cement: 15% Ash stone: 5 sand
Treatment 5 Mixture: 1 Cement: 20% Ash stone: 5 sand

iii. Mixed design for Fly Ash variations with uncontrolled and uncontrolled Fas
Treatment 1 Mixture: 1 Cement: 0 Fly Ash: 5 sand.
Treatment 2 Mixture: 1 Cement: 5% Fly Ash: 5 sand.
Treatment 3 Mixture: 1 Cement: 10% Fly Ash: 5 sand
Treatment 4 Mixture: 1 Cement: 15% Fly Ash: 5 sand
Treatment 4 Mixture : 1 Cement: 20% Fly Ash: 5 sa
The third stage of making the specimen in accordance with the Mixed design

ISBN : 978-602-99806-3-9

Fig 2. Activity of making specimen with pressing technology

The tool used in the process of making paving by pressing consists of several components such as the framework of the press machine as a place to press paving, electric dynamo with power 3 pk as an electric energy converter into mechanical energy, oil tank used for hydraulic pumps, for pump movement automation and equipped with a dial to measure the pressure occurring at the point of compression of the specimen. The average paving sample was pressed with an average pressure of 3 t, with the consideration that the pressure was able to make a solid paving sample without damaging the sample mold.

Fourth stage, press test
After making a sample, then done curing until the age of 28 days. The trick is to accumulate in a shady location which is then done watering every day, then ready for testing.

Fig. 3.Curing CPB

ISBN : 978-602-99806-3-9

Fig. 4 Loading test

3. Results and Discussion

Prior to the manufacture of specimens, tested on paving-forming material is cement and sand which is done in the Laboratory of Structure of Faculty of Engineering, University of Jember. Test results can be seen in the following table:

Table 3.1 Data testing of sand and cement materials

Testing	**Standart**	Test Result	**Ket.**
PPC Cement			
Pecific Grafity	± 2.90	3.28	ok
Unit weight			
Compacted (gr/cm3)	-	1.18	
Uncompacted (gr/cm3)	-	1.08	
Fine Agregate			
Sand Filter Analysis			
Fine Modulus	1.5 - 3.8	2.665	ok
Zona	1,2,3,.4	2	
Humidity	-	19.19%	
Pecific Grafity (gr/cm3)	2.6	1.88	
Air Resapan	20%	15.85%	ok
Unit weight			
Compacted (gr/cm3)	-	1.295	
Uncompacted (gr/cm3)	-	1.091	

Source: Laboratory Test Results

ISBN : 978-602-99806-3-9

With the results of `sieve analysis` as shown below:

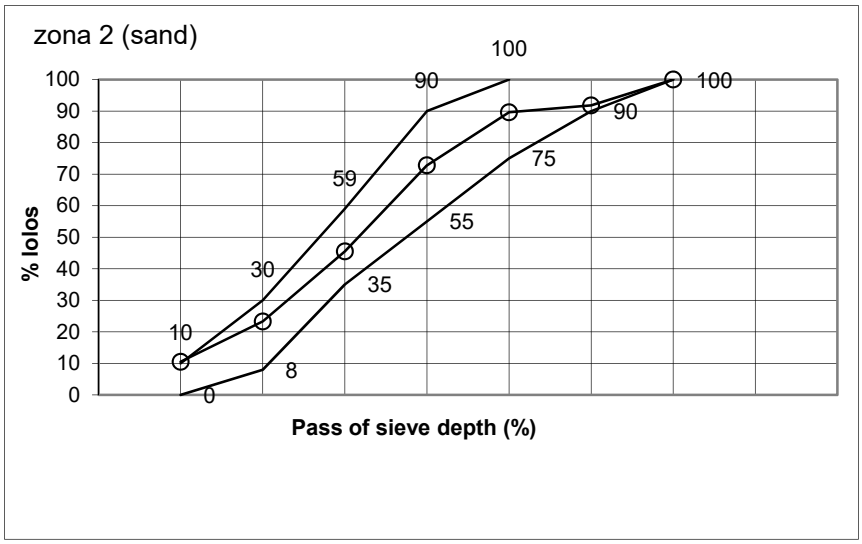


Fig. 5 Sieve analysis sample

With a sample size of 10 x 20 x 6 cm paving, the mixture on the FAS variation produces a compressive strength graph as shown below:

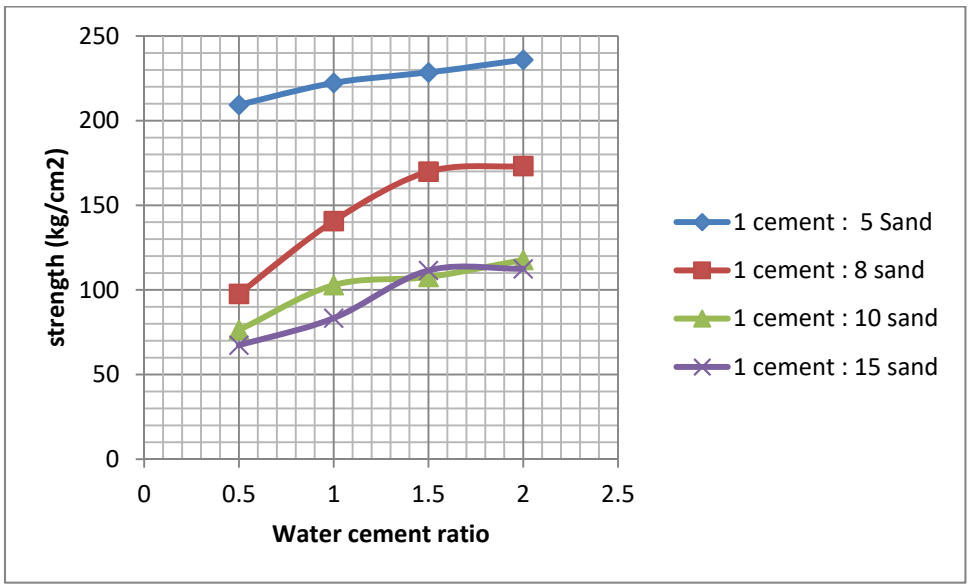


Fig. 6 Relationship of FAS Variation with CPB strength on some mix design variations

In Fig. 5 it is read that the paving device with the Press method is not capable of producing a high compressive strength and achieving only a compressive strength of less than 250 kg / cm2 despite the highest compressive strength at the lowest moisture content. This shows that the cavity in a concrete slab of CPB is still relatively high even though it is high-strengthed.

Stabilization is continued by adding a variation of filler of rock ash from 0% to 20%. For Fas of the mixed design there are two directions, corrected and uncorrected Fas. To which the corrected Fas means

ISBN : 978-602-99806-3-9

to maintain the condition of the crap as the filler is added, the water is added. With the equation as follows:

Addition of water due to stone crusser ash 5% = $B + \{(Ck - Ca) \times C / 100\} - \{(Dk - Da) \times D / 100\}$

Which :

B = Amount of water (kg / m³)
C = Total percentage of fly ash 5% to cement (kg / m³)
Ck = Moisture fly ash
Ca = Water ash fly up

In this corrected FAS it appears fig.6 that there is an upward trend along with the added stone ash filler although not significantly. The fixed pressure on the paving press indicates that compaction using only limited pressure is not able to penetrate the compressive paving strength to reach 200 kg / cm2. Thus proving that the pressing technology is not the dominant factor to get the high paving with high quality, but there are other factors that greatly affect the power of CPB. As for the FAS that is not corrected, the equation of water addition is the addition of cement water factor due to the ash of stone.

The use of water for the normal mixture = $B - \{(Dk - Da) \times D / 100\}$

Which:

B = Amount of water (kg / m³)
D = The amount of fine aggregate (kg / m³)
Dk = Moisture of sand
Da = Water absorption sand

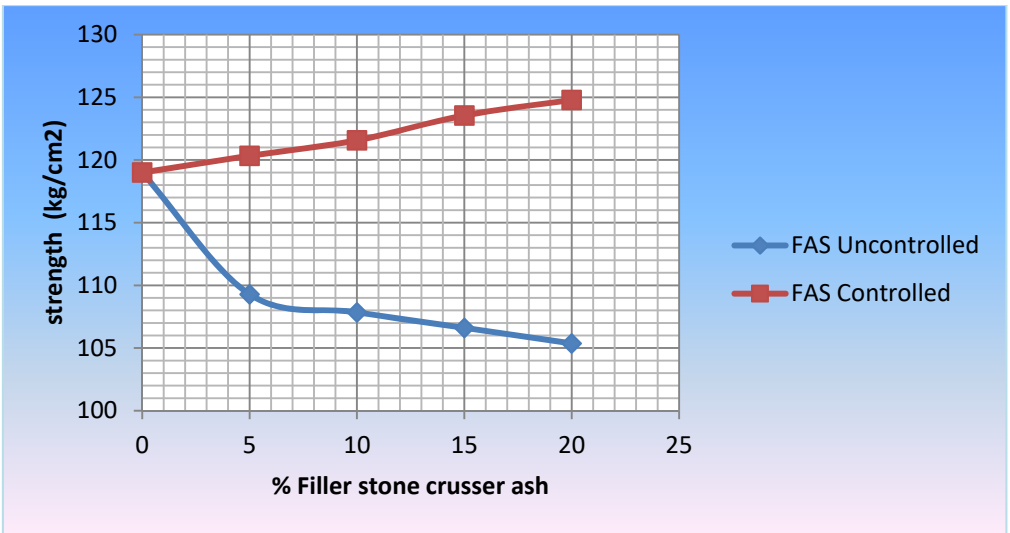


Fig.7 Test results for each Fas

Further stabilization by using the addition of Fly ash filler variation from 0% to 20%. For Fas of the mixed design there are two directions, corrected and uncorrected Fas. To which the corrected Fas means to maintain the condition of the crap as the filler is added, the water is added. Figure 7 shows that the addition of fly ash filler has increased sharp compressive strength to reach 200 kg / cm2. So the use of fly ash on the machine as a filler can still be continued.

ISBN : 978-602-99806-3-9

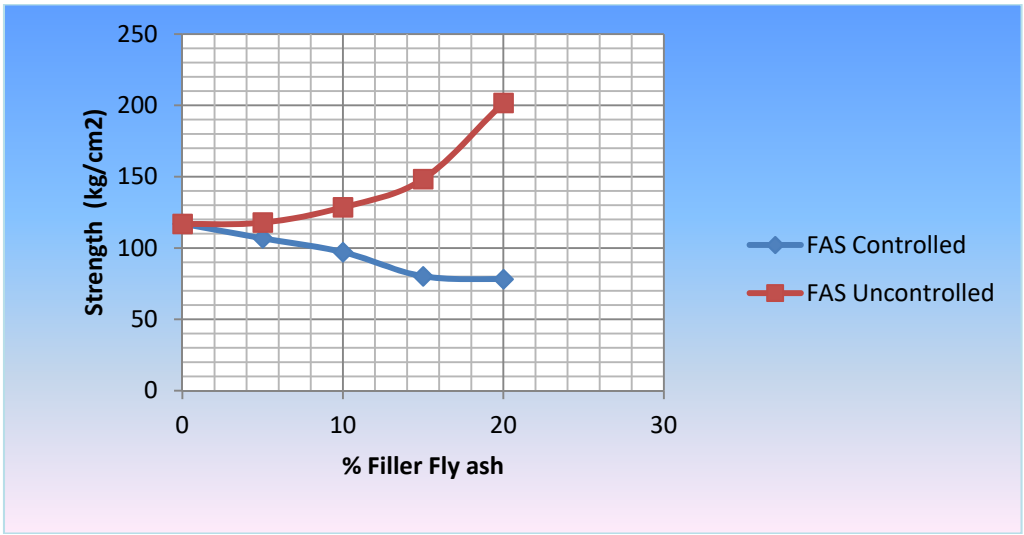


Figure 8 Filler percentage relationship with compressive strength of paving with 2-way FAS

4. Conclusion

There are some conclusions from the use of paving press for the manufacture of paving which include:

1. In the range of 3 ton pressing power is only able to produce the paving presses that only achieve the strong quality of press 250 kg / cm2.
2. The composition of aggregate mixture Fas that maintains a dislocation or with a controlled FAS can sustain and can raise the compressive strength of the paving otherwise unsustainable defects will decrease the compressive strength of the paving.
3. The composition of each treatment mixture, starting from FAS, stone ash and Fly ash respectively can be continued again in subsequent research, due to the upward trend of compressive strength in both rock ash ash and fly ash filler.
4. CPB production press machine limited use in traffic with light loads such as alley, yard and garden. And less precise for public facilities with heavy loads such as terminals, gas stations and container ports, because the resulting compressive strength does not reach the International standard. This proves that the press energy generated from the paving machine by pressing method is not able to remove water, the air is in the CPB.

Acknowledgement

This Research was conducted on funding by private industry and the Structural and Construction Laboratory of Jember University.

References

[1] "*Blocks for paving — specification*", i(x 93.080.200 bis, Bureau Of Indian Standards, New Delhi 110002.

[2] G. LEESj B»Sc»j F.G.S.j A.InstoH.E, *"The Design Of Aggregate Gradings To Minimum And Controlled Porosity - A Study Of Packing Characteristics And Void Characteristics In Aggregates"*, Presented as a thesis for an Official Degree of the University of Birmingham, Department of Transportation October 1967*and Environmental Planning, University of Birmingham.

[3] K. Baskaran and k. Gopinath, 2013, *"Study On Applicability of ACI And DOE Mix DesignMethods For Paving Blocks"*, Annual Transactions of Iesl © The Institution of Engineers, , Pp. [Page Range], Sri Lanka.

ISBN : 978-602-99806-3-9

[4] Mahendra Palnati, 2015,*" Design, Fabrication and Analysis of A Paver Machine Push Bar Mechanism"*, University of South Florida.

[5] Mohammed Seddik Meddah A,*, Salim Zitouni B, Said Belaabes B, 2010,*" Effect Of Content and Particle Size Distribution Of Coarse Aggregate On The Compressive Strength Of Concrete",* Journal Homepage: Www.Elsevier.Com /Locate/Conbuildmat, Higashi-Hiroshima 739-8527, Japan.

[6] Sk SNI 15-0302-2004,*" Semen Portland Pozolan"*

[7] Sulistyanaa, Purwantob, Vemi Widoanindyawatib, M. Mirza Abdillah Pratamab, 2014, *"The Influence of Compression Applied During Production to the Compression Strength of Dry Concrete"*:2nd International Conference On Sustainable Civil Engineering Structures andConstruction Materials, , Semarang 50275, Indonesia.

[8] Tayfun Uygunoglu, Ilker Bekir Topcu, Osman Gencel, Witold Brostow, 2012, *"The Effect of Fly Ash Content and Types Of Aggregates on the Properties of Pre-Fabricated Concrete Interlocking Blocks (Pcibs)"*, Construction And Building Materials, Journal Homepage: Www.Elsevier.Com/ Locate/Conbuildmat.

[9] Radhikesh P. Nanda 1 , Amiya K. Das 2 , Moharana.N.C 3 *"Stone crusher dust as a fine aggregate in Concrete for paving blocks"* International Journal Of Civil And Structural Engineering Volume 1, No 3, 2010

[10] Arief Wahyulie, Bambang Herumanta '*Pengaruh Faktor Air Semen (Fas) Dan Mix Design Pada Pembuatan Bata Beton (Paving Block) Terhadap Kuat Tekan"* skripsi Universitas Gadjah Mada, 2014

ISBN : 978-602-99806-3-9

Handling technique development of live carp, *Cyprinus Carpio*, in cold dry styrofoam box

I Ketut Suwetja[1], Netty Salindeho[1], I Gede Prabawa Suwetja[2]
[1] Departement of Fisheries Technology, Faculty of Fisheries and Marine Science, Sam Ratulangi University, Manado 95115, Indonesia
[2]Departement of Accounting, Faculty of Economic and Business, Sam Ratulangi University, Manado, 95115, Indonesia

suwetja.i.k@gmail.com

Abstract. The study focused on several following aspects: temperature and time optimation for fainting, holding media optimation, temperature and time optimation for recovery, and their correlation with mortality rate of carp, *Cyprinus carpio*. Fainting occurred at the optimum time of 11 minutes and 03 seconds, temperature of 8ºC, and holding time of 6 hours. Holding medium was rice husk. The fastest consciousness of the fish was found in 6 volt-aerated water medium. The fish consciousness after 6 hours of storing in the rice husk at the fainting temperature of 8ºC was found faster ($p < 0.05$), 11 minutes and 15 seconds, than that added with 0.02% of clove oil, 25 minutes and 16 seconds. The fish mortality rate after 6 hours of storage in the rice husk at fainting temperature of 8ºC was lower ($p < 0.05$), 46%, than that with addition of 0.02% of clove oil, 75%.

1. Introduction

Live fish transportation in Indonesia is generally conducted using a water-containing plastic bag filled with either oxygen addition or not, depending upon its necessity. Such a packing and transporting technique has some weaknesses, such as less efficient in weight, volume, and transport cost, decreasing water oxygen content, increased water temperature, fish poisoning from their feces, and relatively long transportation.

Nowadays, live fish transportation has been developed using a dry medium through low temperature fainting method. It is done by cooling the water down to the fainting temperature of the fish. Low temperature is maintained in the Styrofoam box by placing some ice cube. Cool media for fish storage use either rice husk or sawdust.

One of the main goals in live fish transportation is to yield low mortality rate, and therefore, the fish must be fainted. Immotilization is necessarily done that the fish metabolism activity is in basal condition. At very low respiration and metabolism rate, the fish can be transported in long duration at low mortality rate. There are several immotilization techniques, such as the use of low temperature or the use of natural or artificial anti-metabolite (Wijayanti *et al.,* 2011).

Before storing, the fish is previously wrapped with paper to avoid the fish mouth filled with the media material (Suwetja et al., 1993). The wrapped fish is then placed and set in the styrofoam containing cool sawdust of 10-15°C. The fish placement is done in layers, media-fish-media etc., and the top layer is media. The media thickness is more or less 2-3 cm. To maintain the temperature stability, the Styrofoam is filled some ice cube (Suwetja and Pongoh, 2000).

ISBN : 978-602-99806-3-9

Re-awaking carp after fainted and stored can be done by returning the fish into a sufficiently aerated tank at their habitat temperature, 25-27°C. The survival of live fish packed in unconscious condition is affected by initial condition of the fish, fainting temperature, fish origin, and shocks from overlapping at the lower level that causes fish mortality during the transportation (Hjeltnes *et al.,* 2008; Suwetja et al., 2012).

Rinto (2012), Miranti (2011), Junianto (2003), Amend *et al.,* (1982), Berka (1986), and Gomes *et al.* (2003) also supported that live fish transportation was basically aimed to maintain the fish survival during the transportation reaching the target location. Close distance transportation does not need specific treatment, but long distance transportation requires particular treatments to maintain the fish survivorship. Therefore, an appropriate live fish transportation technology following the commodity and condition requirements is needed. Basically, there are two live fish transportation methods, the use of water as media called wet system and the use of dry system (media without water).

The principle of live fish handling is maintaining the fish survivorship as maximum as possible up to accepted by the consumer. For this, there are several handling phases, pre-transport, transport, and post-transport handlings. Closed transportation will yield CO_2 accumulation and pH decline (Grottum *et al.,* 1997; King, 2009; Farrell *et al.,* 2010).

2. Material and Methods

Fainting media used low temperature of 8°C and low temperature of 8°C added with 0.02% of clove oil. Storing media employed rice husk. Sawdust was not used as storing media because it has hazardous material for fish. The ice cube placed in a storing box was 1.8 kg. The fish were held for 8 hours and observed every 2 hours. Holding time treatments were 0, 2, 4, 6, and 8 hours with 2 replications. Parameters recorded were fainting rate time (Septiarusli et al., 2012, and Suwetja, et al., 2016), reawaking time (Anggriani et al., 2014, and Suwetja., et al., 2016), and fish mortality (Jailani, 2000, and Suwetja, et al., 2016).

3. Statistical Analysis

This study used Factorial Complete Randomized Design with two factors as follows:

1) Fainting method (A) with two levels: A1 – fainting at 8°C and A2 – fainting at 8°C plus 0.02% of clove oil
2) Storage duration (B) with five levels: B1: 0 hours, B2- 2 hours, B3- 4 hours, B4- 6 hours, and B5- 8 hours.

4. Results and Discussion

Fainting Speed Time of C. carpio

Mean value of fainting speed time ranged from 1.2 to 14.16 minutes (Fig. 1).

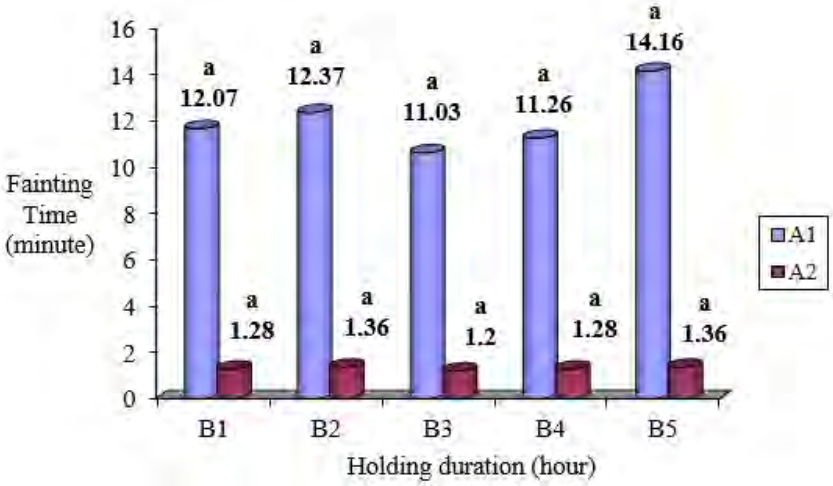


Figure 1. Fainting method and storage duration with fainting speed of *C. carpio*. A1: temperature of 8°C, A2 : temperature of 8°C + 0.02% of clove oil. B1 : 0 hour, B2 : 2 hours, B3 : 4 hours, B4 : 6 hours, B5 : 8 hous.

ISBN : 978-602-99806-3-9

ANOVA showed that fainting method treatment, storing time, and their interaction did not significantly influence the fainting speed time (P > 0.05). Faster fainting time occurred in the method using clove oil since addition of clove oil into water media caused the dissolved oxygen in the water be reducing. Clove oil could function as insulator or barrier for oxygen diffusion process into the water. According to Ferdiansyah (2000), dissolved oxygen decline is directly proportional to the increase in clove oil concentration, since oxygen diffusion process into the water is inhibited. The higher the clove oil concentration is, the lower the oxygen diffusion into the water will be. Eugenol as water-soluble anesthetic will reduce respiration rate of the fish. Decline in the respiration rate results in loss of all feelings on the fish body due to reduced nerve function so that nerve impulse action and delivery are inhibited (Saskia et al., 2012). According to Smith and Breet *in* Wilford (1970), the ionic balance disturbance in fish brain causes the gill unable to normally function, and the osmoregulation of dissolved oxygen in the water into blood cells and gill be disturbed.

Statistical analysis found that the treatment of holding duration did not give significant effect on the fainting speed time of the carp. It could result from that holding duration treatment was done after the fainting process ended so that it did not affect the fainting time.

Re-awaking Time of C. carpio

Mean value of re-awaking time of *C. carpio* ranged from 0.3 – 25.16 minutes. ANOVA indicated that at the confidence level of 95% fainting method, holding duration, and the treatment interaction gave significant effect on the re-awaking timeof *C. carpio* (P≤ 0.05).

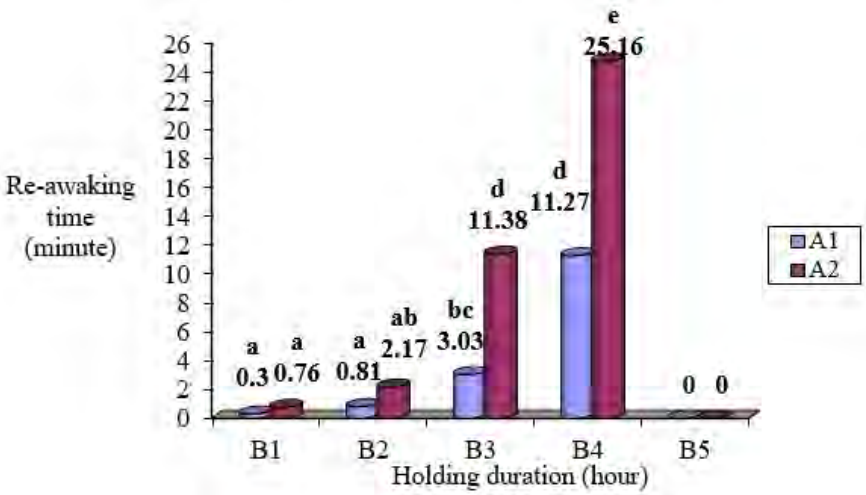


Figure 2. Fainting method and holding duration relationship with re-awaking time of *C. carpio*. A1: temperature of 8°C, A2 : temperature of 8°C added with clove oil of 0.02%; B1: 0 hour, B2: 2 hours, B3: 4 hours, B4: 6 hours, B5: 8 hours.

LSD test on comparison between treatments against the e-awaking time is presented in Fig. 2. The use of fainting method at 8°C and holding duration of 0 hour (A1B1) showed the fastest recovery time, 0.3 minute and the longest recovery time was recorded in fainting method treatment of 8°C added with clove oil of 0.02% for storing duration of 6 hours (A2B4), 25.16 minutes.

This finding reflects that the use of fainting method added with clove oil of 0.02% for 6 hours of storage results in longer re-awaking time than that a without clove oil addition. It could result from that active compounds in the circulatory system of the fish body at certain amount make the fish need longer time to return to normal condition. Eugenol as active compound in the clove oil is an antiseptic material that can weaken the nerve and disturb the nerve system (Hart, 1990).

Based on re-awaking time data, it is apparent that fainting method of 8°C be an effective method to faint the fish with storage duration up to 6 hours compared with the fainting method using temperature of 8°C with clove oil addition of 0.02%.

Mortality of C. carpio

ISBN : 978-602-99806-3-9

Mortality rate of *C. carpio* is presented in Fig. 3. Mean mortality rate ranged from 0 to 100%.

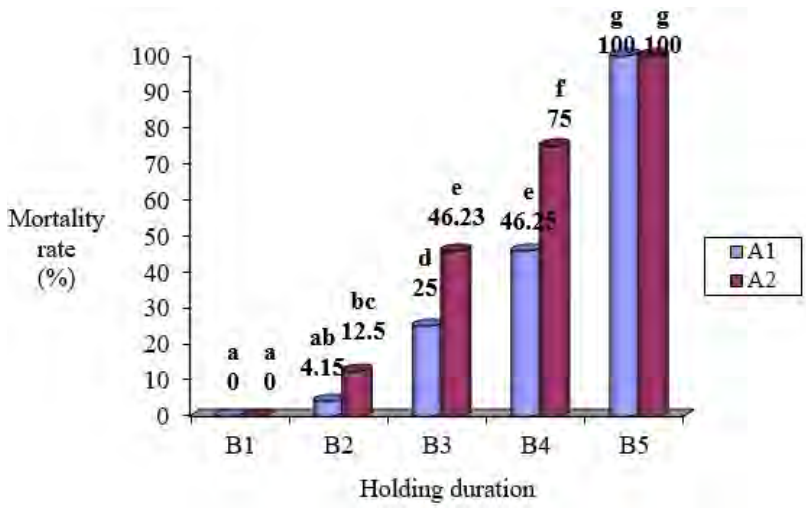


Figure 3. Fainting method and holding time relationship with the mortality rate of *C. carpio*. A1: temperature of 8°C, A2 : temperature of 8°C + 0.02% of clove oil; B1: 0 hour, B2: 2 hours, B3: 4 hours, B4: 6 hours, B5: 8 hours;

ANOVA indicated that fainting method, storing duration and treatment interaction gave significant effect on the mortality rate of *C. carpio* ($P \leq 0.05$). LSD test reflected that the mortality rate of *C. carpio* for 6-hour storage using fainting method of 8°C was found lower than that in fainting method of 8°C added with clove oil of 0.02%, 46.25% and 75%, respectively. It means that the use of fainting method of 8°C is better than that of 8°C added with clove oil of 0.02%.

This study also found that the longer the storing duration was, the higher the fish mortality could be. The fish, particularly *C. carpio*, were only capable of surviving up to 6 hours of storage. All *C. carpio* died in 8 hours of storage.

5. Conclusion

Optimum fainting time was 11.26 minutes and temperature of 8°C through treatment combination with 6-hour storage. Good holding media was rice husk, because the sawdust, despite implementation of initial washing and re-drying, the effect of wood latex on the mortality is still high. Optimum mortality rate, 46%, was obtained at the holding media of rice husk and 6 hours of storage using fainting method of 8°C without clove oil addition.

Optimum re-awaking time was found at 11.27 minutes through treatment combination of 6-hour holding time and optimum fainting temperature of 8°C. Re-awaking was conducted using 1.5 volt and 3.0 volt aerator, but the fish awake faster at the use of 3.0 volt aerator, since more dissolved oxygen were supplied at the 3.0 volt aerator application than that at 1.5 volt.

References

[1] Amend, D. F., Crov, T.R. & Goven, B. A., Transportation of fish in closed system; methods to control. 1982 ammonia, carbon dioxide, pH and bacterial growth. Trans. Am. Fish .Soc., 111(5):603-ll.

[2] Anggraini, D., Taqwa, F. H, and Yulisman, 2014. Mortality of carp (*Cyprinus carpio*) at the bagasse thickness substrate and different transport duration. J. Fish. And Mar. (8) : 78-89.

[3] Berka, 1986. *The Transport of live fish.* A Review. (EIFAC Technical Paper 48). Food and Agriclture Organization Of The United Nations.http://www.fao.org (29 Mei 2010).

[4] Farrell, A., Tang, S., Nomura, M., & Brauner C., 2010. *Toward Improved Public Confidence in Farmed Fish: A Canadian Perspective on Fish Welfare during Marine Transpor*t. Journal Of The World Aquaculture Society. 41, 225-239.

ISBN : 978-602-99806-3-9

[5] Ferdiansah, 2000. Toxicity and anesthetic of clove oil (Eugenol Aromaticum) on catfish (*Pengasius hypophthalmus*) FPIK IPB.
[6] Gomes, L.C.; Araujo, L. C. A. R. M., & Roubach, R.., 2003. Effect of fish density during transportation on stress and mortality of juvenile tambaqui Colossoma macropomum. J. World Aquac. Soc., v.34, p.76-84, 2003a.
[7] Grottum, J., Staurnes, M., & Sigholt, T., 1997. Effect of oxygenation, aeration and pH control on water quality and survival of turbot, Scophthalmus maximus (L), kept at high densities during transport. Aquaculture Research 28, 159-164.
[8] Hart, H. 1990. Organic Chemistry. Translation. Suminar Erlangga, Jakarta.
[9] Hjeltnes, B., Waagbo, R., Finstad, B., Rosseland, B.O., Rosten, T.R., & Stefansson, S., 2008. *Transportation of fish within a closed system*. In, p. 63. Norwegian Scientific Committee for Food Safety.
[10] Jailani. 2000. Study on the effect of banana stalk as fill material on the survival rate of carp (*Cyprinus carpio*) [research paper]. Bogor : Fac. Fish. And Mar. Sci., Institut Pertanian Bogor.
[11] Junianto. 2003. Fish handling techniques. Jakarta: Penebar Swadaya.
[12] King, H., 2009. Fish transport in the aquaculture sector: An overview of the road transport of Atlantic salmon in Tasmania. J. Veterinary Behavior -Clinical Application and Research 4, 163-168.
[13] Miranti. 2011. Study on transportation of carp (Cyprinus carpio) using dry system with Styrofoam media. [PKM-AI]. Bogor: Depart. of Aquaculture. Fac.Fish and Mar. Sci. Institut Pertanian Bogor.
[14] Rinto, 2012. *Transportasi ikan hidup*. http://teknologipascapanen. blogspot.co.id/2012/02/ transportasi-ikan-hidup.html. Diakses 22 Mei 2017.
[15] Saskia, Y. Haspeni, E. and Tutik, K, 2012. Toxicity and Anesthetic Ability of clove oil (Eugenol Aromaticum) on red rainbowfish (Glassolepis nisicus). J. Fisheries Sci.. and Aquatic Resources.
[16] Septiarusli, I. E., Haetami, K., Mulyani, Y., and Dono, D. 2012. Secondary metabolite potential of futu seed (*Baringgtonia asiaica*) extract in anesthesis of Tiger grouper (*Ephinephelus fuscoguttatus*). J. Perikanan dan Ilmu Kelautan Vol. 3(3): 295-299.
[17] Suwetja, I K., A. Agustin, M.Mengga. 1993. Live carp packing experiment without water media. Paper. FPIK UNSRAT.
[18] Suwetja, I K., dan J. Pongoh, 2000. Study on rice husk utilization for live carp transportation in the dry insulated wooden box. Report. UNSRAT.
[19] Suwetja, I K., S. Rogi, and J. Pongoh. 2012. Study on sawdust utilization for live fish transportation in dry media container. Report. UNSRAT.
[20] Suwetja I.K., J. Pongoh & Prabawa I. G., 2015. The use of sawdust for live carp transportation in dry Styrofoam. [Final Repot]. Lembaga Penelitian dan Pengabdian kepada Masyarakat, Universitas Sam Ratulangi Manado.
[21] Suwetja I. K., Salindeho. N., & Suwetja, I. G., 2016. *Technical development of live carp in the dry Styrofoam for inter-regency, city, and islandmarketing in order to raise the added economic value. Year-end report on national priority research of Acceleration and Extension Masterplan of Indonesia Economic Development* - 2011-2025(Perprinas MP3EI 2011-2025. Universitas Sam Ratulangi.
[22] Wijayanti, I., Tapotabun, E. J., Salim, A., Nuer'aenaj, N., Litaay, C., Putri, R. M. S., Kaya, A. O. W., and Suwandi, R., 2011. The effect of temperature on the anesthetic condition of freshwater pemfret, *Colossoma macropomum, and freshwater lobster, Cherax quadricarinatus. Proceeding on Small Islands Development,* 2011 - ISBN: 978-602-98439-2-7 : 67-76.
[23] Wilford, W.A, 1970. Effect of MS 222 on electrolyte and water content in the brain in rainbow trout. US Burean of Sport Fisheries and Wildlife Investigation in Fish Control.

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

Critical success factors to improving safety culture on construction project in Indonesia

Rossy Armyn Machfudianto, Yusuf Latief, Robert, and Dadang Iskandar
Department of Civil Engineering, Faculty of Engineering, University of Indonesia, Depok, West Java, 16424, Indonesia

dadang.iskandar@ui.ac.id

Abstract. Safety in the construction industry is still a major concern in some countries in the world. This is due to the levels of occupational accidents in the construction industry is still far higher than other industries. This study aims to (i) identify factors - factors that affect safety, (ii) determine critical success factors implementation of safety and (iii) the improvement work done to achieve salvation. This study uses Factor Analysis and Analytical Hierarchy Process. From this research, the 5 Critical Success Factors are the leadership of the (30.69%), Behavioral Safety (22.49%), Safety Planning (22.26%), Individual Capability (17.52%), and the Report and Evaluation (7,04%). Based on the critical success factors of the obtained improvement to the implementation of safety culture

1. Introduction

Safety is a very important element in the successful execution of a job. Safety in the construction industry is still a major concern in some countries in the world. This is due to the levels of occupational accidents in the construction industry is statistically still far higher than other industries.

The efforts to prevent from accident is with working effectively to improve policies or regulations regarding occupational safety management system in the construction industry. At the project level, work accidents causing delays in the completion of projects due to lost working hours and the impact is no less important is lowering the quality of human life.

Based on the description that has been described above, then the research formulated several problems as follows: (1) What factors influence the success of safety on construction projects in Indonesia? (2) where the Critical Success Factors that most influence on safety culture? and (3) How to improve the safety program as forming a safety culture is based on the success factors of the safety performance?

The purpose of this research are (1) To identify the success factors of safety work on construction projects, (2) to determine the Critical Success Factors that most influence on safety culture on the project konstruksia and (3) to provide an improved method of implementation of the safety program as a shaper of safety culture work based on the success factors of safety performance

2. Review of Theoretical

Critical Success Factors can be defined as an element which, if the element is satisfactory, it will ensure the successful implementation of safety programs (Rockart, 1979). Rungasamy et al. (2002) stated that the CSF required for the success of any program in a way that if the purpose of the organization 'is not compatible with current conditions, their programs will fail catastrophically. Aksorn and Hadikusumo (2008) proposes a complete list of critical success factors that can affect the successful implementation of safety programs

ISBN : 978-602-99806-3-9

Some Critical Success Factors of safety culture development according to the experts who had conducted research and based on rules

Table 1. Critical Success Factors Development of Safety Culture

No	Dimension	Description	Source
1	Clear goals	Clear and reasonable safety goals should be established to provide a clear direction for staff to work toward, and to serve as the target against which overall safety performance can be measured.	Abudayyeh, et al. (2006)
2	Authority and responsibility	The proper authorities and responsibilities assigned to workers to handle safety incidents and to take appropriate action.	Abudayyeh, et al. (2006)
3	Teamwork	All levels of staff in the company must be engaged in the safety programs; improving safety should be seen as collective effort which requires cooperation from everyone involved.	Abudayyeh, et al. (2006)
4	Program evaluation	Safety programs should be periodically evaluated to determine its success in meeting set out goals and objectives.	Abudayyeh, et al. (2006)
5	Sufficient resource allocation	Sufficient resources (eg, staff, time, money, information, facilities, equipment, machinery) to carry out daily activities to achieve both short-term and long-term.	Abudayyeh, et al. (2006)
6	Leadership	Leaders are personally involved in ensuring that the organization's safety management system was developed and implemented. Leadership and management commitment to safety is recognized as a fundamental component of the organization's safety culture	Dea dan Flin (2001)
7	Safety Meeting	To improve safety performance at the project, formal safety meeting must be held regularly to review the safety records	El-Mashaleh, et al. (2009)
8	Communication	When the lines of communications between management and workforce are open, workers can bring reports of unsafe working practices and hazardous environments	Fang, et al. (2004), Abudayyeh, et al. (2006)
9	Efficient Enforcement System	Efficient enforcement scheme should be developed and implemented to ensure workers follow the safety rules and regulation.	Fang, et al. (2004)
10	Suitable Supervision	Supervisors capable of allocating work that matches worker`s skill, identifying hazard conditions and making the environment safe by communicating with workers and listening to them and be sure all workers follow the safety rules and find solution for the occurring safety problem.	Fang, et al. (2004)
11	Confict resolved quickly by project participants	Safety being overlooked in the context of heavy workload and other priorities, taking shortcut to save effort and time. Confict will aggravate the situation if not resolved quickly	Haslam et al., (2005)
12	Risk preference	The more willingness to take a risk, the stronger risk tolerance an individual may have	Hunter (2006)
13	Decision motivation	With the motivation of specific decisions, the decision is a significant directivity, which resulted in the fact that the activity of the decision will be moving towards the expected direction and purpose	Jiayuan Wangb, Patrick X.W. Zoua, Penny P. Li (2015)
14	Noise	Loud noise from operation of machines may make workers feel fidget, then, unreasonable assessment of self-risk tolerance may happen	Jiayuan Wangb, Patrick X.W.Zoua, Penny P. Li (2015)
15	Peers behaviors	The effect of peers behavior refers to workers would do as same as what their peer workers do. If other workers complete work earlier by taking risks, it will enhance individuals' risk tolerance to take the same risks	Jiayuan Wangb, Patrick X.W. Zoua, Penny P. Li (2015)
16	Participation of employees	Successful safety programs largely depend on employee involvement as workers tend to support the activities that they themselves help to create. Workers should be given the	Peyton and Rubio (1991), Harper and Koehn (1998), Ariss

ISBN : 978-602-99806-3-9

		opportunities to provide input into the design and implementation of safety programs such as being a member of the safety committee, reporting hazards and unsafe practices to supervisors, identifying training needs, investigating accidents, etc.	(2003), Smith (2003), Abudayyeh et al. (2006)
17	Positive group norms	Group norms are the accepted attitudes about various things amongst a group of people. In practice, members of a group conform to certain attitudes simply to avoid sanctions. If positive attitudes towards safety can be built and embedded within a group, safety can then be managed successfully. This is the basis of good safety culture	Petersen (1984), Sarkus (1997), Stranks (2000), Johnson (2003)
18	Safety knowledge	The more safety knowledge the workers has, the more clear about the seriousness of risk taking in construction project, then lower risk tolerance may happen	Pohjola (2003)
19	Physical health	This factor influences the pressure workers can endure, the working quality, and the corresponding ability to confront risks	(Segal et al., 2005)
20	Emotion	It means whether workers are happy or not, sometimes working with anger or sadness may result in irrational of risk decision making	(Segal et al., 2005)
21	Equipment and Maintenance	Regular maintenance of equipment to ensure that they are always in safe working condition.	Toole (2002), Tam, et al. (2004)
22	Personal Attitude	Better safety attitudes mean better perception of the work atmosphere that leads to better safety performance.	Tam,et al.(2001) , Fang, et al. (2006)
23	Professional knowledge	It refers to the degree of professional knowledge will affect workers directly while dealing with professional project issues, result with different risk tolerance.	Wang dan Yuan (2011)
24	Sensitivity to potential risks	It refers to the ability that workers can make quick response and judgment to potential risks by analyzing relevant information. More sensitive means the workers emphasis more on safety issues, thus they have lower willingness to take risks	Wang (2014)
25	Safety Plan Presentation	K3 plan presented at the meeting of the preparation for the construction work to be approved and signed	Permen PU No. 5 tahun 2014 Pasal 9
26	Safety plan is part of a contract	Safety plan which was approved become an integral part of the contract documents the construction work and a reference implementation on the construction	Permen PU No. 5 tahun 2014 Pasal 9
27	Construction K3 policy in the form of Joint Operation	In the case of construction work carried out in the form of Joint Operation, the Joint Operation leader should establish the safety Construction policies that apply to all company in Joint Operation	Permen PU No. 5 tahun 2014 Pasal 9
28	Suitability implementation of the Safety Plan	If there is a discrepancy in the implementation of the implementation of the Safety Plan and / or alteration and / or occupation add / subtract, then thesafety plan must be reviewed and approved	Permen PU No. 5 tahun 2014 Pasal 9
29	Documentation of the results of the application of Safety Plan	Documentation of the results of the implementation of Safety Plans are made and reported regularly (daily, weekly, monthly and quarterly), which became part of the report on the implementation of work	Permen PU No. 5 tahun 2014 Pasal 9
30	Accident report	in case of work accident, the contractor shall make a report workplace accidents	Permen PU No. 5 tahun 2014 Pasal 9
31	Performance improvements	The Company shall implement performance improvements based on the results of performance evaluation is conducted quarterly safety plan, in order to ensure the suitability and effectiveness of the application	Permen PU No. 5 tahun 2014 Pasal 9

ISBN : 978-602-99806-3-9

3. Research Methodology

In answering the formulation of research problems discussed earlier, there are several stages of research by the author. Stages of the research is intended that this study can be done effectively and efficiently and to produce relevant outputs. The following stages of the research to be carried out:

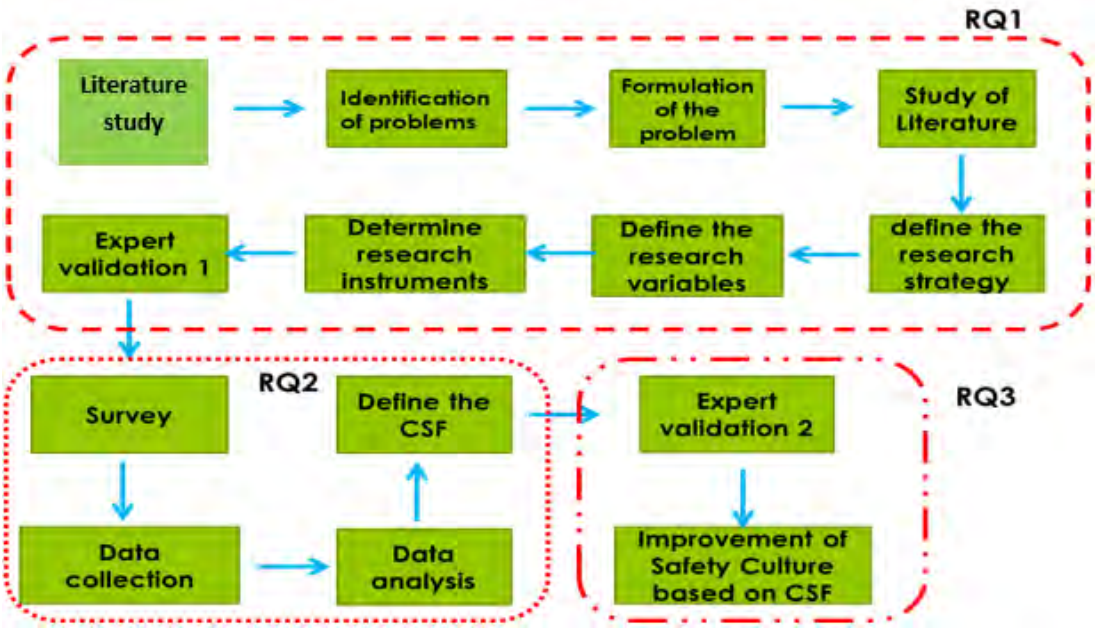


Figure 1. **Stages Research**

Research variables used in the questionnaire respondents of this study are as follows:

Table 2. Research variables

No	Variable	No	Variable
1	Clear goals	17	Positive group norms
2	Authority and responsibility	18	Safety knowledge
3	Teamwork	19	Physical health
4	Program evaluation	20	Emotion
5	Sufficient resource allocation	21	Equipment and Maintenance
6	Leadership	22	Personal Attitude
7	Safety Meeting	23	Professional knowledge
8	Communication	24	Sensitivity to potential risks
9	Efficient Enforcement System	25	Safety Plan Presentation
10	Suitable Supervision	26	Safety plan is part of a contract
11	Confict resolved quickly by project participants	27	Construction K3 policy in the form of Joint Operation
12	Risk preference	28	Suitability implementation of the Safety Plan
13	Decision motivation	29	Documentation of the results of the application of Safety Plan
14	Noise	30	Accident report
15	Peers behaviors	31	Performance improvements
16	Participation of employees		

ISBN : 978-602-99806-3-9

This research method is based on the study of literature, depth interviews and survey respondents. Data analysis method using factor analysis for grouping CSF and Analytical Hierarchy Process to determine the ranking

4. Results

Factor Analysis calculation serves to reduce the factors into new factor by combining several factors into one new factor. With this method the factor analysis results are obtained in the form of five factors obtained from forming factors (Table 3) as follows: (1) Report and evaluation, (2) Safety behavior, (3) Safety planning, (4) individual ability, (5) Leadership

Table 3. Results of Factor Analysis

No.	Reports and Evaluation Companies	Behavioral Safety	Safety planning	the ability of the individual	Leadership
	1	2	3	4	5
1	Program evaluation	Communication	Clear goals	Risk preference	Authority and responsibility
2	Sufficient resource allocation	Noise	Safety Plan Presentation	Decision motivation	Teamwork
3	Efficient Enforcement System	Peers behaviors	Safety plan is part of a contract	Sensitivity to potential risks	Leadership
4	Suitable Supervision	Participation of employees	Construction K3 policy in the form of Joint Operation		Conflict resolved quickly by project participants
5	Equipment and Maintenance	Positive group norms	Documentation of the results of the application of Safety Plan		
6	Suitability implementation of the Safety Plan	Safety knowledge			
7	The accident report	Physical health			
8	Performance improvements	Emotion			
9	Safety Meeting	Personal Attitude			
10		Professional knowledge			

After the factor analysis to determine the Critical Success Factors for development of the implementation of new safety work on the construction project and then do a ranking of the Critical Success Factors by comparing each - each of these factors. Rating assessment aims to determine how important these factors in the development of safety culture on the project construction purposes in Indonesia. The ranking is done by using Analytical Hierarchy Process (AHP).

After getting the data from each - each expert then do recapitulation and take the value - average of all ratings of experts in order to obtain results as in the following table:

ISBN : 978-602-99806-3-9

Table 4. Results Analytical Hierarchy Process

Critical Success Factors	Reports and evaluations	Safety behavior	safety planning	Individual ability	Leadership
Reports and evaluations	1,000	0301	0306	1,890	1872
Safety behavior	6,200	1,000	4,250	3,250	1269
safety planning	6,400	1092	1,000	4,840	3,051
the ability of the individual	4225	3,456	1,279	1,000	1,672
Leadership	5,225	5,440	3458	5229	1,000

Based on the AHP calculation of the obtained percentage of weight each - each factor, as follows: (1) Leadership = 30.688%, (2) Safety behavior = 22.492%. (3) Safety Planning = 22.258%, (4) Individual Ability = 17.525%, and (5) Report and Evaluation = 7.038%

5. Discussion

Based on the questioner that has been given to respondents to the safety factor of 31, then then the data is processed using factor analysis (using SPSS Program) which aims to reduce the factors into five new factors. Each - each new factor that also has a new description that is described in the following table

Table 5. Description of Critical Success Factors

No.	*Critical Success Factors*	Description	Literature
1	Leadership	Top Management must have the commitment and concern in making and improve workplace safety programs involving all workers and employees (such as policy making as well as reward and punishment consistently)	Aksorn and Hadikusumo (2008) states that management plays a very important role in the safety program that is efficient and effective.
2	Behavioral safety	Behavior and awareness of every employee of the importance of workplace safety can improve the implementation of safety so that each employee is expected to behave positively included in maintaining safety (such as workers always wear PPE and part of the signs and rules)	Aksorn and Hadikusumo (2008) states that management plays a very important role in the safety program that is efficient and effective.
3	safety planning	The company must have a good plan that includes goals, costs and policies in the implementation of safety on every work unit	According to Cooper (1993) and Blake (1997) that the safety program can achieve the desired results when the safety objectives have been clear.
4	the ability of the individual	Workers should be able to have a rapid response to the risks that may arise and can take immediate decisions that can prevent accidents	Wang (2014) that the ability of workers can make a rapid response and assessment of potential risks by analyzing relevant information
5	Reports and Evaluation	Companies must have a report that is standard / have on the implementation of safety standards in full. The report will be evaluated periodically to allow for increased performance	According Aksorn and Hadikusumo (2008) safety program should be periodically evaluated to determine their success in meeting the goals and objectives set

Based on these findings it is necessary to Critical Success Factors strategy that could be implemented either as shown in Table 5, as follows:

ISBN : 978-602-99806-3-9

Table 6. Safety Culture Improvement Implementation CSF

No.	CSF (Results of Factor Analysis and AHP)	Findings On The Ground	*Improvement Policy*	The responsible stakeholders
1	Leadership	Lack of commitment from top management to the importance of safety	Aksorn and Hadikusumo (2008) states that management plays a very important role in the safety program that is efficient and effective. The need for a strong commitment from the top management of companies to be able to continue to conduct the evaluation and improvement of the implementation of work safety regulations	Top Company Management
2	Safety behavior	The low awareness of the workers on the implementation of safety as there are still many violations of rules / signs and lack of awareness of the use of PPE	Successful implementation of the program of work safety can be achieved if the positive attitude of employees towards safety amplified (Aksorn and Hadikusumo, 2008) The need for appropriate policies that include reward and punishment so that the implementation of work safety can be done well and can be understood by all employees and workers	All employees and workers, safety supervisors
3	safety planning	The absence of good planning on safety such as budget planning implementation K3 safety have not been allocated properly and lack of planning of the safety program	According Sumaâ € ™ nut (1992), states that a variety of approaches in occupational safety and health, among others, will be outlined the importance of proper planning. The need for careful planning of the budget allocation on safety and the need for such a program concerning safety training	Top Management and Safety Manager
4	Individual ability	Workers have less sensitivity to the risk for accidents that caused the anticipation of still low	According Siagian (1998: 184) training can help employees make better decisions, improve the ability in his field of work The need for training to know what to do in case of accident	Top Management, Safety Manager and employees as well as workers
5	Reports and Evaluation	The low reports of accidents that occur so an evaluation of the risk of accident is not achieved with the maximum so that the anticipation of occupational accidents is still low	According Aksorn and Hadikusumo (2008) safety program should be periodically evaluated to determine their success in meeting the goals and objectives set Need to be monitored for any accidents to work and be evaluated regularly and continuously to improve the implementation of work safety	Top Management, Safety Manager, Safety Supervisor

6. Conclusion

The conclusions and results of this research to the development of safety on the construction project are:

ISBN : 978-602-99806-3-9

1. There are 31 safety factors derived from the literature and previous research. 31 becomes a variable factor questionnaires to respondents who had experience in the field
2. In the implementation of the safety culture in construction projects there are 5 Critical Success Factors that must be considered and implemented to achieve a good safety. The fifth factor weighs role on the implementation of safety ie Leadership Factor = 30.69%, Behavioral Safety Factor = 22.49%, Safety Planning Factor = 22.26%, Individual Capability Factor = 17.52%, and Factor Report and evaluation = 7.04%
3. Critical Success Factors Based on the necessary steps - steps to increase safety culture that involves all levels of the company both from top management to project workers step, namely:
   a. The need for a strong commitment from the top management of companies to be able to continue to conduct the evaluation and improvement of the implementation of work safety regulations
   b. The need for appropriate policies that include reward and punishment so that the implementation of work safety can be done well and can be understood by all employees and workers
   c. The need for careful planning of the budget allocation on safety and the need for such a program concerning safety training
   d. Need for training / training to know what to do in case of accident
   e. Need to be monitored for any accidents to work and be evaluated regularly and continuously to improve the implementation of work safety

It is expected to increase in safety can be achieved by implementing the 5 Critical Success Factors.

References

[1] Abudayyeh O, Fredericks T, Butt S and Shaar A (2006). An investigation of management's commitment to construction safety. *International Journal of Project Management*, 24(2), pp.167-174.

[2] Aksorn T and Hadikusumo B (2008). Critical success factors influencing safety program performance in Thai construction projects. *Journal of Safety Science*, 46(4), pp. 709-727

[3] Jiayuan Wang, Patrick X.W. Zoua, Penny P. Lia (2015). Critical factors and paths influencing construction workers' safetyrisk tolerances. *Journal of Science Direct,* pp.13-25

[4] S. Al Haadir and K. Panuwatwanich (2011). Critical Success Factors for Safety Program Implementation among Construction Companies in Saudi Arabia. *Journal of Safety Science*, Procedia Engineering 14, pp. 148–155

[5] Badan Pusat Statistik Provinsi DKI Jakarta (2015). Statistik Daerah DKI Jakarta 2015. Katalog BPS: 1101002.31.

[6] PT. Lemtek Konsultan Indonesia (2015). *Laporan Akhir Paket 10: Konsultan Manajemen Pusat Penerapan SMK3 Pekerjaan Konstruksi Bidang Pekerjaan Umum dan Perumahan Rakyat. Kementerian Pekerjaan Umum dan Perumahan Rakyat: Direktorat Jenderal Bina Konstruksi.*

[7] Heravi, Gholamreza., & Rafsanjani, Hamed Nabizadeh. (2011). Critical Safety Factors in Construction Projects. *Advanced Materials Research,* Volumes 255-260, 3921-3927.

[8] DePasquale, Jason., & E. Scott Geller. (1999). Critical success factors for behavior-based safety: A study of twenty industry-wide applications. *Journal of Safety Research* Volume 30, Issue 4, Winter 1999, 237–249.

[9] Derrick J-Z Tan and F.E. Mohamed Ghazali (2011). Critical Success Factors for Malaysian Contractors in International Construction Projects using Analytical Hierarchy Process. EPPM, Singapore, 20-21 Sep 2011

[10] Ismail, Faridah., Ahmad, Norizan., Janipha, Nurul Afida Isnaini., Ismail, Razidah. (2012). Assessing the Behavioural Factors' of Safety Culture for the Malaysian Construction Companies. *Journal of Science Direct,* Procedia - Social and Behavioral Sciences, Volume 36, p. 573-582

[11] Q.Z. Yua, L.Y. Dinga, C. Zhoua, H.B. Luoa (2013). Analysis of factors influencing safety management for metroconstruction in China. *Journal of Eselvier*, Accident Analysis and Prevention 68, 131–138

ISBN : 978-602-99806-3-9

TEST VIBRATION IN TREATMENT OF AGAVE FIBER AND BAMBOO FIBER TO VARIATION OF FAKE DIRECTION

[1]Muh. Yamin*, [2]Hammada, [3]Ilyas, [4]Moh. Adnan, [5]Nur wahyuni

[1,2,3] Mechanical Engineering Department, Universitas Hasanuddin
[4,5] Mechanical Engineering Department, Politeknik Negeri Ujung Pandang

[1,2,3]Jl. Perintis kemerdekaan km 10, Makassar, Indonesia
[4,5]Jl. Perintis kemerdekaan km 10, Makassar, Indonesia

email : yuniadelia29@yahoo.com

This study aims to (1) analyze the effect of agave fiber and bamboo fiber treatment on tensile strength and adhesive ability as composite material; (2) to analyze the effect of variation of vibrator placement on personal frequency and stiffness in composite beam agave fiber and bamboo fiber, analyzed the effects of variations in the direction of the fibers (0°/0°/0°), (-45°/0°/45°), and (-90°/0°/90 °) on the personal frequency and stiffness of the fiber composite agave and bamboo fiber, (4) comparing experimental analysis with numerical effect of variation of fiber direction from vibration test result using finite element method. This study uses finite element method for numerical analysis and spectrum method for experimental analysis. For finite element method in numerical analysis, the stem is divided into 5 elements while for the experimental analysis is done 4 eksposimental placement of eksiter, the pedestal used is simple. Material of the test material used is the composite beam of agave fiber and bamboo fiber. The treatment process of agave fiber and bamboo fiber using alkaline solution (NaOH) and Ethanol solution (C2H5OH) with soaking time of 1 hour and 3 hours for the first year. And for the second year it is planned to treat agave fiber and bamboo fiber, using alkali (NaOH) and Ethanol (C2H5OH) solution with 2 hours and 4 hours immersion time with 10%, 20%, 30%, and 40% %.

Keywords: tensile strength, modulus of elasticity, stiffness

INTRODUCTION

Image "Green" attached to natural fibers, paving the way for natural fibers for product innovation and development in the last decade, for example the development of fiber reinforced composites in the automotive industry, building construction, geotextiles and agricultural products. Although natural fibers have been used in a variety of applications, extensive research should be undertaken to further explore the given treatment shape and to optimize the potential of natural fibers and to obtain new types of fibers.

Various types of natural fibers have been explored to produce valuable composite materials that have been produced such as flax, hemp, kenaf, sisal, abaca, hemp and others. Benefits of using composites include light weight, corrosion resistance, water resistance, performance is attractive, and without machining process. Natural fibers are easy to obtain at low prices, easy to process, environmentally friendly, and biologically elaborated.

Agave fiber is a natural fiber derived from pineapple tree, where pineapple tree is a plant that grows spread in some areas of Indonesia. The manufacture of natural fiber reinforced composites (agave fibers) is intended to find alternative composite materials that are less dependent on synthetic fibers (Santoso, 2008).

In determining the mechanical properties of composite structures, there are several factors that influence, such as orientation of fiber direction in the composite material as the amplifier and the volume fraction of fiber used. The placement of fibers with a certain direction angle in composite maktriks is

ISBN : 978-602-99806-3-9

intended to allow the tension to be uniformly distributed on the fiber parts to provide good rigidity. One of the advantages of composite materials is that it can accept loads in certain directions, meaning they are only strong and rigid in certain directions and weak in undesirable directions. This capability is clearly not possessed by isotropic materials having the same strength and stiffness in all directions.

Taurista, et al (2006) conducted a study on bamboo fiber which aims to determine the tensile strengt h and bending strength on fiber width variation. The largest actual tensile strength test result is composite with a width of 5 mm fiber with actual value of 16,806 Kg / mm2. The largest tensile strain is composite with a width of 5 mm fiber with εaktual value of 0.012. While the largest tensile elastic modulus is composite with a width of 5 mm fiber with a value of 1421,129 kg / mm2. The largest bending strength is owned by a composite with a width of 5 mm fiber with a value of 17.60533 kg / mm2. These results are eligible for ship leather material applications, according to BKI standards (Bureau of Classification Indonesia).

Wijoyo et al (2011) conducted research on pineapple fiber surface to investigate the effect of pineapple fiber surface treatment (Ananas comosus L. Merr) on tensile strength and adhesive ability with unsaturated polyester type 157 BQTN-EX matrix. Test results show the effect of pineapple fiber treatment with alkhali solution and ethanol solution can increase tensile strength and compatibility in fiber.

Vibration is one of the most important issues in machine construction planning. When the frequency of the excitation force coincides with one of the personal frequencies of the system, the resonance condition occurs and produces a large deviation. The characteristics of vibration in the composite stem are influenced by the dimension and modulus of elasticity. A large elastic modulus will produce natural material frequencies and large material stiffness. The effect of positioning of the vibrating position will have an impact on the frequency value and stiffness of the material, the closer to the vibrating position on the pedestal will provide great rigidity and natural frequency (Endrianto, 2012).

In this research will be developed the use of composite material that is agave fiber and bamboo fiber which is treated on the surface of both fibers with alkhali and ethanol solution, then the vibration test is done on simple support system (jepit-roll). As a numerical analysis solution used finite element method with the help of numerical computation program Matlab (Labolatory Matrix), and vibration spectrum analysis used to analyze the vibration of composite beam by experimental method.

METHODOLOGY

1.1. Test Specimen Testing Technique

Specimens of agave fibers and bamboo fibers were prepared with two treatments each with an immersion treatment with an alkaline solution (10% NaOH, 20%, 30%, 40%) and immersion of 10%, 20%, 30%, 40% ethanol solution with variation soaking 1 and 3 hours. The test samples were then tested for tensile strength. For the compatibility test specimens on agave fibers 10%, 20%, 30%, 40% NaOH and 10%, 20%, 30%, 40% ethanol solutions at one end of the agave fiber were deposited with resin. The size of the fiber tensile test specimen conforms to the JIS K-7601 reference standard as Fig. 1. As for compatibility testing according to JISR-3420.

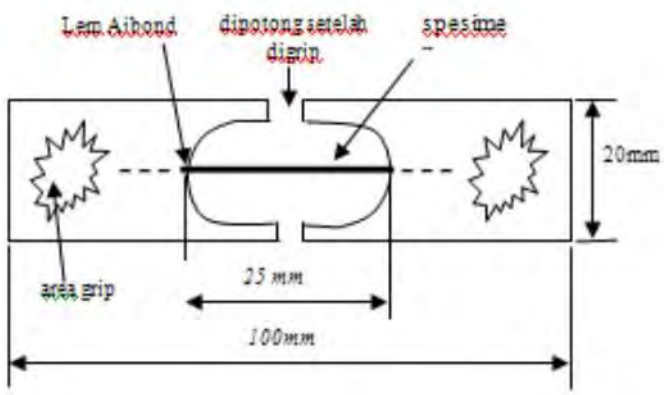


Figure 1. Tensile fiber test specimens

1.2. Form of material for tensile test

The shape of the material for tensile test with its dimensions is addressed in the following figure based on American Society For Testing and Materials (ASTM) D-790:

ISBN : 978-602-99806-3-9

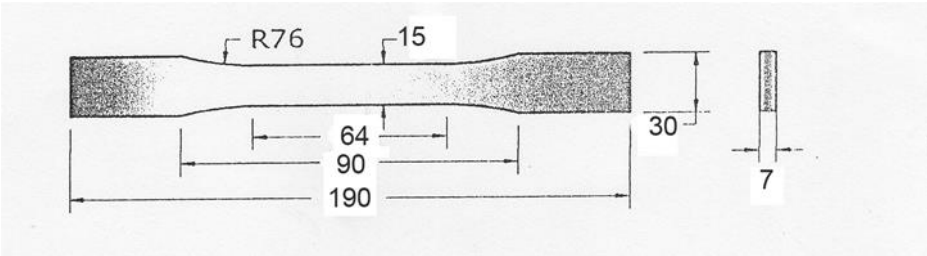


Figure 2. Material shape and dimensions for tensile test

Tensile Test Procedure
1. The test machine is turned on and set to zero
2. The specimen is mounted on the subsequent clamps the tap is locked.
3. Set the oil flow rate.
4. Notes the value of the load occurring on the specimen each step or any extension thereof, until the specimen is broken.
5. Remove the specimen that has been broken and shut off the test machine.
6. Repeats the a-e procedure for another specimen.

1.3. Vibration Tester Procedures

The agave fiber and bamboo fiber composite beams are supported on the cantilever, where the vibrating motor (Eksiter) is varied at 10 cm, 20 cm, 30 cm and 40 cm positions. Implementation stage of vibration testing as follows:
1. Install the composite beam on the clasp well.
2. Put the vibration sensor on the top of the tongs.
3. Put the eksiter (vibrator motor) on the specimen in accordance with the desired position.
4. Turn on the motor vibrator (ON).
5. Taking vibration data from the vibration sensor device
6. Repeat step a-f for exciter position and other fiber direction composition.

Vibration testing data retrieval scheme can be seen in the following figure :

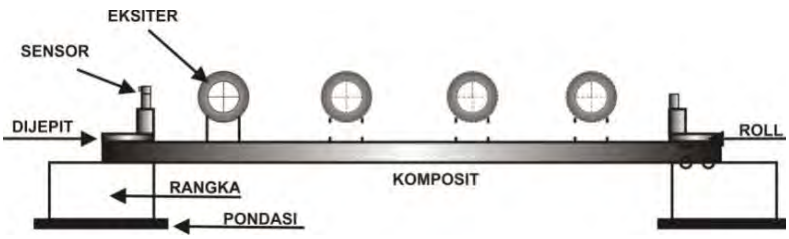


Figure 3. Data retrieval scheme

RESULT AND DISCUSSION
2.1. Agave Fiber Treatment

Table 2.1.1. Tensile test of agave fiber with 1 hour NaOH solution

No	Prosentase	Tensile Stress	Elongation (%)
1	10	625.186	3.123
2	20	840.918	4.653
3	30	1021.351	6.216
4	40	810.634	4.023

ISBN : 978-602-99806-3-9

Table 2.1.2. Tensile test of agave fiber with 3 hour NaOH solution

No	Prosentase	Tensile Stress	Elongation (%)
1	10	631.424	4.037
2	20	743.216	6.123
3	30	405.920	3.598
4	40	451.019	5.377

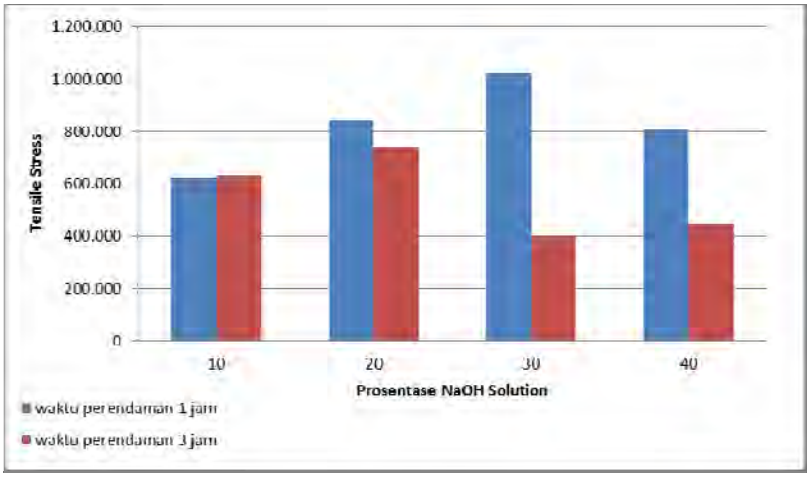


Figure 2.1.1. Tensile Stress Agave Fiber on Percentage of NaOH Solution

In table 2.1.1., the agave fiber tensile test results with 1 hour NaOH solution, visible tensile stress tends to increase as percentage of NaOH solution. Likewise elongation is also happening. In percentage of 40% NaOH solution, tensile and elongation stress decreases.

In table 2.1.2., The result of agave fiber tensile test with 3 hours of NaOH solution, visible tensile stress tends to decrease as percentage of NaOH solution. Similarly, the elongation is also smaller.

Figure 5.2.1 shows clearly the percentage of NaOH solution at 1 hour immersion, has a higher tensile stress and elongation value along with the increase of percentage percentage of NaOH solution. But at a very high percentage rate, the value of tensile stress and elongation has dropped. In contrast to the percentage of NaOH solution at 3 hours of immersion, the value of tensile stress and elongation tends to decrease as the percentage of NaOH solution increases.

Tabel 2.1.3. Tensile test of agave fiber with 1 hour Ethanol solution

No	Prosentase	Tensile Stress	Elongation (%)
1	10	968.072	2.500
2	20	1054.670	2.366
3	30	1179.814	1.766
4	40	1589.770	2.475

Tabel 2.1.4. Tensile test of agave fiber with 3 hour Ethanol solution

No	Prosentase	Tensile Stress	Elongation (%)
1	10	946.171	1.756
2	20	472.570	1.756
3	30	630.442	2.400
4	40	584.335	2.313

ISBN : 978-602-99806-3-9

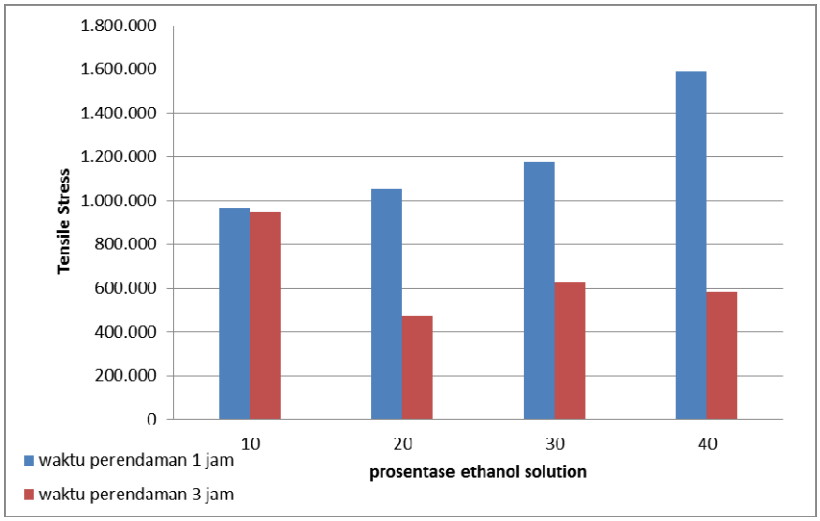


Figure 2.1.2. Tensile Stress Agave Fiber on Percentage of Ethanol Solution

In Table 2.1.3, the result of tensile test of agave fiber with Ethanol solution 1 hour, visible tensile stress tends to increase as percentage of NaOH solution. Likewise elongation is also happening.

In Table 2.1.4, the agave fiber tensile test with 3 hours Ethanol solution showed that tensile stress and elongation tend to decrease along with the increase of percentage of NaOH solution. the same is also shown in Figure 2.1.2.

2.2. Treatment of bamboo fiber

Table 2.2.1. Tensile test of bamboo fiber with 1 hour NaOH solution

No	Prosentase	Tensile Stress	Elongation (%)
1	10	525.176	2.123
2	20	740.918	4.513
3	30	921.351	6.766
4	40	810.534	4.053

Table 2.2.2. Tensile test of bamboo fiber with 3 hour NaOH solution

No	Prosentase	Tensile Stress	Elongation (%)
1	10	531.424	4.037
2	20	644.236	6.113
3	30	425.930	3.578
4	40	453.039	5.310

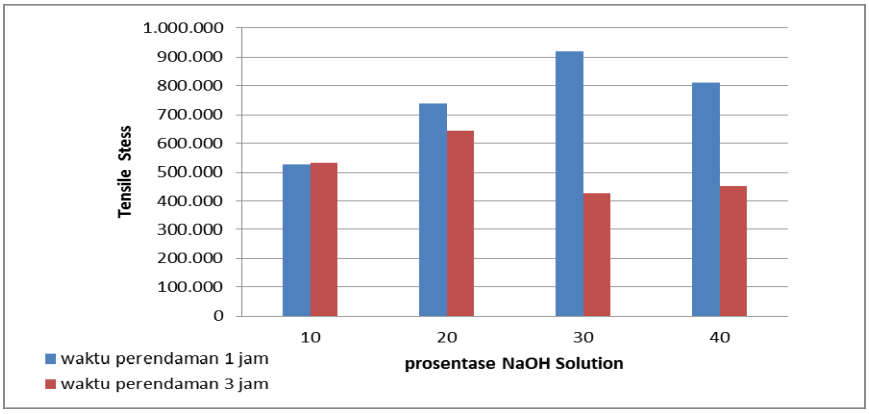


Figure 2.2.1. Tension of Bamboo Fiber at the Percentage of NaOH Solution

ISBN : 978-602-99806-3-9

In Table 2.2.1. and Table 2.2.2., a bamboo fiber tensile test with 1 hour and 3 hour NaOH solution showed a not-so-significant increase when compared to agave fiber tensile test results.

It can be concluded that NaOH solution has properties that can change the surface of the fiber becomes rough, due to the increasingly rough fiber will cause the tensile strength is decreased after exceeding the saturation limit.

Tabel 5.2.3. Tensile test of bamboo fiber with 1 hour Ethanol solution

No	Prosentase	Tegangan tarik	Elongation (%)
1	10	825.186	2.123
2	20	940.918	4.688
3	30	1021.361	6.900
4	40	1102.544	7.041

Tabel 5.2.4. Tensile test of bamboo fiber with 3 hour Ethanol solution

No	Prosentase	Tegangan tarik	Elongation (%)
1	10	940.600	4.069
2	20	760.236	4.049
3	30	625.930	3.568
4	40	453.039	3.210

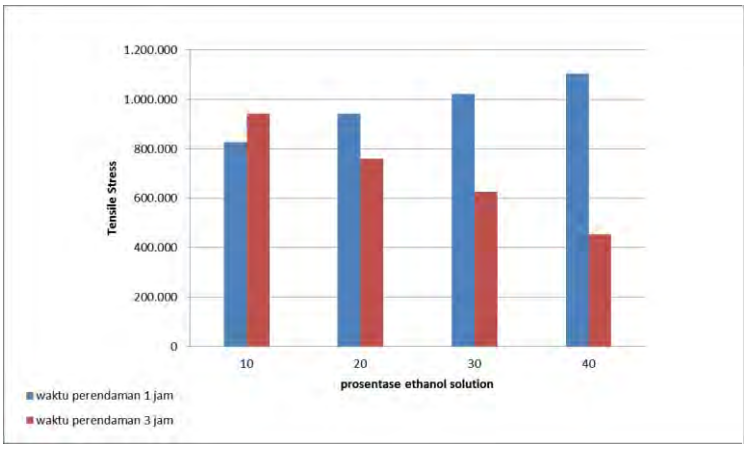


Figure 2.2.1. Tension of Bamboo Fiber at the Percentage of Ethanol Solution

Soaking with soluble ethanol gives the effect of increasing the tensile strength of agave and bamboo fibers, but the addition of ethanol content will decrease the value of elongation of agave fiber and bamboo fiber.

2.3. Vibration test

Table 2.3.1. Result of Personal frequency test and stiffness for Agave fiber composite - epoxy matrix with variation of fiber direction.

NO	The direction of Serat Agave (°)	Exit Position (Cm)	m (kg)	ω_n (rad/s)	k (kg/m)
1	0°/0°/0°	10	0,074	4470,2	369679,7287
		20		3657,97	247543,7736
		30		2630,14	127976,2738
		40		1510,11	42187,99592
2	-45°/0°/45°	10	0,074	4040,13	301969,0327
		20		3359,8	208832,7367

ISBN : 978-602-99806-3-9

		30		2200,01	89540,814
		40		1389,29	35707,34403
3	-90°/0°/90°	10	0,074	3789,99	265734,4477
		20		3120,31	180122,1882
		30		2240,6	92875,33466
		40		1337,63	33101,19931

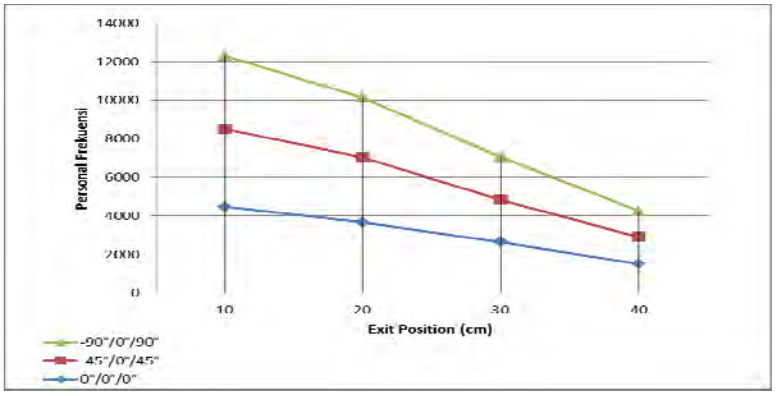


Figure 2.3.1. Graphic Relation Frequency Personals Fiber Agave Vs Position of Rangers

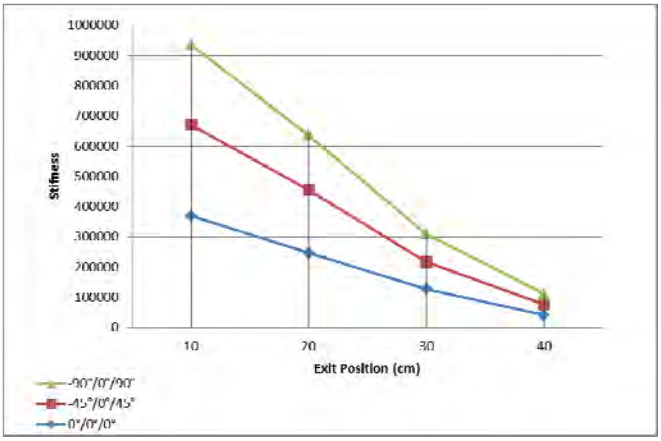


Figure 2.3.2. Graph of Rigidity Relationship Fiber Agave Vs Position of Razors

Table 2.3.2. Result of Personal frequency test and stiffness for Bamboo fiber composite - epoxy matrix with variation of fiber direction

NO	Arah Serat Ijuk (°)	Posisi Eksiter (Cm)	m (kg)	wn (rad/s)	k (kg/m)
1	0°/0°/0°	10	0,082	4040,02	334596,1128
		20		3360,17	231460,2198
		30		2409,33	118999,8565
		40		1407,66	40620,88685
2	-45°/0°/45°	10	0,082	3639,53	271546,6617
		20		3019,42	186896,3913
		30		2130,43	93044,00569
		40		1250,19	32040,98824
3	-90°/0°/90°	10	0,082	3449,71	243960,2312
		20		2869,66	168816,4446
		30		2009,4	82772,61138
		40		1179,39	28514,69583

ISBN : 978-602-99806-3-9

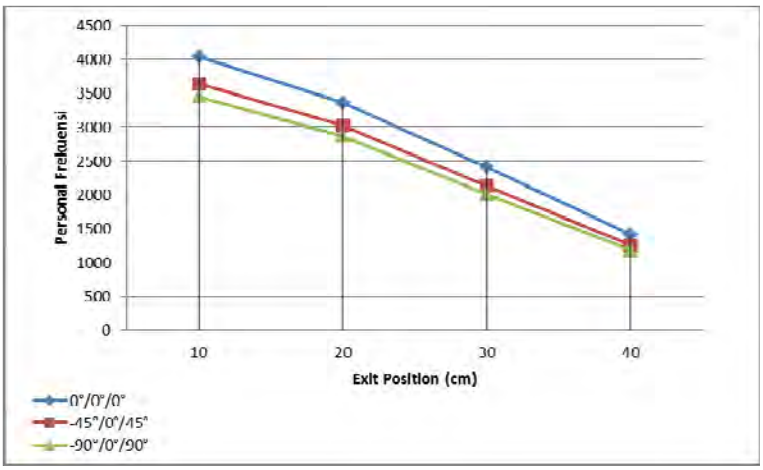


Figure 2.3.3. Graph of the Relation of the Personal Frequency of Bamboo Fiber vs. the Position of the Rangers

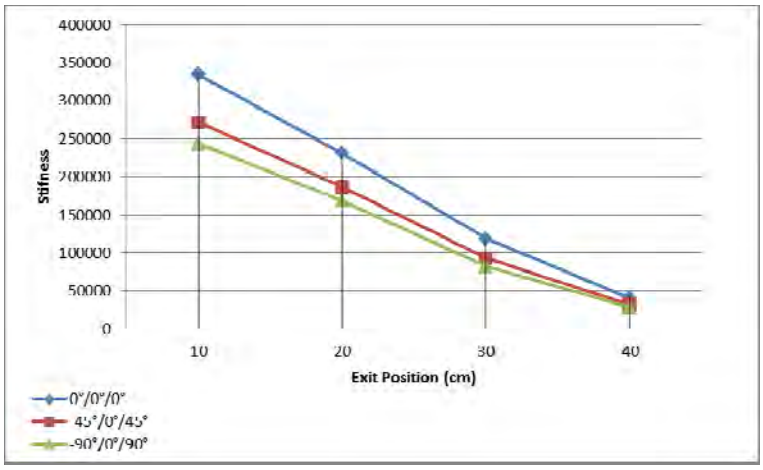


Figure 2.3.4. Graph of Stiffness of Bamboo Fiber vs. Position of Rangers

In agave fibers, the personal frequency values and composite stiffness are affected by the direction of the fibers, the maximum occurs in the -90º/0º/90º direction with values ω_{nmax} = 3789.99rad /s, k_{max} = 265734.4477 kg /m and minimum in direction 0º/0º/0º with value ω_{nmin} = 4470.2 rad/s, k_{min} = 369679.7287 kg /m.

In agave fibers, the personal frequency value and composite stiffness decreased as the exit position increased from the clamp pedestal, the maximum occurred in the direction of 0º/0º/0º for the 10 cm exiter position with the value ω_{nmax} = 4470.2 rad /s, k_{max} = 369679.7287 kg /m and minimum at the -90º/0º/ 90º direction for exciter position of 40 cm with value ω_{nmin} = 1337.63 rad/s, k_{min} = 33101.19931 kg/m.

In bamboo fiber, personal frequency values and composite stiffness are affected by the direction of fiber, the maximum occurs in the direction of 0º/0º/0º with the value ω_{nmax} = 4040.02 rad/s, k_{max} = 334596,1128 kg/m and minimum in direction -90º/0º/90º with the value of ω_{nmin} = 3449.71 rad/s, k_{min} = 243960.2312 kg / m.

In bamboo fiber, the personal frequency value and composite stiffness decreased as the exit position increased from the clamp pedestal, the maximum occurred in the direction of 0º/0º/0º for the 10 cm exiter position with the value ω_{nmax} = 4040.02 rad/ s, k_{max} = 334596,1128 kg /m and minimum at the -90º/0º/ 90º direction for exciter position of 40 cm with value ω_{nmin} = 1179,39 rad/s, k_{min} = 28514.69583 kg/m.

ISBN : 978-602-99806-3-9

CONCLUSION

1. Effect of agave fiber treatment on immersion for 1 hour and 3 hours in 10%, 20%, 30% and 40% alkali (NaOH) solution can increase tensile strength especially on fiber with 1 hour treatment while in fiber treated by NaOH for 3 hour tends to drop its tensile strength.
2. Effect of agave fiber treatment on immersion for 1 hour and 3 hours at 10%, 20%, 30% and 40% ethanol solution also showed optimum tensile strength at 1 hour treatment compared with 3 hours treatment.
3. Effect of bamboo fiber treatment on soaking for 1 hour and 3 hours in 10%, 20%, 30% and 40% alkali (NaOH) solution can increase tensile strength especially on fiber with 3 hours treatment.
4. Effect of bamboo fiber treatment on immersion for 1 hour and 3 hours at 10%, 20%, 30% and 40% ethanol solution also showed optimum tensile strength at 3 hours treatment compared with 1 hour treatment.
5. In agave fibers, the personal frequency values and composite stiffness are affected by the direction of the fibers, the maximum occurs in the -90º/0º/90º direction with values ω_{nmax} = 3789.99rad /s, k_{max} = 265734.4477 kg/m and minimum in direction 0º/0º/0º with value ω_{nmin} = 4470.2 rad/s, k_{min} = 369679.7287 kg /m.
6. In agave fibers, the personal frequency value and composite stiffness decreased as the exit position increased from the clamp pedestal, the maximum occurred in the direction of 0º/0º/0º for the 10 cm exiter position with the value ω_{nmax} = 4470.2 rad /s, k_{max} = 369679.7287 kg /m and minimum at the -90º/0º/ 90º direction for exciter position of 40 cm with value ω_{nmin} = 1337.63 rad/s, k_{min} = 33101.19931 kg/m.
7. In bamboo fiber, personal frequency values and composite stiffness are affected by the direction of fiber, the maximum occurs in the direction of 0º/0º/0º with the value ω_{nmax} = 4040.02 rad/s, k_{max} = 334596,1128 kg/m and minimum in direction -90º/0º/90º with the value of ω_{nmin} = 3449.71 rad/s, k_{min} = 243960.2312 kg / m.
8. In bamboo fiber, the personal frequency value and composite stiffness decreased as the exit position increased from the clamp pedestal, the maximum occurred in the direction of 0º/0º/0º for the 10 cm exiter position with the value ω_{nmax} = 4040.02 rad/ s, k_{max} = 334596,1128 kg /m and minimum at the -90º/0º/ 90º direction for exciter position of 40 cm with value ω_{nmin} = 1179,39 rad/s, k_{min} = 28514.69583 kg/m.

BIBLIOGRAPHY

[1] Fausan. 2007. **"Analisis Getaran Torsional Pada Poros Bulat dengan Metode elemen Hingga Berbasis Matlab".** Tesis tidak dipublikasikan, Makassar.
[2] Nanang Endrianto . 2012. "Analisis Numerik dan Eksperimental Getaran Balok Komposit yang diperkuat Serat Abaca". Tesis tidak dipublikasikan, Makassar.
[3] Santoso. 2008, " Potensi Bahan Baku Komposit Serat Agave Dalam Ruang Lingkup Industri" Lembaga Penelitian dan Pengabdian Pada Masyarakat (LP3M) Institut Pertanian, Malang.
[4] Steven T. Karis. 2007. "Numerical Analysis Using Matlab and Excel". Orchard Publications, USA.
[5] Taurista, dkk. 2006 "*Komposit Laminat Bambu Serat Woven Sebagai Bahan Alternatif Pengganti Fiber Glass Pada Kulit Kapal",* Jurusan Teknik Material, Institut Teknologi Sepuluh Nopember, Surabaya
[6] Van Vlack . 1989. "Elemen-elemen Ilmu Dan Rekayasa Material".PT. Erlangga, Jakarta.
[7] Van Vlack . 1990. "Ilmu Dan Tekhnologi Bahan". PT.Erlangga , Jakarta.
[8] Wijoyo, dkk, 2011, Pengaruh Perlakuan Permukaan Serat Nanas (*Ananas Comosus L.Merr*) Terhadap Kekuatan Tarik Dan Kemampuan Rekat Sebagai Bahan Komposit, Procedding Mekanika volume 9 no 2, Universitas Surakarta.
[9] William T. Thomson . 1986. " Teory Getaran Dengan Penerapan". PT.Erlangga, Jakarta.

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

Images of Javanese women in patriarchal culture represented by Aisyah, (a character in Umar Kayam's Para Priyayi)

Sri Warsidah Rahmi
Literary Studies , Universitas Indonesia, Jalan Kober, Wisma Puri Ayu RT001/RW05 Kelurahan Pondok Cina, Kecamatan Beji, Depok, Indonesia.

sriwarsidahrahmi@yahoo.com

Abstract: This study uses a gender perspective, a concept used to review the role between men and women constructed by culture. Culture that has been inherent in the society that is patriarchal culture resulted in the role of women always reside in the domestic territory. The patriarchal culture can be found in Javanese culture.This research uses descriptive analysis method. From the analysis, this research shows 1) the description of the role acted by Aishah figure as Javanese woman always in domestic area, 2) perspective of Aisyah figure as a wife in environment that embraces patriarchy culture shows his acceptance of 3 basic duties of Javanese women namely; *Masak* (Cooking), *Macak* (Dressing Up), and *Manak* (Giving a birth).

1. Introduction

Literary work is a creative process of an author, which produces an idea, concepts and ideas that take the theme exists among society. This creative process makes the public (reader) feel that the literary works created by the author, describe his own life, although the picture of life is based on the imagination made by the author. Literary works convey "understanding" of life in its own way [1]. Literary work represents wide range of discourse, from personal behave to cultural problem.

One of the discourses represented by literary works is the emergence of patriarchal culture. This patriarchal culture is a form of discrimination that women accept on the basis of customs and religion [2]. This culture says that women should be controlled by men. In doing something, women have to ask permission first for men, so they can run their activities or work. A system of male authority which oppresses women through its social, political and economic institutions [3].

"our civilization, like all other historical civilizations, is a patriarchy" [4]. Patriarchy is present in various countries around the globe and it has been perpetuated through various institutions. The given system can appear in many forms, one of which is culture. Culture can be a male authoritative institution against women. One of the culture that embraces patriarchy is Javanese culture. In the context of Javanese culture, patriarchal culture shapes women to be obedient and devoted to their husbands.

Talking about women's portraits, especially Javanese women, it is closely related to the myriad of manners that accompany it. The view that women should be a devoted, faithful, and gentle has been embedded in social life in Java. This view is reinforced by the *priyayi* culture adopted by most Javanese families of the upper class (*keraton*), especially the people residing in the area around the palace. Culture and values within a society that have been shaped in such manner create the roles division between men and women in which the public role is played by men while the domestic role is handled by women.

ISBN : 978-602-99806-3-9

The public role played by a male produces a material or position that earns him a superiority. While the role of women who do not earn money or position place them in an inferior position.

The superior and inferior classification is what causes some men to underestimate the status of women as housewives. Women's tasks that are limited to domestic areas are often underestimated. It is this viewpoint that causes the status of the housewife to be increasingly underestimated. The cultural heritage maintained in the community, often positioning women as complementary, makes women afraid to speak out the rights women deserve. Such superficial thoughts led to patriarchy flourishing in Java. Representing the public's assumption that the nature of women must honor husband. To marry a husband is a duty to a wife, but it is wrong when the wife's compliance is overwhelmed by oppression and violence from her husband.

In literary work, it is possible that a writing takes the background of Javanese culture and utilize above Javanese women's phenomenon to represent the female Javanese characters in his work. One example of literary works that use the background of Javanese culture is the work of Umar Kayam *Para Priyayi*. It is important to see the story through the perspective of a wife as part of the characterizations depicted. A wife that is faithful and constantly accompanying her husband. Women who start her life in *Priyayi* households. Through her point of view, the researcher will describe how Kayam potrays the ideal woman of Java undergoing her role as a wife. Therefore this research will discuss; 1). The role of Aisyah as a Javanese woman in Umar Kayam's novel Para Priyayi, 2) Perspective of Aisyah as a wife is under the patriarchal culture system.

In line with the above problem formulation, the purpose of this study are; 1). Knowing the role played by Aisyah as a Javanese woman in Umar Kayam's *Para Priyayi*, 2) to know Aisyah's perspective as a wife who is in an environment that embraces patriarchal culture.

Theoretically this research will contribute in to the science of literature especially in analyzing the literary works using the perspective of gender and patriarchal culture. Not only that, practically this research will broaden reader's insight in understanding gender and patriarchal culture, especially in Javanese cultural background.

2. Literature Review

2.1 Gender

Gender is a term in social science used by Ann Oakley to analyze and understand the issue of discrimination against women. The term gender is also used to describe how men and women differ socially. “The society is not satisfied with the natural difference of sex, but adds cultural differences of gender” [5]. Therefore, gender is interpreted as a concept of social relationships that separate men. and women in their functions and roles. The differences in function and role between men and women are not determined by biological or natural distinctions but on the basis of their position and function and role in different areas of life [6]. Similar to the statement above, it is stated that, “gender is a term that has psychological or cultural rather than biological connotations”. [7] In addition, Oakley explains: ‘‘Sex’ is a word that refers to the biological differences between male and female: the visible difference in genitalia, the related difference in procreative function. ‘Gender’ however is a matter of culture: it refers to the social classification into ‘masculine’ and ‘feminine’” [8].

Thus, the division of roles between men and women that occurred during this is a cultural construction. A construction that is traditionally handed down from generation to generation. This tradition has been inherent in society that results in outward acceptance. Similiar to the opinian above, [9] says that:

“Sociocultural gender is not a matter of the sexual division of people into female and male as such, what people typically mean by “natural’ gender, but of the significance attached to that division, the institutions and ideologies, the prescribed and claimed identities, and the array of social practices that sustain those institutions, ideologies, and identities.”

The gender concept is utilized to break away from the traditional view of the division of roles by sex. The gender concept reconstructs the position and role between men and women in social practice, thus opening up balanced opportunities regardless of gender, male and female differences.

ISBN : 978-602-99806-3-9

2.2 Patriarchy and Javanese Culture

Patriarchy comes from the word patriarchate which means placing the male role as the sole ruler of all things. So, it can be stated that patriarchal culture is a culture built on the basis of hierarchy of domination and subordination that requires men and men's view to be a norm [10]. In [11] term, it is "a social system where males hold the authorial power of the family" (2015: 1). In addition, Makama [12] considers that patriarchy: "It is a system of social stratification and differentiation on the basis of sex, which provides material advantages to males while simultaneously placing severe constraints on the roles and activities of females." Further more, [13] in his article discussed how patriarchy affects the role of women. According to him since world war era men has shown his authority over power by joining in combat, it continues in society until current time. Although no longer fighting, men consistently show their strength through aggressive activities such as hunting. Conversely, women will be required to play their part in childbirth and take care of them. Therefore, according to Archana, parents possess an important role in determining the role that will be carried by his child. If the family perpetuates a patriarchal culture, then surely women will be required to submit to men. This reflects how marriage institutions assist to preserve patriarchal culture.

Not only in the institution of marriage, but [3] also explains that patriarchy is a system of male authority that oppresses women through social, economic, and political institutions. It reflects the preference to men. Having become a culture, patriarchal society gives priority to men which impact on women's progress [14]. In the top of that [15] view stated "Women are not allowed to assert their presence; they are cornered, pitied and looked down upon by their male counterparts."

Therefore, as a culture, patriarchy establishes the opinion that men are always superior to women. The longstanding and continuous patriarchal culture has resulted in the division of the roles of women and men in many areas of life to be unjust and unbalanced.

This phenomenon can be observed in Javanese culture. In the Javanese culture, many terms affirm the inferiority of women before men, for example in the Javanese term wife as Kanca Wingking means friend behind. A term that indicates that women are only in charge of managing household affairs, especially child care, cooking, and washing [16].

The role of wife in Javanese culture by it is explained that the philosophy of Javanese women and their duties in the household are three namely; *Masak*, *Macak* and *Manak*. *Masak* is related to the kitchen affairs, doing housework. *Macak* is ornamented that is meant to dress up or look beautiful in front of the husband. While *Manak* is giving birth to offspring [17]. Of the three Javanese women's philosophies, can be seen clearly how the position of women placed all day centered at home. The concept defines the position of women whose lives are centered at home and husband.

Both statements above affirm the role and position of women who are limited in the domestic sector. In the Javanese culture the role is a form of a submission toward man (father or husband).

3. Research Method

This research is a qualitative research on Umar Kayam's novel *Para Priyayi*. Descriptive method of analysis will be used in this study, which according to [18] is a method of data collection by finding related supporting factors to the research with the aim of connecting these factors with research results.

This study uses a gender perspective to review the roles between men and women. To that end, this study looks at the role acted by one of the female characters (Aisyah) in the novel. The data in this study were obtained from Umar Kayam's novel *Para Priyayi* in the form of text such as; words, sentences and paragraphs related to the object of research.

ISBN : 978-602-99806-3-9

4. Research Instrument

Through this research, the writer used note taking as the instrument. It was the essential tool in conducting a research. Boch and Piolat [19] states "Confronted with a diverse range of information-transmission situations, note-takers are striving to avoid forgetting something. Note taking is an essential tool in many information-transmission situations". Note taking is needed as part of writing a research paper because of its function as notes record and gather the information from the sources used in writing the paper.

5. Findings and Discussions

In the novel *Para Priyayi*, portraits of women working in public sphere seem hard to find. Kayam describes the Javanese woman who acts as the wife of a Priyayi by representing it through Aisha's character (*Dik* Ngaisah). In accordance with the background described which is the Javanese culture, this novel contains the philosophy of Javanese women to describe the daily life of Ngaisah *Dik* in novel *Para Priyayi*; *Masak*, *Macak* and *Manak*. Cook is related to the kitchen affairs, doing housework. Macak is ornamented that is meant to dress up or look beautiful in front of the husband. While Manak is giving birth to offspring. In the novel, Dik Ngaisah does his duty as a wife.

5.1 Doing housework and husband's needs

Dik Ngaisah is described as a wife who was ready to accompany a husband to start building a family labeled Priyayi. Through the commentary of the figure Sastrodarsono who is her husband, confirmed that the wife of a priyayi should be prepared and educated to be agile in taking care of household and husband needs. Even in the case of having a servant, a wife remains demanded to take care of or lead the maids in the kitchen. Here is the quote:

"Dik Ngaisah, Alhamdulillah adalah istri seperti yang saya harapkan semula. Ia adalah perempuan yang agaknya memang sudah disiapkan orangtuanya untuk menjadi istri yang mumpuni, lengkap akan kecakapan dan keprigelannya. Di dapur ia tidak hanya tahu memasak, tetapi juga meimpin para pembantu di dapur" [20].

"Dik Ngaisah, Alhamdulillah is the wife as I expected. He is a woman who seems to have been prepared by his parents to be a qualified wife, complete with skills and *keprigelannya*. In the kitchen, she not only knew cooking, but also led the maids in the kitchen" [20].

As a wife, *Dik* Ngaisah represents an acceptance in serving the daily needs of a husband by taking care of household chores. This can be seen through the following quotation:

" Bukankah itu pembagian kerja saja antara saya dan bapak mereka? Bapak sudah membanting tulang mencari nafkah, saya yang ada digaris belakang mengurus semuanya agar ada dalam keadaan beres. Kalau sampai tidak beres, bapake tole bingung dan marah-marah, bisa kacau dia bekerja[20] .

"Is not that a division of labor between me and their father? Daddy has toil for a living, I have a back line to take care of everything to be in a state of course. If it goes wrong, bapake tole is confused and angry, it can mess up he works" [20].

Through above quotation, it can be inferred that *Dik* Ngaisah as a wife already understand his role. He accepted his work taking care of household needs as well as the needs of her husband. Ngaisah thinks of it as a proper division of tasks. Taking care of the back line indicates the kitchen needs to be well managed to meet the expectations of the husband.

As a woman *Dik* Ngaisah is described that she has been accustomed to always be ready to be at home. While a husband has the freedom to socialize with neighbors and the surrounding community in Wanagalih through the morning stroll routine. It is unnecessary to take a wife in the routine. It can be

ISBN : 978-602-99806-3-9

concluded that a woman's routine is always preparing for the needs of husbands in any situation including breakfast in the morning. This can be seen in the following quotation:

"…sebentar lagi jam 5 pagi. Dan itu berarti jam kebiasaan saya untuk bangun menyiapkan kopi, makanan kecil pagi, air hangat, dan sarapan pagi, sementara bapaknya tole jalan-jalan pagi ke alun-alun [20].

"... It's going to be 5 am. And that means my habitual hour to wake up preparing coffee, morning snacks, warm water, and breakfast, while Tole's (name of their son) father does morning walk to the square" [20].

In addition to the image that has become the habit of a wife in doing his duty, Kayam also includes sincerity in serving the husband. The following quotation emphasizes that in doing the job there is no burden of feeling let alone become a compulsion. Precisely, this is a satisfaction to do the job of taking care of husbands.

"... saya mesti turun mengawasi bukankah semua itu untuk kesenangan suami dan saya sendiri?"
"... I should go down to watch that, is not all for the pleasure of my husband and myself? " [20]

In the context above, Dik Ngaisah who has a housekeeper still supervise his assistant in preparing the needs of his husband such as coffee, warm water and small meals in the morning. The work has been done by Dik Ngaisah for many years and has never been bored to keep an eye on his maid. He worried that if not supervised the results will not be satisfactory.
In addition to serving the husband, the tradition of preparing food for the guests is also done by the wife. It became the habit of Ngaisah. As a good wife, she greets guests but not by welcoming at the door, yet she prepares the dishes to impress the guests. Here is the quote:

"Istri saya jauh hari sudah repot membenahi rumah dan halaman. Juga pada waktu tamu saya itu datang, istri saya sudah siap sedia menyediakan macam-macam penganan dan santapan yang tentu saja dia harapkan akan dapat mengesankan para tamu" [20]

"My wife is already busy to fix the house and the yard. Also when my visitor arrived, my wife was ready to provide all kinds of snacks and meals that she hoped would impress the guests" [20].

So it is clear how all household affairs related to the kitchen has always been the work of a wife, not a husband. Thus, Dik Ngaisah is a portrait of a woman who is obedient to her husband, for doing all the housework without complaining about the division of tasks. The division of tasks that are culturally meant women already understand their duties and are educated to be ready for the role.

5.2 Dress up or decorate for a husband

The second task a wife has to do is beautify herself. Beautify yourself not only in the sense of wearing lipstick and talcum but also means caring for the body. Likewise, with *Dik* Ngaisah who always painstaking in caring for the body. He felt that it was natural to take care of the body to please the husband.

"… kadang-kadang ada juga istri yang tidak cukup pintar menjaga kewanitaannya ... Maksud saya tidak telaten menjaga tubuhnya, baunya, keluwesan dan *kegandesan* sikapnya dan tindak tanduknya. Suami akan selalu senang dan kerasan dengan istri yang telaten menjaga semua itu… seringkali adalah suami yang menetapkan bagaimana mestinya kewanitaan kami itu" [20].
"… sometimes there is also a wife who is not smart enough to keep her feminine ... I mean careless to her body, its smell, manner, stance of attitude and its behavior. The husband will always be happy and at ease with his patient wife to keep with those attitudes ... the husband often the one who establishes how our feminine should [20].

ISBN : 978-602-99806-3-9

In the above quote the male dominance of the female body is seen clearly. How women should take care of the body is not for their own sake, but for the sake of the husband. A wife should look beautiful for the husband's pleasure. In other words, the female body is completely regulated by men.

5. 3 Giving a birth

In the novel *Para Priyayi*, *Dik* Ngaisah fulfills his duties as a Javanese woman who has to bear offspring. In the following passage, it is explained that He had given birth to two sons and one daughter whom they craved would be the successor of the *Priyayi* family.

"Anak-anak kami lahir dalam jarak dua tahun antara yang seseorang dengan yang lain. Noegroho lahir dua bulan sesudah kami pindah di Wanagalih [20].
"Our children are born within two years between one child to another. Noegroho was born two months after we moved to Wanagalih" [20].

Their first child is Noegroho. The firstborn son after they live at the house which is located in Wanagalih. Two years after it was born Hardojo ago Seomini as the youngest child. *Dik* Ngaisah perfect his role as a woman.

By looking at the portrait of Javanese women who play the role of a Priyayi's wife, it is clear that women are still within the cultural boundaries that restrain women's space. Women are still in the realm of the back line. Kayam shows an ideal woman who is devoted to her husband without any protests or dissatisfaction with the treatment. Described that the division of tasks or roles that exist, is an absolute thing to do and not a thing that needs to be protested.

In Ngaisah's description above, it cannot be classified into oppression. Ngaisah represents a woman who is aware of her role and accepts her nature as a woman. Regardless of their potential, the culture prevailed at that time seemed to lead women to accept their natures whose space is limited only at home unless there is a need with a husband. Kayam presents a receptive, sincere and happy woman side to devote herself to her husband and does not demand to have freedom or perhaps more precisely. Ngaisah does not feel constrained by all her routines centered solely at home.

6. Conclusions

By looking at the image of Javanese women in the novel Para Priyayi, it is seen how the representation of an ideal Javanese woman. This has been proven through the portrait of the wife of Sastrodarsono (Dik Ngaisah) who is very faithful to accompany her husband. Sincerely, she accepted her role as a woman and fulfilled the philosophy of the Javanese women's duties: Cook, Macak, and Manak. It shows how the representation of Ngaisah as a Javanese woman does not see the limits of women in the public sphere as a problem. Ngaisah submissive and obedient to her husband, Make the view of the husband as a reference and see it as something that is natural. In the context of patriarchal culture, women are created to always obey and serve their husbands.

Acknowledgement

Author has succeeded in finishing this paper and the author is greatly indebted to many people who always support her to finish this paper: Irsak, Muliati, Darmatasia. To all of them, the author extends his deepest gratitude.

7. References

[1] Budianta, Melani et al. *Membaca sastra*. Magelang: Indonesia Tera, 2003.
[2] Fakih, Mansour. *Analisis gender dan transformasi sosial*. Yoyakarta: Pustaka Pelajar, 2003.
[3] Humm, Maggie. *The dictionary of feminist theory*. USA: Ohio State University Press, 1990.
[4] Millett, Kate. *Sexual Politics*. New York: Doubleday.University of Illinois Press, 1969.
[5] Kochuthara, Shaji George. *Patriarchy and Sexual Roles: Active-Passive Gender Roles versus an Ethics of Mutuality*. Journal of Dharma, Vol. 36, No. 4, 2011, pp. 435-452.

ISBN : 978-602-99806-3-9

[6] Narwoko J. Dwi & B. Suyatno. *Sosiologi teks pengantar dan terapan*. Jakarta: Kencana, 2010.
[7] Stoller, Robert J. *Sex and Gender*. New York:Science House.1968.
[8] Oakley, Ann. *Sex, gender and society*. London: Temple Smith (revised edition, Gower), (1972/1985).
[9] Corbett, Greville G (Ed). *The Expression of gender*. Germany: De Gruyter, 2014.
[10] Rokhmansyah, Alfian. *Pengantar gender dan feminisme: pemahaman awal kritik sastra feminisme*. Yogyakarta: Garudhawaca, 2016.
[11] Handique, Patrika. *Patriarchy and Women: An Exploration of Ruskin Bond's Selected Novels*. International Journal of Scientific and Research Publications, Vol. 5, Issue 3, 2015, pp:1-3.
[12] Makama, Godiya Allanana. *Patriarchy and Gender Inequality in Nigeria : The Way Forward*. European Scientific Journal, Vol.9, No.17, 2013, pp. 115-144.
[13] Archana Verma Singh. *The Influence of Patriarchy on Gender Roles*. The journal of IJELR, Vol. 3, Issue 1, 2016, pp: 27- 29.
[14] Sultana, Abeda. *Patriarchy and Women's Subordination: A Theoretical Analysis*. The art Faculty Journal. 2010, pp.1-18.
[15] Neelima, Smt C. *Women's Place in a Patriarchal Society: A Critical Analysis of Arundhati Roy's The God of Small Things*. European Journal of English Language and Literature Studies Vol.4, No.1, 2016, pp.37-41.
[16] Hermawati, Tanti. *Budaya jawa dan kesetaraan gender*. Jurnal Komunikasi Massa Vol.1, 2007, pp. 18- 24.
[17] Fauzan, M Romyan. *Perempuan dalam bingkai budaya visual*. Yogyakarta: Garudhawaca, 2013.
[18] Arikunto, S. *Prosedur penelitian suatu pendekatan praktek*. Jakarta: Rineka Cipta, 2010.
[19] Boch, Francoise and Annie Piolat. *Note Taking and Learning: A summary of Research*. The WAC Journal, Vol. 16 p.1-13. Stendhal University and University of Provence.
[20] Umar Kayam. *Para Priyayi*. Jakarta: PT Pustaka Utama Grafiti, 2012.

 ISBN : 978-602-99806-3-9

Strengthening of fishermen bargaining position in marketing of capture fishery catch

I Ketut Setia Sapta, I Nengah Landra, I Nengah Sudja
Universitas Mahasaraswati Denpasar

Abstract Coastal Community Economic Empowerment Program (PEMP) is a national program that becomes the policy framework and reference for the implementation of various poverty reduction programs based on coastal community empowerment. The Coastal Community Economic Empowerment Program (PEMP), is started by the government since 2007. Fishermen are the main target of the PEMP program. The activities designed in the PEMP program aims to improve the welfare and employment opportunities of the fishermen, especially those who still in poor category.
This research will be carried out for two years. The purpose of this research in the first year is as follows. (1) Exploration of marketing system of fishery product to strengthen the fisherman's bargaining position in Karangasem Regency, Bali Province, and (2) To analyze the efficiency of capture fishery in Karangasem regency.
This research is a survey research. The population of this research is coastal community which become target of PEMP program. Sampling using quoted random method with sample amount 100 people. The exploration of fish catch marketing system was analyzed descriptively. The level of capture fisheries efficiency was analyzed by using Data Envelopment Analysis (DEA) approach, while the competitiveness of capture fisheries was analyzed by Policy Analysis Matrix (PAM) approach.
The results of the research indicate that (1) The institution of cooperative is the best alternative to accommodate the marketing of fishery products to strengthen the bargaining position of fishermen, (2) The efficiency of capture fishery is still low, which is influenced by the simple fishing equipment.
It is recommended that fishermen join and adhere to the principles of cooperative to further strengthen their bargaining position. Fishermen should be assured that a well-managed cooperative will be able to strengthen their bargaining position in marketing capture fisheries.
Keywords: bargaining position of fishermen, fishery catch, empowerment, economy, community, coastal area

1. INTRODUCTION

1.1. Background

Fisherman is occupation which is seen as identical to poverty. The absence of alternative jobs to earn a living, causing a person to set his choice on the job as a fisherman. In carrying out their occupations, fishermen are confronted with various limitations, including limited human resource quality, limited capital, limited access to information and business opportunities and limited ability to face the challenges of climate change and geographical area. Saad (2006) states that the causes of fisherman poverty are: 1) weak access to formal financial institutions due to debt to moneylenders, 2) lack of financial institution partiality due to tight requirements and low level of trust) 3) weakness of system and business management and 4) weak access to information on science and technology and the market.

 ISBN : 978-602-99806-3-9

To stimulate fishermen in improving the underdeveloped and impoverished life, it is necessary to increase their income either by themselves or by the government. Efforts to improve life, which is more involving fishiermen communities to participate in development are better known as the principle of fishermen empowerment. The purpose of empowering fishermen is to strengthen the ability of fishermen, change the behavior of fishermen and self-organizing fishermen. The ability of fishermen that can be developed is the ability to strive, the ability to seek information, the ability to manage activities tailored to the needs or problems they face. The behavior of fishermen who need to be changed is certainly the behavior that harms the fishermen themselves or that hampers the improvement of fishermen's welfare.

Usman (1998) stated that an approach is needed to strengthen the economy of lower income fishermen communities such as: 1) a technocratic approach that starts firstly with establishing programs and target groups, followed by standardizing delivery system, for target groups, issuing implementation guidelines and technical guidelines, and providing budget to support technical implementation, and 2) a participatory approach by strengthening community self-reliance. The community is assisted, accompanied, and facilitated to perform financial problems analysis they face, give them the opportunity to decide what is desired and their initiative to be the basis of activities. The role of the government is as a facilitator and to provide initiavive support to the community.

Coastal Community Economic Empowerment Program (PEMP) is a national program that becomes the policy framework and reference for the implementation of various poverty reduction programs based on coastal community empowerment. The Coastal Community Economic Empowerment Program (PEMP) has been implemented by the government since 2007. The Government has integrated the program in the Coastal Community Economic Empowerment Program (PEMP) which is coordinated by the Director General of Marine, Coastal and Small Islands.

The fishermen group in Karangasem district is the main target of the PEMP program that began in 2007. The activities designed in the PEMP program are aimed at improving the welfare and employment of fishermen, especially those still considered poor. All phases of PEMP program implementation are based on the empowerment of fishermen to create and improve their capacity in carrying out the development from, by and for fishermen by placing fishermen as subjects, and not as objects of development (Anonymous, 2009).

Through the PEMP program the fishermen groups are given capacity building (counseling and training), strengthening access to micro credit, provided direct community assistance (BLM) in the form of capital to buy wooden boat (6 meters long) with 10 PK machine and equipped with fishing gear, as well as provided accompaniment in conducting productive business activities. There are great hopes for the implementation of the PEMP program for fishermen groups, namely the strengthening of capacities and institutions which then is expected to lead to increased income of fishermen groups so that they can get out of poverty trap.

Now, after almost 9 (nine) years of PEMP program is implemented, it still can be recorded the atmosphere of the fisherman life (target PEMP program) that is apprehensive. By naked eye it can be seen fishermen residential house buildings are not feasible for habitation, in addition it often seen some fishermen’s wives and children from Karangasem regency still live life as a beggar for a bite of rice. This factual condition shows that the fisherman has not been able to get out of the poverty trap that twisted them. Many problems are still familiar to the fisherman’s daily life.

It is undeniable that the PEMP program has been able to improve the yield of capture fisheries. Thanks to the help of nets and boat with the 10 PK engine as the implementation of PEMP program, fishermen have succeeded in increasing the catch. However, the fishermen group has not enjoyed the added value of the increase of the catching fishery results. The problem is the weak bargaining position of fishermen in the marketing of fishery products. Moreover, when the fish season comes, the price of

 ISBN : 978-602-99806-3-9

capture fishery goes down drastically, resulting in the abundance of fish catch, does not provide a significant increase in fisherman income.

Based on the factual condition of the fishermen's life which is the target of the PEMP program, it is necessary to study the strengthening of the bargaining position of fishermen in the marketing of fishery products in the framework of Coastal Community Economic Empowerment Program.

1.2 The purposes of research

The research purposes are:

(1) To explore the marketing system of fishery products to strengthen the bargaining position of fishermen in Karangasem Regency, Bali Province.
(2) To analyze the efficiency of fishery fishermen fishermen in Karangasem regency.

RESEARCH METHODOLOGY

2.1. Research Location

This research will be conducted in Kubu and Karangasem Subdistricts, Karangasem Regency, Bali Province. The selection of the location of this study was deliberately based on the consideration that (1) Kubu and Karangasem sub-districts were the main target of PEMP program in Karangasem Regency, Bali Province since 2007, (2) Fishermen Groups in Kubu and Karangasem Sub-district of Karangasem Regency has established institutional and has obtained sustainable development in the form of Coastal Community Economic Empowerment Program.

2.2. Population and Sample

The population in this study are all members of fishermen group that became the target of PEMP program since 2007 in Kubu and Karangasem sub-districts joined in 20 groups of fishermen with the number of members 200 people. Sampling was conducted by quoted random method with 50 respondents in Karangasem Sub-district and 50 people in Kubu Sub-district.

2.3.Data Collection Method

In this study data collection was conducted using survey methods through direct interviews with respondents using a list of questions that have been prepared previously.

2.4 Research Variable

The variables in this research are dependent variable that is capture fishery yield (Y), and independent variable which include (1) amount of fuel (X1), (2) net area (X2), total supply (X3), long sail (X4) , and the amount of labor (X5).

2.5. Variable Operationalisation

The variables involved in this study were measured as follows:

1) Capture fishery results are expressed in kg, is the catch in a single trip.
2) The amount of fuel is the amount of diesel spent in a single trip expressed in liters.
3) The net area is the net area used in fishing is expressed in m2.
4) The amount of supplies is the value of food and drinks and cigarettes spent during fishing is expressed in rupiah.
5) The length of sailing is the time spent in a single fishing trip expressed in hours.
6) The number of laborers is the number of laborers involved in a single trip expressed within the working day.

2.6. Data Analysis Method

The exploration of marketing model of fishery product was analyzed descriptively. The efficiency of capture fisheries was analyzed using data envelopment analysis (DEA). The competitiveness of capture fisheries is analyzed by Policy Analysis Matrix (PAM) approach.

 ISBN : 978-602-99806-3-9

RESULTS AND DISCUSSION

3.1 Exploration of Capture Fisheries Marketing System.

The fishery product marketing system that has been done by fishermen in Karangasem District is direct marketing when they land from the sea. The intermediary traders have been waiting at fishermen base (Ujung beach, Jasi beach, Pasir Putih beach) to buy fisherman catch. Fishermen generally do not have an alternative to market the fishery products except selling them with collecting merchants. This is in accordance with the opinion of Lubis et al., (2012), which states that fishermen are more tied to the owners of capital or merchant collectors in marketing their catch fish. Limited capital and fish landing that is generally done at night also become the factors causing the reluctance of fisherman sell fish directly to TPI.

Groups of fishermen that have been established are helpless in playing a role to assist its members in marketing the yield of capture fisheries. Individualistic impression is very strong detected in the marketing system of capture fisheries, because every individual seems to be competing to get cash immediately from the catch. There is no synergistic effort in the marketing of capture fishery products to strengthen the bargaining position of fishermen, and even implied contestation between individuals who precisely weakening the bargaining position among them. The weakness of capital is the cause of the fisherman's trapping in the created system, as Sinulingga (2011) states that the middlemen in certain conditions have created the monopoly system because they operate from financial provision, ownership of production factors, and determine the marketing path.

To strengthen the bargaining position of fishermen, then through deep exploration and observation can be identified more competitive fishing marketing system results as described in the following exposure.

(1) Marketing fresh fish through the group
The group established a marketing organization that then assigned marketing staff to sell the catch of fishermen to various market segments. Groups can play an active role in educating their members so as not to get caught in the monopsony market. The group's role is very important in strengthening the bargaining position of the fishermen so that they obtain competitive prices.

(2) Marketing fresh fish through cooperative.
Fishermen can form cooperatives to specifically engage in the marketing of capture fisheries. Cooperatives can also serve the needs of capital for its members so as not to be trapped by the middlemen in marketing the catch. Cooperatives can make breakthroughs in the marketing of capture fisheries, for example through the purchase of cold storage capable of storing large quantities of catches to be marketed when the selling price improves. Cooperatives can establish partnerships with various stakeholders so that the catch has a certainty of selling prices and fishermen get added value.
Cooperatives can expand their wings by processing fish catches or can export. Processing of catching fishery product is aimed to overcome the weakness of fishery product that is easy to decay so that it can be stored longer to obtain the competitive selling price.

(3) Marketing fresh fish through partnership with culinary entrepreneurs
Fishermen who are not incorporated in a cooperative or group can assign family members to establish partnerships with culinary entrepreneurs. Through partnerships, then when the fish season, the fishermen can enjoy the added value of the catch. Fishermen are required to maintain continuity of supply so that the continuity of the partnership is maintained.

(4) Marketing of post-cooling catches
Fishermen can independently purchase refrigerators to temporarily store their catch, before being sold to buyers.

 ISBN : 978-602-99806-3-9

(5) Marketing of post-processing catches.
Fishermen can independently perform the processing of their catch by referring to consumer preferences.

3.2 Capture Fisheries Efficiency

To support the DEA analysis in order to assess the efficiency of capture fishery, it is also used to analyze the production function to know the effect of production factor on the production level of capture fishery. The results of capture fisheries production using Cobb-Douglas type production function are presented in Table 1. In Table 1 it can be seen that the number of labor, the amount of fuel, the width of the jarring, and the duration of going to the sea has a significant effect on the catch. The coefficient of determination (R2) is obtained at 0.8746. This number means that 87.46% of the dependent variable variation (Y) can be explained together by the independent variable (Xi), and the remaining 12.54% is explained by other factors not included in the model. The result of variance analysis (F-hitung) shows that together independent variable (Xi) have real effect on the dependent variable (Y).

Tabel 1. Result of Regression Analysis of Capture Fishery.

Variable	Coefisien	Std. deviation	t-count	P-Value
Constants	1,8984	0,0679	27,9588	5,113E-128
Amount of labor (X1)	0,2724	0,0321	8,4859	3,7549E-07
Amount of fuel (X2)	0,2126	0,0507	4,1932	0,0001
The large of nets (X3)	0,3117	0,0413	7,5363	9,3255E-16
Duration of going to sea (X4)	0,1987	0,0513	3,8733	0,0031
Captain experience (X5)	-0,0259	0,0152	1.7039	0,3380
R^2 = 0,8746	F = 479,1738	Sig. F = 8,3483E-108		

Source : Primary data analysis

The result of F-count analysis and the significant coefficient of determination followed by empirical-t on significant regression coefficients (regression coefficient of labor quantity, amount of fuel, net large, duration of goingto sea) shows that the model can be used as a good estimator.

Based on Table 1 it can be formrd capture fishery production functions as follows:

$$\mathbf{Y = 79{,}1407\ X_1^{0{,}2724} X_2^{0{,}2126} X_3^{0{,}3117}\ X_4^{0{,}1987}\ X_5^{-0{,}0259}}$$

based on the capture fishery production function, it can be explained things as follows:

1) The variable of labor force (X1) has a coefficient of elasticity of 0.2724, this figure means that every increase of labor input use by 1%, will increase the production of capture fishery by 0,2724%.
2) The fuel quantity variable (X2) has a coefficient of elasticity of 0.2126, this figure means that any increase in fuel input use by 1%, will increase the fish catch by 0.2126%.
3) The net large variables (X3) have a coefficient of elasticity of 0.3117, this figure means that any increase in net usage by 1%, will increase fish catch by 0.3117%.
4) Variabel lama melaut (X4) memiliki koefisien elastisitas sebesar 0,1987, angka ini member makna bahwa setiap peningkatan lama melaut 1%, akan meningkatkan hasil tangkapan ikan sebesar 0,1987%.

 ISBN : 978-602-99806-3-9

5) The variable of duration of going to sea (X4) has a coefficient of elasticity of 0.1987, this number means that every 1% increase in duration of going to sea, will increase fish catch by 0.1987%.
6) Variabel pengalaman sebagai nahkoda (X5) memiliki koefisien elastisitas sebesar -0,0139. Variabel ini tidak berpengaruh nyata terhadap variabel terikat (hasil tangkapan ikan (Y)).
7) The variable of experience as a captain (X5) has a coefficient of elasticity of -0.0139. This variable has no significant effect on the dependent variable (fish catch (Y)).

Based on the capture fisheries production function, it is identified that the large of the jarring variables has the greatest coefficient of elasticity. Thus, the net width variables give the greatest influence on the catch. The amount of fish catch depends on the large of the net used.

The efficiency index or technical coefficient of the capture fisheries production function is 101.8984 or equal to 79.1407. According to Debertin (1986) the technical coefficients of the Cobb-Douglas type production function reflect the level of technology applied in production. Thus the relatively low technical coefficients in the production function give meaning that the level of technology applied in capture fishery business is relatively low. The fishermen use only a limited fishing gear with the use of a 5 pk machine that has not been able to reach the roaming area for wider fishing.

DEA analysis results show that the scale of fishery catch fisherman group efficiency in Kabupaten Karangasem is 0.74, which means 26% inefficiency. This figure means that fishermen can reduce their production costs by 26%, and are still at the same level of output. Simple fishing equipment factor, which is outboard boat with 5 pk engine and makeshift net becomes the cause of low efficiency. In addition, the magnitude of uncertainty is thought to be the cause of this, since fishermen operating in open access areas compete closely to obtain fish, their existance even become unclear. When there is a fish season, the catch is abundant, and when the seasons change, the fishermen rarely get fish so that the catch is low even nil.

CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusion

1) Cooperatives institution to be the best alternative in accommodating the marketing of fishery products to strengthen the fishing bargaining position.
2) The efficiency of capture fisheries is still low, which is influenced by simple fishing equipment.

4.2 Recomendations

It is recommended that fishermen join and adhere to the principles of cooperatives to further strengthen their bargaining position. Fishermen should be assured that a well-managed cooperative will be able to strengthen its bargaining position in marketing capture fisheries.

REFFERENCES

[1] Anonim.2009. Petunjuk Teknis Pencatatan dan Pelaporan Pemutakhiran Data Keluarga Dalam Pelaksanaan Pendataan Keluarga. Jakarta: Direktorat Pelaporan dan Statistik BKKBN Pusat.
[2] Saad, S. 2006. Peran Lembaga Keagamaan/Adat dalam Pemberdayaan Masyarakat Pesisir.Makalah disampaikan dalam pelatihan peningkatan peranserta Lembaga Keagamaan/Adat oleh Direktorat Pemberdayaan Masyarakat Pesisir, Ditjen KP3K DKP di Cipayung Bogor, 22-25 Agustus.
[3] Usman, S. 1998. Pembangunan dan Pemberdayaan Masyarakat. Jakarta : Pustaka pelajar

ISBN : 978-602-99806-3-9

Determining blewah fruit maturity based on skin color texture using feature extraction

***Chrystia Aji Putra[1] and Budi Nugroho[2]**
[1,2] Faculty of Computer Science, Universitas Pembangunan Nasional "Veteran" Jawa Timur, Indonesia

Abstract. Blewah (Cucumis Melo L) is the original fruit of Indonesia. Blewah is a similar fruit to Cantaloupe, but difference in skin texture. In Indonesia, many farmers are conducting cultivation of cantaloupe. The period of cultivation of blewah fruits need 50 days after planting period. Purpose of this research is determined blewah maturity based on skin color texture image. Feature extraction process begins with converting RGB image to grayscale image. Feature extraction is processed on the grayscale image with 11 characteristic parameters. 11 characteristic parameter is Mean, Variance, Skewness, Kurtosis, Entropy, Angular Second Moment, Contrast, Correlation, Standard Deviation, Inverse Difference Moment and Homogenity. 11 characteristic parameters are further classified using artificial neural network LVQ. The final weight obtained is used as a reference weight to identify whether the blewah is ripe. Based on the test conducted using 30 data test, the feature extraction method has a good accuracy level. 85,7% accuracy rate obtained by the number of test data as much as 30 images using first ordo feature extraction method. 78,5% accuracy rate obtained by the number of test data as much as 30 images using second ordo feature extraction method.

Keywords: Blewah Maturity, Feature Extraction, Neural Network, Learning Vector Quantization.

1. INTRODUCTION

Blewah (Cucumis Melo L) is the original fruit of Indonesia. Blewah is a similar fruit to Cantaloupe, but difference in skin texture. Blewah is closely related to cantaloupe formerly known as Melon Londo in Indonesia. Other than Cantaloupe, fruit that have similarity with blewah is Timun Suri. Blewah is similar to cantaloupe but different in cultivation group. Blewah is liana shaped, similiar with pumpkin and cucumber. Blewah is generally oval-shaped, with bright orange skin with greenish spots. In Indonesia, many farmers are conducting cultivation of cantaloupe. The period of cultivation of blewah fruits need 50 days after planting period.

After harvest, farmers separate the fruit based on quality. It aims to ensure uniformity of fruit quality. Agricultural and plantation processing industries are growing rapidly. Post-harvest activities are closely related to product quality, which ultimately determines the selling price of the product. There are two ways to determine the maturity of blewah, which is destructive and non-destructive. Determining the maturity of blewah is destructively done by splitting the fruit to determine the level of maturity. This is done when blewah will be consumed directly, but it is not possible if the fruit will be sold in the market. Determining fruit maturity in a non-destructive way is required to keep the quality of blewah.

ISBN : 978-602-99806-3-9

Fig 1 Blewah Fruit

Identification of non-destructive blewah maturity is done by considering the age of the planting of blewah, the physical size of blewah, and color change on blewah fruit. Determining the maturity of cantaloupe by non-destructively can also be applied various kinds of digital image processing methods. Method of digital image processing that can be applied are K-Nearest Neighbour, Gabor Filter, Feature Extraction, Image Clustering, HSV (Hue Saturation Value), etc. Feature extraction methods are done implemented for identification of various fruit maturity process based on color texture. In this research, proposed method for determining maturity of blewah based on the color texture are First Order Feature Extraction Method, Second Order Feature Extraction Method, and Neural Network (Learning Vector Quantization).

2. FEATURE EXTRACTION

This section describes the first and second-order statistical feature extraction methods. Extraction of first-order features is obtained through an image histogram. The extraction of second-order statistical features is obtained by a co-occurrence matrix, matrix that representing the neighbor relationship between pixels in the image in various orientation and spatial directions.

2.1 First Order Feature Extraction

First-order feature extraction is a characteristic retrieval method based on the characteristics of an image histogram. The histogram shows the probability of occurrence of the pixel gray degree value in an image. From the resulting histogram values, we can calculate some first order characteristic parameters, including Mean, Skewness, Variance, Kurtosis, and Entropy.

2.2 Second Order Feature Extraction

In some cases, first-order features can no longer be used to recognize differences between images. In such a case, we need to take the characteristic of a second-order statistic. The technique for obtaining a second-order statistical feature is to calculate the probability of an adjacency relationship between two pixels at a certain distance and angle orientation. This approach forms a co-occurrence matrix of image data, further defining the feature as a function of the intermediate matrix.

Co-occurrence means a common occurrence, the number of occurrences of one level of pixel value adjacent to one level of another pixel value within a certain distance (d) and angle orientation (θ). Distance is expressed in pixels and orientation expressed in degrees. Orientation is formed in 4 (Four) angular directions with angle intervals of 45 °, 0 °, 45 °, 90 °, and 135 °. Distance between pixels is usually set by 1 pixel.

Co-occurrence matrix is a square matrix with the number of elements as large as the square of the number of pixel intensity levels in the image. Each point (p, q) of the oriented θ-oriented matrix contains the probability of a pixel event having p value adjacent to the pixel having value q at distance d and orientation θ and (180-θ).

ISBN : 978-602-99806-3-9

3. LEARNING VECTOR QUANTIZATION

Learning vector quantization (LVQ) is a method for conducting learning on a supervised competitive layer. A competitive layer will automatically learn to classify input vectors. The classes obtained as a result of this competitive layer depend only on the distance between the input vectors. If two input vectors are approximately equal, then the competitive layer will place the two input vectors into the same class.

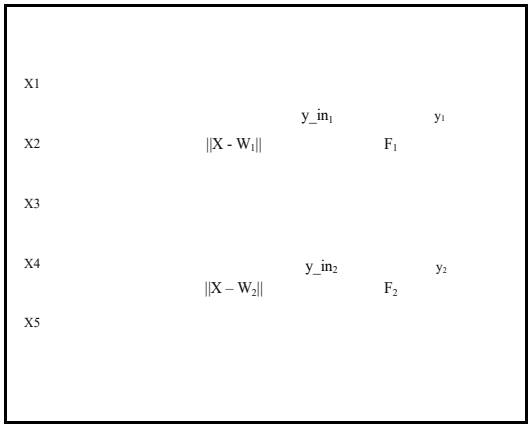


Fig 2 LVQ Architecture Example.

LVQ architecture as well as SOM (Self Organizing Map), LVQ consists of 2 layers, input (X) and output (Y), between layers connected by certain weights that are often referred to as vector representatives (W). Information provided to the network during learning is not just a data vector, but class information from the data is also included. Figure 2 shows an LVQ network with 6 units on the input layer and 2 units (Neuron) on the output layer. The processing that occurs in each neuron is to find the distance between an input vector to the corresponding weights (*w_1* and *w_2*). *w_1* is a weight vector that links each neuron in the input layer to the first neuron in the output layer, whereas *w_2* is the weight vector that connects each neuron in the input layer to the second neuron in the output layer. The activation function F1 will map y_in1 to *y1 = 1 if* || *x - w1* || <|| *x - w2* ||, and *y1 = 0* if otherwise. Similarly, what happens to the F2 activation function will map *y_in1 to y1 = 1 if* || *x - w2* || <|| *x - w1* || and *y1 = 0* otherwise.

4. DETERMINING BLEWAH FRUIT MATURITY

In this research, image used as training data is 16 data skin fruit of blewah. Consists of 8 images of mature fruit, and 8 images of raw fruit. Skin image of blewah fruit taken at the curve of blewah skin. Trained data image used extension *.JPEG, with image size 512x512 pixels. Image testing is 14 pieces of data. Image of blewah skin used extension *.JEG. Consists of 8 images of mature fruit, and 8 images of raw fruit. Skin image of blewah fruit taken at the curve of blewah skin.

The research process is designed on a flowchart. In this section there are 3 processes, Pre-processing, Feature Extraction Process and Classification Process with Artificial Neural Network using Learning Vector Quantization. Figure 2 shows the main program design flowchart in this research**.**

ISBN : 978-602-99806-3-9

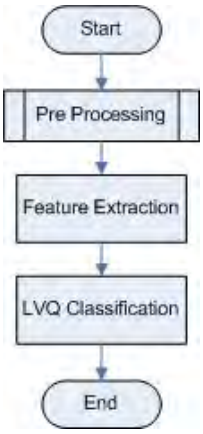


Figure 3. System Flowchart.

In pre-processing stage can be explained as follows. The first stage of this process is to insert a RGB image that is 512x512 pixels in size. Then image is converted into grayscale. Histogram value is then calculated from the grayscale image resulting in a value on the histogram.

In this research, there are 2 artificial neural networks, each for first order feature extraction method and second order feature extraction method. This is done to compare the results of identification of maturity of blewah. The first step is to determine the value of training data and test data values for data needs to be processed on the LVQ network. After the initialization of variables that exist within both artificial neural networks LVQ, variables used include input vector (*Xij*), iteration (*Epoch*), initial weight (*Wij*), Learning Rate *(α),* Minimal Learning Rate (*Minα*), Decrease of Learning Rate (*Decα*), Learning Function (*LF*), and Target Class (*Tk*).

Variables used to create artificial neural networks for the first order feature extraction method are the input vector (*Xij*) of 5 vectors, the iteration (*Epoch*) is 100 Epoch, the initial weight (*Wij*) is obtained from 2 row data 1 and 2 in the data of train and data test, node hidden layer is 10, Learning Rate (*α*) is generally '0.05', Minimal Learning Rate (*Minα*) is' 0.05 ', Decreasing Learning Rate (*'000'*), Learning Function (*LF*) using "learnlv1", target class (*Tk*) worth 1 and 2 (1 for raw and 2 for mature), and ouput node amounted to 2. As for LVQ neural networks the second order characteristic extraction method as a whole variables used equal to the variable used to create artificial neural network LVQ first order extraction method, only input vector used in LVQ network second order feature extraction method amounted to 6 vectors due to parameters on the first order feature extraction has 5 characteristic parameters of second order feature extraction feature has 6 characteristic parameters.

To determine the value of *Decα* can be done by means $\alpha = \alpha - Dec\alpha$ or $\alpha = \alpha * Dec\alpha$. The value of Learning Rate (*α*) can be changeable, the closer to the number 1 then the LVQ network learning is getting better.

From table 1 is the sample data from the total data of 14 test images. The number of images in accordance with the classification of neural network Learning Vector Quantization amounted to 11 pieces. While the number of unsuitable images amounted to 3. Thus the value of accuracy of success amounted to 78.5%.

ISBN : 978-602-99806-3-9

Table 1. Testing Result Sample

Image Testing (Blewah)	Cate-gories	Class	Result (First Order Feature Extraction)	Result (Second Order Feature Extraction)
	Raw	1	1	1
	Mature	2	2	1
	Raw	1	2	1
	Mature	2	2	2
	Raw	1	1	1
	Mature	2	2	2
	Raw	1	1	1
	Mature	2	2	2

Table 1 on column Second Order Feature Extraction is a sample data of all 14 test data. The number of images in accordance with the classification of neural network Learning Vector Quantization amounted to 12 units, While the number of unsuitable images amounted to 2. Thus the value of accuracy of success amounted to 85.7%.

5. CONCLUSION

Based on the testing result, the maturity of Blewah can be known from the age of planting, fruit aroma, and physical size of the fruit. Blewah maturity also known from the texture of skin color. In

ISBN : 978-602-99806-3-9

addition, it can be compared from the calculation of first order feature extraction and second order feature extraction.

Results of determining maturity of blewah based on fruit color texture has a good recognition rate percentage that using second order feature extraction methods. Accuration percentage of second order feature extraction method reached 85.7%, while the accuration percentage of first order feature extraction method reached 78,5%.

6. ACKNOWLEDGEMENTS

This research partially supported by University of Pembangunan Nasional "Veteran" Jawa Timur, Faculty of Computer Science.

7. REFERENCES

[1] 'Uyun, Shofwatul, Sri Hartati, Agus Harjoko, dan Subanar. 2013. "Selection Mammogram Texture Descriptors Based on Statistics Properties Backpropagation Structure". Journal. Yogyakarta : (IJCSIS) International Journal of Computer Science and Information Security, Vol. 11, No. 5, May 2013.

[2] Pradeep, N. Et al. 2012. "Feature Extraction of Mammograms". International Journal of Bioinformatics Research (Volume 4). Hlm. 241-244.

[3] Haralick, Robert M., Shanmugam, K. & Dinstein, I. 1973. "Textural Features for image Classification". IEEE Transaction on System, Man and Cybernetics. Vol. 3. Hlm. 618 – 619.

[4] Gonzalez, Rafael C, dan Woods Richard E. "Digital Image Processing the Third Edition". United States of America : Prentice Hall, 2002, pp. 849 – 856.

[5] Demuth, Howard, dan Mark Beale. "Neural Network Toolbox For Use With Matlab". United States of America : MathWorks, Inc. 1992 – 2002, pp. 8-2 – 8-7.

ISBN : 978-602-99806-3-9

Cobit maturity level at PT KAI DAOP 8 Surabaya

Siti Mukaromah*, Agung Brastama P

Department of Information System, Faculty of Computer Science,
Universitas Pembangunan Nasional "Veteran" Jawa Timur

ABSTRACT: COBIT maturity model is to measure the state where the enterprise currently is, decide where it needs to go, and to measure the progress against that goal. The COBIT maturity model is measuring how well IT processes are managed. The specific models consist of a textual description of the target state for each level. Maturity levels designated by six levels from 0 through 5, there are 0 Non-existent, 1 Initial/Ad Hoc, 2 Repeatable but Intuitive, 3 Defined Process, 4 Managed and Measurable, 5 Optimised.
This paper focus at PT Kereta Api Indonesia (KAI) Daop 8 Surabaya. PT KAI Daop 8 Surabaya is one of the Indonesian railway operations area, under the environment of PT Kereta Api Indonesia (Persero) headed by an Executive Vice President (EVP). The result of this paper is maturity level at PT KAI Daop 8 Surabaya for internal perspective is at Level 3 (3 Defined Process—Procedures have been standardised and documented, and communicated through training. It is mandated that these processes should be followed; however, it is unlikely that deviations will be detected. The procedures themselves are not sophisticated but are the formalisation of existing practices), and for Customer Perspective is at Level 4 (4 Managed and Measurable—Management monitors and measures compliance with procedures and takes action where processes appear not to be working effectively. Processes are under constant improvement and provide good practice. Automation and tools are used in a limited or fragmented way).

Keywords: cobit, maturity level, pt kai daop 8 surabaya

1. INTRODUCTION

Along with the development of technology IT needs are increasingly used in assisting companies in solving problems experienced, moreover many companies budgeted funds for IT investment [18]. On the contrary sometimes IT is used on the company does not provide a balanced benefit to the business [1]. In the 1980s and 1990s there was much research on the effects of IT on the productivity of the company, where the study shows that IT has no significant effect on business productivity [6,] [7], [8], and [10]. Brynjolfsson [5] argues that there is a contradiction between the remarkable advances in computer application and the relatively slow development of productivity at the economic level as a whole. It is often known as Solow Productivity Paradox. Called Solow because based on the expression Solow (1987), "You can see the computer age everywhere but in the productivity statistics".

IT Productivity Paradox [5] is when IT implementation in IT companies does not have a positive impact expected by the company, in other words that the company's investment in IT is useless but consumes company's budget.

ISBN : 978-602-99806-3-9

In this case can be concluded in good governance, the role of IT Governance is very important as guideline in IT implementation. IT Governance has 5 pillars, there are Strategic Alignment, Value Delivery, Resource Management, Risk Management, and Performance Measurement. Companies that use IT as an enabler must implement IT Governance in order for business processes to proceed as planned. To find out if the company has successfully implemented the IT Governance one of them is through the audit. From the audit results will be known how the implementation of IT in the company.

Control Objective for Information and Related Technology (COBIT) can be used as a tool used to streamline the implementation of IT Governance, i.e. as a management guideline by applying all the domains contained in COBIT 4.1 [11]

2. METHODOLOGY

Steps for IT/IS audit are audit Subject, audit scope, pre-audit plan, audit evidence collection, evaluation, and audit report [16]. Audit Subject is Determine or identify the unit or location audit. In this research took location at PT KAI Daop 8 Surabaya. Audit Scope in this research is Identified systems specifically, functions or organizational units to be included the scope of examination. Defining the scope and purpose of the audit based on the results of the most high-risk IT risk level by taking into account the direction of the management. Function to be examined is academic information system.

2.1 Audit Evidence Collection

Identify and select the audit approach to examine and test the internal controls. This paper use Cobit 4.1 as framework to measure IT Governance at PT KAI Daop 8 Surabaya, that focus on Customer Perspective at Business Goal 4 – Improve customer orientation and service, and Internal Perspective at Business Goal 14 – Manage business change. Each Business Goal has IT Goal which link to its IT Processes. This research mapping can be seen in Figure 1.

Data collection is instrument of audit to collect the evidence. A list of employees will be interviewed as the criteria in RACI chart (Responsible, Accountable, Consulted, Informed) provided by COBIT 4.1. The data used as a comparison literature that may affect research. The question posed is based on Maturity Model contained in COBIT 4.1. Organize according to the conditions and circumstances. Identification of evaluation procedures on test the effectiveness and efficiency of the system, evaluation of the strength of the documents, policies and procedures are audited. Here's an example of a working paper COBIT 4.1, as can be seen in Figure 2.

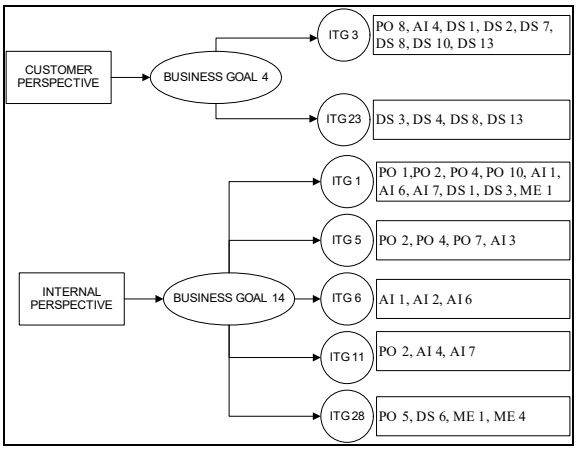


Fig 1. Research Mapping on Cobit 4.1 Business Goal

ISBN : 978-602-99806-3-9

			Do you agree?				
Process Name	Manage Operations						
Process ID	DS13	Maturity Level 2					
Nr	Statement	Weight	Not at all 0.00	A little 0.33	To some degree 0.66	Completely 1.00	VALUE
1	The organisation is aware of the key role that IT operations activities play in providing IT support functions.	1			■		0.66
2	Budgets for tools are being allocated on a case-by-case basis.	1			■		0.66
2	IT support operations are informal and intuitive.	1			■		
3	There is a high dependence on the skills and abilities of individuals.	1			■		0.66
3	The instructions covering what to do, when and in what order are not documented.	1				■	1.00
4	Some operator training exists, and there are some formal operating standards.	1			■		0.66
	Total Weight	6				Compliance	0.6067

Fig 2. Working Paper Maturity Level DS13 Level 2

Next step is Maturity Level Determination. Data collection from the interviews that already translate to working paper (Figure 1) will be used to calculate the level of maturity. Next will be measured contribution of each level of maturity and totalized to obtain the value of IT process maturity in question. Compliance is obtained from level 0 to level 5. Normalize give you an idea of how much influence the compliance of the overall IT process maturity. Normalize the value derived from the value compliance each level divided by total compliance. While the Contribution value obtained by multiplying the value of compliance to normalize the value, and the total of the contribution is the value of the level of maturity. For the assessment of the level of maturity Domain Plan and Organize, as can be seen in Table 1.

Table 1. Maturity Level DS13 Level 2

Level	Compliance	Normalize	Contribution
0	0.660	0.229	0.151
1	0.550	0.191	0.105
2	0.607	0.211	0.128
3	0.371	0.129	0.048
4	0.364	0.126	0.046
5	0.330	0.115	0.038
sum	2.882	Maturity Level	0.515

Measurement scale of maturity level resulting in decimal value does not use round up result [14]. Suppose the value of 2.853 will not be rounded to 3 or located at level 3, as this is not a mathematical problem and the value of rounding, but the fulfillment of the requirements of each level in the Maturity Model.

2.2 Audit Report

Reports objective, constructive and accommodating explanation audit have to be prepared. Results of the evaluation of the implementation of information systems audit will contain findings based on the due diligence carried out as well as recommendations to improve the existing processes. The format of the report will vary in each organization so that there is no standard format in preparation. The final report of the audit should present an overview of today's organizations then allows the management to take the necessary steps [14].

ISBN : 978-602-99806-3-9

3. RESULTS AND DISCUSSION

Results of the interviews conducted, the results obtained maturity level of each process. This paper does not display all of the IT processes for assessment, but representation of each domain. Here are the results of assessment Maturity Level:

3.1 Domain Plan and Organise (PO)

Maturity Level calculation results for domain PO can be seen in table 2 and graphically can be seen in Figure 3a.

Table 2. Maturity Level Domain PO

Domain	Score
PO1	4.467
PO2	4.424
PO4	3.99
PO5	4.654
PO7	4.104
PO8	3.096
PO10	4.018

(a)

(b)

Fig 3.
(a) Maturity Level Domain PO; and
(b) Maturity Level Domain AI

ISBN : 978-602-99806-3-9

3.2 Domain Acquire and Implement (AI)

Maturity Level calculation results for domain AI can be seen in table 3 and graphically can be seen in Figure 3b.

Table 3. Maturity Level Domain AI

Domain	Score
AI1	4.289
AI3	3.862
AI4	3.181
AI6	3.716
AI7	4.153

3.3 Domain Deliver and Support (DS)

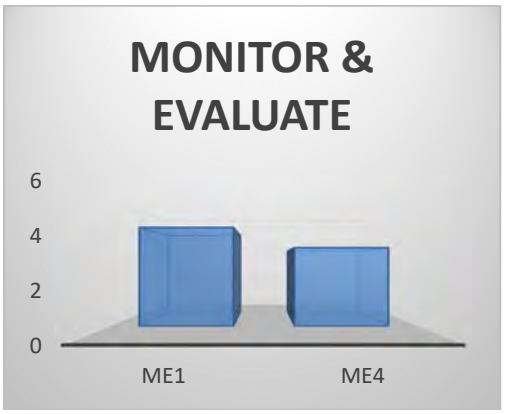
Maturity Level calculation results for domain DS can be seen in table 4 and graphically can be seen in Figure 4a.

Table 4. Maturity Level Domain DS

Domain	Score
DS1	3.25
DS2	4.188
DS3	3.927
DS4	4.253
DS6	4.524
DS7	4.181
DS8	3.914
DS10	4.444
DS13	4.116

(a)

ISBN : 978-602-99806-3-9



(b)

Fig 4.
(a) Maturity Level Domain DS; and (b) Maturity Level Domain ME

3.4 Domain Deliver and Support (DS)

Maturity Level calculation results for domain DS can be seen in table 5 and graphically can be seen in Figure 4b.

Table 5. Maturity Level Domain ME

Domain	Score
ME1	4.635
ME4	3.685

Figure 5 shows that from audit information system the Maturity Level at this research is at Level 4 (Managed and Measurable), which means Status of the Internal Control Environment is – There is an effective internal control and risk management environment. A formal, documented evaluation of controls occurs frequently. Many controls are automated and regularly reviewed. Management is likely to detect most control issues, but not all issues are routinely identified. There is consistent follow-up to address identified control weaknesses. A limited, tactical use of technology is applied to automate controls.

Establishment of Internal Controls – IT process criticality is regularly defined with full support and agreement from the relevant business process owners. Assessment of control requirements is based on policy and the actual maturity of these processes, following a thorough and measured analysis involving key stakeholders. Accountability for these assessments is clear and enforced. Improvement strategies are supported by business cases. Performance in achieving the desired outcomes is consistently monitored. External control reviews are organized occasionally.

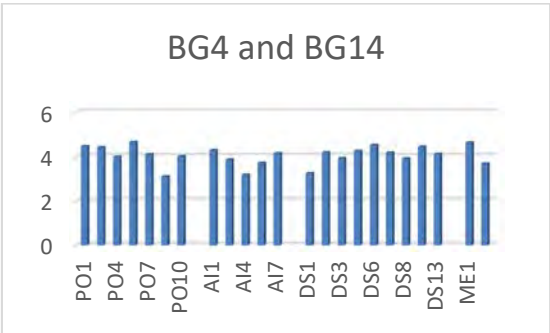


Fig 5. Maturity Level Customer Perspective (BG4) and Internal Perspective (BG14)

ISBN : 978-602-99806-3-9

4. CONCLUSION

The result of this paper is maturity level at PT KAI Daop 8 Surabaya for internal perspective (BG14), and for Customer Perspective (BG4) is at Level 4 (4 Managed and Measurable—Management monitors and measures compliance with procedures and takes action where processes appear not to be working effectively. Processes are under constant improvement and provide good practice. Automation and tools are used in a limited or fragmented way).

5. REFERENCES

[1] Subriadi A. P., Hadiwidjojo D., Rahayu M., & Sarno R, Journal of Theoretical & Applied Information Technology 54 3.

[2] Amalia Fitri, Mukaromah S., Analisis Tingkat Kematangan Berdasarkan Perspektif Pelanggan Untuk Peningkatan Layanan Dan Orientasi Pelanggan Menggunakan Cobit 4.1 (Studi Kasus: PT. Kereta Api Indonesia Persero Daerah Operasional (Daop) 8 Surabaya), Jurnal SIBC vol 10 (1), 2017.

[3] Anderson, Mark C., Banker, Rajiv D. dan Ravindran Sury, The New Productivity Paradox Communication of The ACM), March 2003/Vol. 46, No. 3, 2003.

[4] Brynjolfsson, Erick dan Lorin M., Hitt, Beyond the Productivity Paradox, Communication of the ACM (Association for Computing Machinery), August 1998/ Vol 41, no. 8, 1998.

[5] Brynjolfsson, Erick, The Productivity Paradox of Information Technology: Review and Assessment, Communication of ACM, and Japan Management Research, 1993.

[6] Brynjolfsson, Erick., Yang S., The Intangible Benefits and Cost of Investment: Evidence from Financial Market, Proceeding of 18th International Conference on Information System, Atlanta, 1997.

[7] Devaraj S., Kohli R., Performance Impacts of Information Technology: Is Actual Usage the Missing Link?, Management Science © 2003 INFORMS Vol. 49, No. 3, 2003, pp. 273–289

[8] Dos Santos, Bryan L., Peffer, Ken., Mauer, David C., The Impact of Information Technology Investment Announcements on the Market Value of the Firm, Information Systems Research 4: 1, |O47-7O47/93/O4OI/0O0l/$O1.25, The Institute of Management Sciences, 1993.

[9] Henderson, John., Venkatraman, N., Strategic Alignment Model for Organizational Transformation Via Information Technology, Center for Information System research, Center for Information Systems Research, Massachusetts Institute of Technology, Sloan School of Management,1993.

[10] Hitt, Lorin M., Brynjolfsson, Erick, Productivity, Business Profit Ability, and Consumer Surplus: Three Different measures of Information Technology Value, MIS Quarterly, 1996.

[11] ITGI, COBIT 4.1: Control Objective, Management Guidelines, Maturity Models. United States of America, IT Governance Institute, 2007.

[12] Kusumastuti, Nabila D., Mukaromah S., Analisis Tingkat Kematangan Berdasarkan Perspektif Internal Tujuan Bisnis 14 Menggunakan Standar Cobit 4.1 (Studi Kasus: Pt. Kai Daop 8 Surabaya), Jurnal SIBC Vol. 10 (1) , 2017.

[13] Luftman, Jerry, Assessing Business-IT Alignment Maturity, Communication of the Association for Information System, Volume 4, Article 14, 2000.

[14] Mukaromah, Siti, Tingkat Kematangan Tujuan It "Memastikan Informasi Yang Penting Dan Rahasia Disembunyikan Dari Pihak-Pihak Yang Tidak Berkepentingan"Berdasar Cobit 4.1, Seminar Nasional Manajemen Teknologi XXIII, 2015.

[15] Mukaromah Siti, Subriadi A., The Significant of Cobit Mapping Business Goal 12 and IT Goal 19 (Case Study: Stikom Surabaya), The 1st international seminar of science and technology, 2015.

ISBN : 978-602-99806-3-9

[16] Mukaromah Siti, Putra A. B., Maturity Level at University Academic Information System Linking IT Goals and Business Goal Based on Cobit 4.1, MATEC Web of Conferences, 58, 2016, 03009
[17] Solow, R, "We'd better Watch Out", New York Times Book Review, 1987, p.36.
[18] Woodal P., Solving the paradox: IT is making America's productivity grow faster at last, but for how long? The Economist, Vol. 356, no. 8189, 2000, pp. S11 S19.

ISBN : 978-602-99806-3-9

Analysis of soybean production to achieve soybean self-sufficiency using system dynamics approach

*Agung Brastama Putra[1], Siti Mukaromah[2], Nur Cahyo Wibowo[3]

[1,2,3]Departement of Information System, Faculty of Computer Science, Universitas Pembangunan Nasional "Veteran" Jawa Timur, Indonesia

ABSTRACT: Soybean is widely used as raw material of various types of processed foods. The still remaining problem today is the soybean's demand that is not balance when it's compared to the farmer's soybean production. This could affect soybean shortage. If the need of soybean in East Java Province can be fulfilled, then East Java Province can be said to have a surplus and self-sufficiency of soybean. The decline in soybean production was influenced by handled and unhandled factors. The contribution of this paper is modeling soybean production and scenario. Both were used to increase soybean production, so that it can achieve self-sufficiency by considering the variables that influence in soybean production. This research use system dynamic approach because it can be used like a tool to provide information and feed back to the system and offer a solution from developed scenarios.

Keywords: Soybean, Production Analysis, Self-Sufficiency, Demand, System Dynamics

1. INTRODUCTION

The agricultural sector has an important contribution to national development. Soybean is one of food crops commodities, all of the food crops are surplus, except for soybean. The East Java Province has an excellent products are Rice and Corn (see Figure 1), in other side, Soybeans and other food crop commodities, which potentially in terms of economy and employment. The Soybeans commodities are one of example from many commodities potential in east java. Until now, The Government need's import to fulfillment of soybean commodities, soybean is a raw material in the manufacture of "tempe", tofu and soy sauce, etc.

The harvest area of Soybean commodities slowly decline from 2000 until now, with an average decrease of 5% and a 3% increase (see Figure 2), the highest decrease occurred in 2006 to 2007 amounted to 19% (1). It's caused by pest, plant diseases and rainfall (2), and infrastructure development, resident building and industry areas (3). Conversion of harvest area can be affect productivity (4).

The Soybean demand is still not balanced compared to the production of soybean farmers, if requirement of soybean can be fulfilled, then East Java Province can be said to have a surplus and self-sufficiency. The contribution of this paper is modeling soybean production and scenario to increase soybean production. First, expansion of land area and the second, seed treatment, both were used to increasing soybean production, so that it can achieve self-sufficiency by considering the variables that influence in soybean production. This research use system dynamic approach because it can be used like a tool to provide information and feed back to the system and offer a solution from developed scenarios.

To be able to answer the question then in this research need to do stages in solving the above problem, first, creating a causal loop, secondly, creating a base model, and third, developing the model by

ISBN : 978-602-99806-3-9

incorporating the scenario of adding new planting area with dynamic system simulation approach. A system dynamics approach is used in this research because it can be used as a tool that can provide information in relation to the decision making process (5), a complex dynamic system approach requires formal models and simulation methods to test, improve and design a new policy (6).

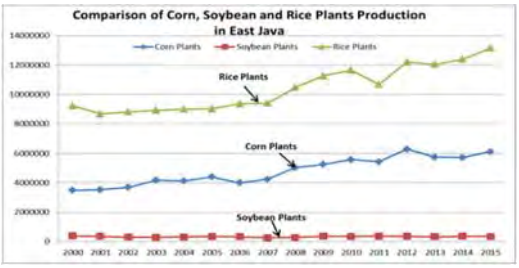


Fig.1 Comparison of Corn, Soybean and Rice Plants Production in East Java. (1)

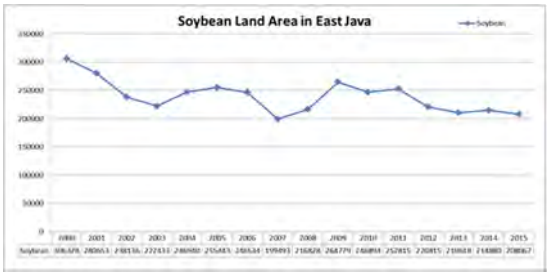


Fig.2 Harvest Area of Soybean in East Java. (1)

2. METHODOLOGY

In this section will be discussed about modelling, system dynamics, step by step development using system dynamics approach and validation.

2.1 Modelling

Modelling is to use a certain formal language with the help of software to the imitate system in real life the focus which of attention and subject matter in the study (7)

2.2 System Dynamics

The dynamic system interprets real systems into computer simulation models that allow one to see structure and policies (8). Stocks and flows are a main component in system dynamics approach, Stocks represents some of the information or entity in the system, Flows define the rate of change to stocks-add or subtract-more from the type of information or entity to the stocks (9)

2.3 Step by Step System Dynamics Approach

In this research using five stages in developing a dynamic system model from Sterman(2000) (6) i.e: step 1: problem articulation, step 2: dynamic hypothesis, step 3: formulation, step 4: testing, step 5: policy formulation and evaluation. The five stages are described in the flowchart as follows

2.4 Validation

The results from the simulation will be validated to ensure that the model created can really describe the real system condition, validation system using two way of testing that is model validation with statistical test of mean comparison or validation model with comparison test of amplitude variation or % error variance (10):

a. Mean Comparison

$$\boldsymbol{E1} = \frac{|\bar{S}-\bar{A}|}{\bar{A}} \qquad (1)$$

Where :

$\bar{S}$ = **average of data simulasi**

$\bar{A}$ = **average of real data**

Model valid if $\boldsymbol{E1} \leq \mathbf{5}$ %

ISBN : 978-602-99806-3-9

% error variance

$$E2 = \frac{|Ss - Sa|}{Sa} \quad (2)$$

Where :
Ss = Standart Deviation Model
Sa = Standart Deviation Data
Model valid if $E2 \leq 30$ %
The model are considered valid when $E1 \leq 5$ % and $E2 \leq 30$ %.

Fig.3 Methodology using system dynamics (7),

3. RESULTS

In this section will be discussed about result causal loop/causatic diagram, stock-flow diagram and stock-flow diagram with scenario, validation model.

3.1 Causal Loop Diagram

Causal loops are used as translating each variable that affects production, productivity and harvested area on soybean commodities, in the causal loop, the variable described must have a relationship or affect each other to that variable and have feedback on the existing system (11). Soybean production is influenced by productivity and harvest area, the causal loop diagram is used to perform the simulation using systems dynamic approach by the visible components (12).

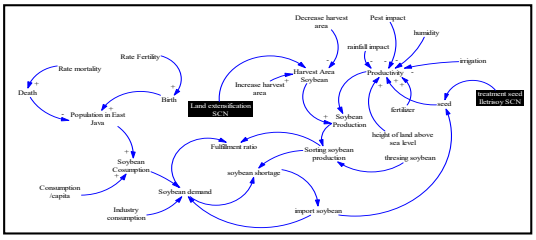


Fig.4 Causal loop diagram

ISBN : 978-602-99806-3-9

3.2 Stock Flow Diagram Base Model

Base model is the model as used for the initial model to do validation of model. The variables of production are influenced by land area and productivity, whereas productivity and land area have an increase and decrease caused by certain factors. Figure 5 are a stock flow diagram of production, productivity and harvest area soybean.

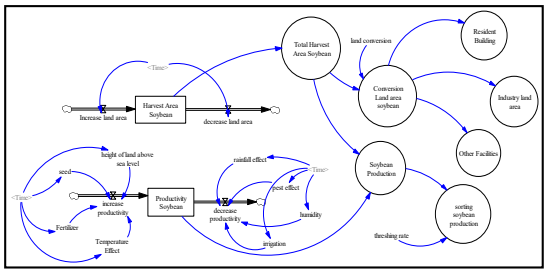


Fig.5 Stock flow diagram of production, productivity and harvest area soybean

In figure 6, displayed graph about harvest area, productivity and production soybean. Overall, it can be said that the harvest area decline while the productivity increase, in another side, there is a relationship between harvest area with production, harvested area increase or decrease then the production follows the down. Productivity land in East Java is stable in well condition, but the harvest area conversion, make land area reduce.

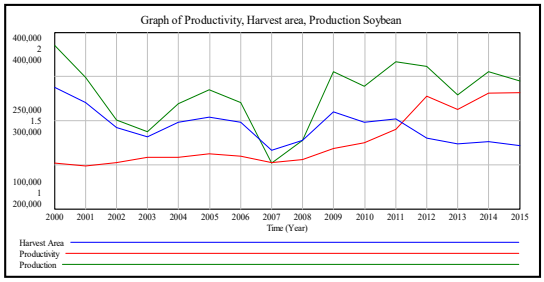


Fig.6 Graph of Productivity, Harvest Area and Production Soybean

3.3 Validation Model

Modelling validation in this paper using 2 methods, first, the model validation with statistical mean comparison and using error variance (10).

Table 1 Validation production model

Year	Production data	Simulation data
2000	385212	385361
2001	349188	349062
2002	300184	300403
2003	287205	287252
2004	318929	319147
2005	335106	335236
2006	320205	320298

ISBN : 978-602-99806-3-9

2007	252027	251940
2008	277281	277302
2009	355260	355264
2010	339491	339248
2011	366999	366837
2012	361986	361659
2013	329461	329165
2014	355464	355151
2015	344998	344618
Mean	351933	351863
Standart Deviasi	35809.1	35750.11

E1 = (|(351933-351863)| : 351863) = 0.000199
E2 = (|(35809.1-35750.11)| : 35750.11) = 0.00165

$\boldsymbol{E1 \leq 5}$ % → 0.000199 x 100% = 0.0199
$\boldsymbol{E2 \leq 30}$ % → 0.00165 x 100% = 0.165
This model valid because $\boldsymbol{E1 \leq 5}$ % and $\boldsymbol{E2 \leq 30}$ %.

3.4 Stock Flow with Scenario

The scenario using in this research are expansion of land area and seed treatment. The Ministry of Agriculture will add 500,000 hectares to expansion of planting area (Perluasan Area Tanam(PAT)) (13), and the second, using seed treatment (14). Based on the description, the sub-model on expansion of planting area (PAT) and seed treatment then added in model for period 2016 to 2025 (Figure 7). The results from model development using scenarios of land expansion and seed treatment scenarios are increasing productivity and production soybean.

Production soybean at 2015 is 344,618 Ton, after using scenarios at 2016 is 1,205,242 Ton, productivity at 2016 increase amount 1.7 Ton/ha, and harvest area subsequent to PAT is 707,991 hectares(ha)(**appendix A** of the scenario summary and **appendix B** on data comparison).

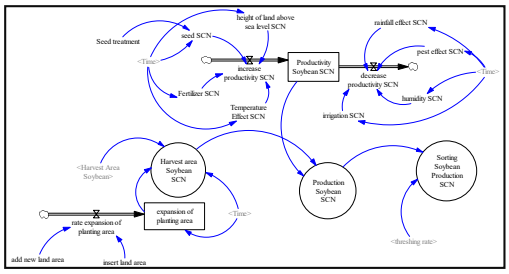


Fig.7 Modelling Scenario With Expansion Of Planting Area And Seed Treatment

4. CONCLUSION

Based on the results of the analysis and development of the model it can be concluded:

a. In the case of model development using system dynamic approach, it needs deep understanding and information about current conditions, based on the validation in development of model then the model in this research is valid.
b. The addition in expansion of land area and seed treatment in the scenario shows a decrease in soybean shortage, but this scenario can increase the production, harvest area and productivity soybean crops.
c. In this research successfully develop productivity model with adding variable irrigation,

ISBN : 978-602-99806-3-9

humidity, seed, rainfall, fertilizer, pest, temperature and height of land above sea level. Production variable influenced by productivity and harvest area. Whereas, ratio fulfilment indicates a correlation between production and harvested area.

The suggestion for further research are model of market price stability based on demand and supply with consider inflation and deflation, and models of logistics using system dynamics approach.

5. REFERENCES

[1] Ministry of Agriculture RoI. Ministry of Agriculture. [Online]. [cited 2017 04 11. Available from: HYPERLINK "http://aplikasi.pertanian.go.id/bdsp" http://aplikasi.pertanian.go.id/bdsp
[2] Ferraro DO, Rivero DE, Ghersa CM. An analysis of the factors that influence sugarcane yield in Northern Argentina using classification and regression trees. Field Crops Research. 2009, p. 149–157.
[3] Efendi PML, Alla A. Impact of Road and Infrastructure Development Other Economic Variables To Wide Field Land In Java Economic Corridor. Jurnal Agribisnis Indonesia, 2(1), 2014, p. 21-32.
[4] Ellis R. N., Basford KE, Cooper M, Leslie JK, Byth DE. A methodology for analysis of sugarcane productivity trends 1. Analysis across districts. Journal Agriculture, 2000, p. 1001–1009.
[5] Kelton W. D., Simulation with Arena second edition: McGraw-Hill Companie, inc; 1998.
[6] Sterman J. D., Business Dynamics Systems Thinking and Modeling for a Complex World: McGraw-Hill Companie, inc., 2000.
[7] Suryani E., Simulation and Modelling Jogja: Graha Ilmu, 2005.
[8] Forrester J. W., System Dynamics: The Foundation Under Systems Thinking. System Dynamic. 2010, D-402.
[9] Leaf J., DynSysMod: A Framework for Modeling Composite Dynamic Systems. TCSS 702: Design Project Final Report. tacoma; 2007. Report No.: https://www.tacoma.uw.edu/sites/default/files/global/documents/institute_tech/jleaf.pdf.
[10] Barlas Y., Multiple tests for validation of system dynamics type of simulation models. European Journal of Operational Research. 42, 1989, p. 59-87.
[11] Campuzano FaM. Supply Chain Simulation. Springer-Verlag, London. 2011, p. DOI: 10.1007/978-0-85729-719-8_4.
[12] putra ab, Suryani e. Scenarios Policies In Sugar Industry To Increase Availability Of Sugar Market Using System Dynamics Approach. OAJIS-SISFO ITS. 5(1), 2014, pp. 51-61.
[13] Putra A. B., Nugroho B., Forecasting of Soybean Production Using System Dynamics Approach. Jurnal Sistem Informasi dan Bisnis Cerdas (SIBC), ISSN: 2087-0639. 2016, p. 63-76.
[14] Mustikawati D. R., Mulyanti N, Endriani. Response of Biofertilizer of Iletrisoy on Growth and Yield of Soybean. In Prosiding Seminar Nasional Swasembada Pangan, ISBN: 978-602-70530-2-1, Politeknik Negeri Lampung. 2015, p. 213-219.

ISBN : 978-602-99806-3-9

Appendix A

Resume Scenario

Scenario	Explanation	Result
Scenario: expansion of land area and seed treatment	**Before using scenario**	1. Harvest area at 2015 is 207,852 Ha 2. Production at 2015 reach is 344,168 Ton 3. Soybean shortage reach is minus 426,765 Ton
	After using scenario	1. The harvest area after apply PAT scenario at 2016 (add 500,000 Ha) reach 707, 991 Ha and then, in the final period of the simulation (2025) is 709,248 Ha 2. Production soybean at 2016 is 1,206,243 Ton and in the final period of the simulation (2025) is 1,531,111 Ton. 3. Production Soybean shortage reach is minus 377,234 Ton

Appendix B

Data comparison of harvest area and production before and after scenario applied

Tahun	Harvest Area (Ha)	Harvest Area Scenario PAT (Ha)	Produksi Kedelai (Ton)	Produksi Kedelai Skenario PAT (Ton)	Kekurangan (-) atau Surplus (+)
2000	306,328		385,361		-374,928
2001	280,596		349,062		-380,568
2002	238,226		300,403		-387,131
2003	222,503		287,252		-391,170
2004	247,018		319,147		-391,990
2005	255,516		335,236		-393,981
2006	246,573		320,298		-398,240
2007	199,477		251,940		-406,380
2008	216,812		277,302		-407,808
2009	264,727		355,264		-405,484
2010	246,726		339,248		-409,963
2011	252,643		366,837		-411,339
2012	220,658		361,659		-415,111
2013	210,464		329,165		-420,888
2014	214,723		355,151		-422,492
2015	207,852		344,618		-426,765
2016		707,991		1,205,243	-368,268
2017		708,130		1,237,720	-369,423
2018		708,270		1,271,072	-370,543
2019		708,409		1,305,324	-371,624
2020		708,549		1,340,498	-372,667
2021		708,689		1,376,620	-373,669
2022		708,828		1,413,716	-374,628
2023		708,968		1,451,812	-375,543
2024		709,108		1,490,934	-376,412
2025		709,248		1,531,111	-377,234

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

It balanced scorecard method for performance measurement of information system technology unit in regional water company of Surabaya City

*** Faisal Muttaqin, Firza Prima Aditiawan, Fetty Tri Anggraeny and Try Khurniawati**
Faculty of Computer Science, Universitas Pembangunan Nasional Veteran Jawa Timur, Indonesia

ABSTRACT: The Process of measuring the performance of IT division unit in the company is a very important thing for the progress of the company. This research discusses about IT balanced scorecard method for performance measurement of information system technology unit in Regional Water Company (PDAM)Surabaya city. The purpose of this study is to performance measurement of information system technology unit to assess the extent to which the information system technology unit in contributing to PDAM Surabaya city. IT balance scorecard is a method for measuring performance of IT owned by a company, which will be measured with four perspectives. The first is the company contribution perspective, the second is the user orientation perspective, the third is the operational excellence perspective and the fourth is the future orientation perspective. After doing research on information system technology unit in PDAM Surabaya city using IT balanced scorecard get value that is for company contribution perspective is 78.80%, user orientation perspective get value 79.20%, operational excellence perspective get value 75.80% and future orientation perspective get value 75.80%. From these results, the value obtained by the information system technology unit in PDAM Surabaya city is categorized well.

Keywords: IT Performance Measurement, IT Balanced Scorecard, Information Systems Technology

1. INTRODUCTION

Balance Scorecard method was introduced by Kaplan and Norton [1], [2], has been successfully implemented into various areas such as manufacturing companies, government units, nonprofit companies, service organizations and other industries around the world [3], [4], [5], [6]. According to [7], Balance Scorecard (BSC) can help organizations achieve better results when compared to traditional performance measurement systems. Balance scorecards are adopted by companies around the world to implement corporate strategy, so it can be considered as a bridge to implement sustainability strategies and link the company's sustainability goals with actions and performance results [8].

The Balanced Scorecard (BSC) is one of the most important and widely applied methods of performance measurement, and especially the use of recently developed IT governance makes it an attractive tool for measuring and evaluating IT contribution to corporate performance [9]. Balance scorecard (BSC), originally developed by Kaplan and Norton, is a performance management system that enables companies to drive strategies based on measurement and follow-through. IT BSC is becoming a popular tool with widely supported concepts and spread by international consulting groups such as Gartner Group, Renaissance Systems, Nolan Norton Institute, and others [10].

According to Wati and Coo [11] introduce the Green IT Balanced Scorecard by incorporating an

ISBN : 978-602-99806-3-9

environmental aspect of technology into the scorecard measurement method. We conceptualized the Green IT balanced scorecard as "a nomological management tool to systematically align IT strategy with business strategy from an environmental sustainability perspective in order to achieve competitive advantage". The objectives of the Green IT balanced scorecard include the measurement of technology performance via the effective integration of environmental aspects, the investigation of both tangible and intangible assets of Green IT investment, the alignment of IT performance and business performance, and the transformation of the results into competitive advantage. This concept offers a new possibility for both practitioners and researchers to translate their sustainable business strategies into Green IT actions.

Van Der Zee and De Jong [12], for instance, explored the ways of integrating business and IT management by examining two cases of building a corporate Balanced Scorecard. They argued that the Balanced Scorecard offers two unique benefits to the alignment process in contrast to traditional methods. First, business and IT management can use the same "performance measurement" language, enabling discussions on what IT can do to support business performance. Second, IT can be managed using an integrated planning and evaluation cycle as other business processes.

Balanced Scorecard (BSC) is a discipline that has considerably evolved in recent years and is the most widely accepted discipline in organizations when deploying a balanced strategy and, subsequently, monitoring the evolution of change and its deviations. Moreover, in recent years interesting methodologies, techniques and models which have brought IT to business, as is the case of version 3 of ITIL and its philosophy based on the life cycle of IT services, have appeared. All these ideas have affected IT governance and, consequently, IT Strategic Planning process, one of its most important processes, and its deployment through Balanced Scorecard oriented to IT (IT BSC) [13].

High levels of investment in IT and related products and services over the last two decades have produced only mixed results. Research has shown that one of the most significant determinants of successful IT investment is the alignment between IT and the competitive strategies of a firm. Yet, it is largely unclear to both researchers and practitioners how to achieve such alignment in a complex business environment. In this paper, using the IT alignment model of Reich and Benbasat [14] as the underlying theory, we present the preliminary findings of a case study on how one company used a well established strategic management tool, the Balanced Scorecard, as the framework for aligning its IT initiatives with business strategies, that resulted in financial success for the company [15].

According to [16] many companies use Balanced Scorecard but for it to be really successful from an IT perspective, there must be alignment with IT. The Enterprise IT Balanced Scorecard version must be created and both of these should be broken down into business unit level or some other appropriate low level. Action should be defined at every level. In this way, the whole enterprise can pull together in the same direction to achieve its business purpose. We focus on how AstraZeneca has implemented its business and IT strategy and the scorecards they have defined to follow and measure progress.

Performance measurement is an important factor for the current and future organizational environment and current performance appraisal methods that are only seen from financial performance still have weaknesses, then effective performance measurement should be able to translate the mission, vision and organizational strategy into the measurement of financial performance as well as non-financial [17].

The IT Balanced Scorecard will measure IT performance from four perspectives. The first perspective is a corporate contribution that shows how the management (leadership) assesses or sees the IT organization. The second perspective is customer orientation, to know the results of IT performance based on the way users view or see the results of IT organizations. The third perspective is operational excellence which contains measures of effectiveness and efficiency of IT processes. While the fourth perspective is the future orientation that contains the measures that describe how IT positions in the future challenges. Thus IT Balanced Scorecard is very well used to formulate strategic targets IT support the strategic objectives of the company and measure the performance of IT comprehensively [18].

Regional Water Company (PDAM) Surya Sembada Surabaya is one of Surabaya City

ISBN : 978-602-99806-3-9

Government-owned companies, located on Jalan Mayjen Prof. Dr. Moestopo 2 Surabaya. PDAM Surabaya City has a main business in the provision of drinking water for the people of Surabaya. PDAM Surabaya City has been serious to implement Information technology in the environment in order to position itself as a world-class company in providing service to customers. Support from all levels of PDAM to collaborate and participate in realizing the sustainability and success demanded in PDAM vision and mission is a requirement to meet the goals and objectives to be achieved PDAM Surabaya City.

Based on the results of interviews with [19] found the problem that is in the management of human resources existing in the TSI Unit (Information Systems Technology) has not been managed properly because of the qualifications or skills of IT from Human Resources TSI Unit available is not enough to support business processes in the TSI Unit. So far, PDAM Surabaya City has not yet measured the performance of TSI Unit to assess how the contribution made by TSI Unit to the company. With the existence of these problems it is necessary that the measurement of IT performance on the TSI Unit using IT Balanced Scorecard so that later can know the extent to which the contribution of TSI performance to PDAM Surabaya City.

2. METHODS

The following is the research flow used to measure the performance of IT in PDAM Surabaya city, can been seen in figure 1.

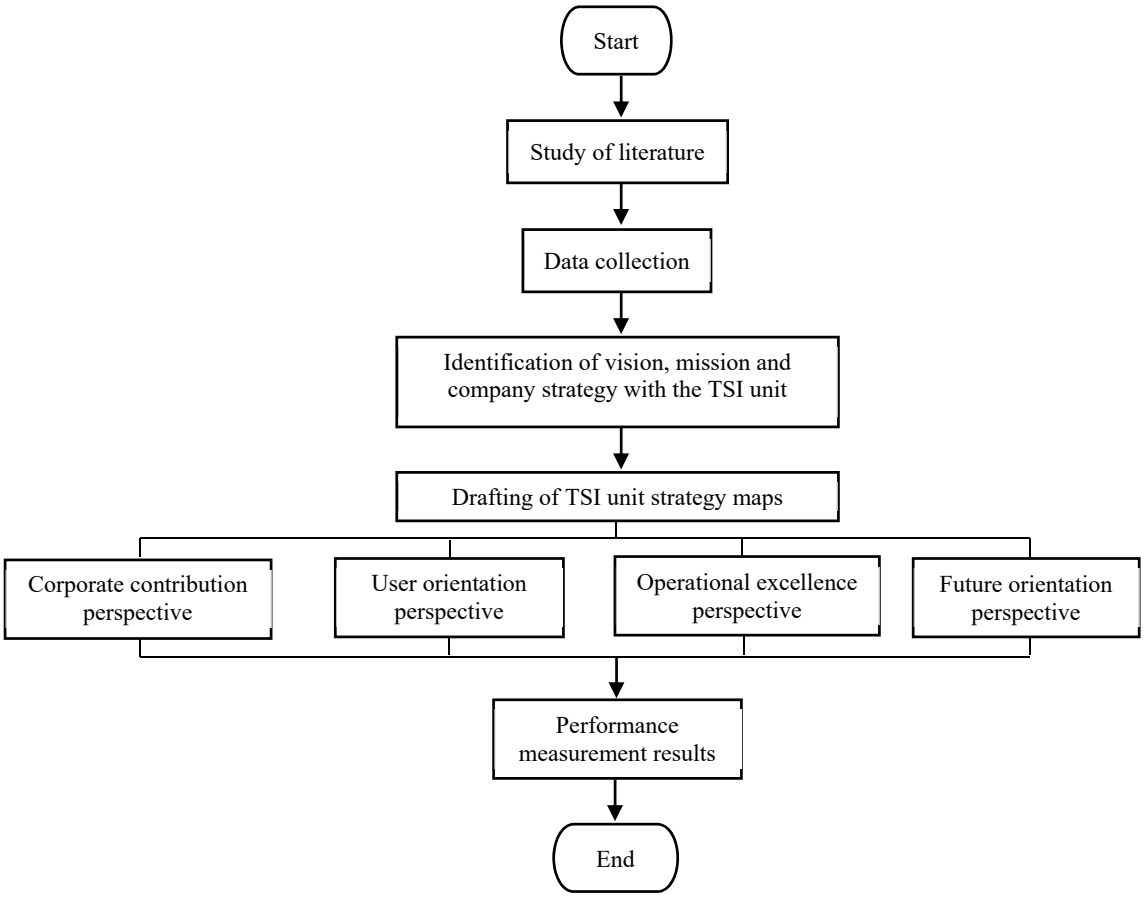


Fig. 1 Research Stages

2.1. Study of Literature

At this stage of the literature study is looking for information and references in the form of text

ISBN : 978-602-99806-3-9

books, literature, articles, journals and information from the internet and other sources related to this research.

2.2. Data Collection

At this stage the data obtained comes from the primary data and secondary data. For primary data, data collection techniques were conducted with interviews and field observations and questionnaires. While for secondary data obtained from various reports and publications relevant to the research.

2.3. Identification of Vision, Mission and Company Strategy with the Tsi Unit.

At this stage the process identification of the company's vision, mission, and strategy with the unit of information systems technology that aims to see how the relevance of the division with the company.

2.4. Preparation of TSI Unit Strategy Map

At this stage will be the compilation of strategic information technology unit map based on the strategy that has been done by information technology unit.

2.5. Identification of KPI (Key Performance Indicator)

At this stage will determine the strategic objectives based on interviews with TSI Unit manager and determine the targets to be achieved on each KPI based on interviews with Information Systems Technology manager and determine the number of performance or realization conducted by the organization based on the results of the questionnaire.

2.6. Corporate Contribution Perspective

At this stage the authors define strategic targets for the perspective of the company's contribution IT cost control and measuring the business value of information technology system investment in the organization.

2.7. User Orientation Perspective

At this stage an evaluation is performed on information technology users. The focus of this perspective is how the end user's view of the IT division is corporate customers and internal users (company employees) aimed at ensuring user satisfaction.

2.8. Operational Excellence Perspective

At this stage will be the process of measuring information technology that produces and develops applications and focuses on the measurement and progress of the two main processes of information systems technology units, namely the development of information systems and computer operations.

2.9. Future Orientation Perspective

At this stage, will be measured against information technology system personnel and information technology personnel expertise and perform an evaluation process that focuses on the mastery of information technology systems both in terms of technology and individuals who use it.

2.10. Performance Measurement Results

This stage will get performance measurement results by assessing the target weight, current

ISBN : 978-602-99806-3-9

conditions and achievement of the four perspectives that exist in IT Balanced Scorecard. With the result of measurement performance of unit of information system technology hence will know each percentage of four perspectives that exist in IT Balanced Scorecard.

3. RESULT AND DISCUSSION

There are several steps in completing this research include:

3.1. Identify the Company's Vision, Mission and Strategy with the TSI Unit

3.1.1. Vision of Surabaya City Drinking Water Company:

The availability of sufficient drinking water for customers through an independent, global, and best water supply company in Indonesia.

3.1.2. Mission of Drinking Water Company of Surabaya City:

- Producing and distributing drinking water for customers.
- Providing excellent customer service and sustainable for the stakeholders.
- Do other business for the company's progress and actively participate in social activities.

3.1.3. Strategy of Regional Water Company of Surabaya City:

- Improve customer service that includes quality, quantity, and continuity.
- Looking for better sources of raw water in terms of quality and quantity.
- Maintain, build on the existing drinking water supply system infrastructure, suitable for customers and technological developments.
- Build Soft Skill capabilities in the construction of water supply system which includes installation, transmission, distribution, quality laboratory, customer service.
- Making a professional and independent company in professional management.

3.1.4. Vision Unit Information Technology System:

Making Information Technology as the company's advantage in customer service. In an effort to support the vision of Regional Water Company of Surabaya City.

3.1.5. Mission Unit of Information System Technology:

- Use the right and current IT to improve customer service.
- Utilizing IT as an added value for the company.
- Perform maintenance and development of IT tools to support management policies.
- Utilizing the competitive advantage of IT to make PDAM Surabaya become the best PDAM in its class.
- Creating a conducive and dynamic working environment for all personnel of information systems technology unit.

3.1.6. Information Systems Technology Unit Strategy:

- Improved data quality and data integration that is complete, accurate, timely and valid.
- Improved quality of IT infrastructure and reliable communications.
- Improved accessibility of data and information to users.
- Increased competence of human resources for IT knowledge.

Based on the strategies owned by the information technology unit that supports the company's

ISBN : 978-602-99806-3-9

strategy in achieving the company's vision, the strategy within the information technology unit can then be mapped into the perspective of the IT Balanced Scorecard that is the company's contribution perspective, operational excellence, user orientation and future orientation. For the results of the mapping can be seen in table 1.

Table 1. Mapping the TSI Unit Strategy to the BSC IT perspective

IT Balance Scorecard perspective	Strategy
Corporate Contributions	Improved data quality and data integration that is complete, accurate, timely and valid.
Operational Excellence	Improved quality of IT infrastructure and reliable communications.
User Orientation	Increased accessibility of data and information to users.
Future Orientation	Increased competence of human resources will IT knowledge.

3.2. Preparation of TSI Unit Strategy Map

In the information technology unit strategy map, every element of each perspective perceives relationships that are related to each other. Each cause and effect relationship between the elements in each perspective are positively correlated to the achievement of information technology unit contribution to PDAM Surabaya City. For the result of strategic map of TSI unit can be seen in figure 2.

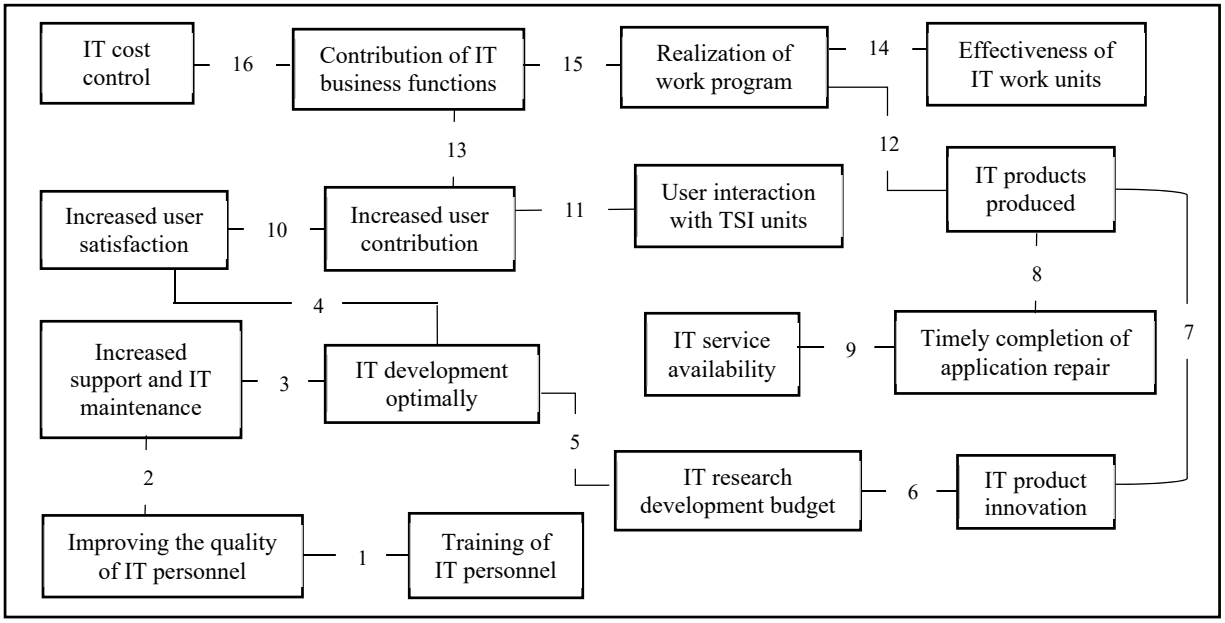


Fig 2. Strategy Map of Information System Technology Unit

3.3. Identification Key Performance Indicator (KPI)

After Preparation of corporate strategy map is completed, then the next step is to determine the Key Performance Indicator (KPI) for each strategic target on the TSI Unit. Based on it balanced scorecard perspective there are already some examples of objectives to determine key performance indicators to achieve the success of the company. In table 2 is the KPI that will be used to perform

ISBN : 978-602-99806-3-9

IT performance measurement of TSI units in PDAM Surabaya City:

Table 2. KPI in perspective IT Balance Scorecard

Corporate contribution perspective	User orientation perspective
IT cost control	User satisfaction
Contribution of IT business functions	User contributions
Realization of work program	User interaction with TSI units
The effectiveness of IT work units	IT products produced
Operational excellence perspective	**Future orientation perspective**
Level support and IT maintenance	Quality IT personnel
Development IT optimally	Training IT personnel
Availability IT services	Budget development IT research
Completion application repairs on time	IT Product Innovation

3.4. IT Performance Measurement Based on IT Balanced Scorecard

IT performance measurement based on IT Balanced Scorecard is done by division of questionnaire according to perspective in IT Balanced Scorecard that is company contribution perspective, operational excellence perspective, user orientation perspective and future orientation perspective. The questionnaire is given to the Information Systems Technology Unit and is filled in accordance with the conditions of the actual work unit condition. For the number of questionnaires given are as many employees who are in PDAM System Information System Unit Surabaya City. Then do the calculation to get the final value of each indicator. The calculation used using Likert scale to get the percentage value based on the result of the questionnaire. The questionnaire provided contains 16 questions in accordance with each indicator in the IT Balanced Scorecard. After the measurement is obtained results for Unit of information systems technology in PDAM Surabaya city that can be seen in table 3.

Table 3. Total Value of Balanced Scorecard in TSI Unit of PDAM Surabaya

Perspective	Performance
Corporate contribution perspective	78,80 %
User orientation perspective	79,20 %
Operational excellence perspective	75,80 %
Future orientation perspective	75,80 %
Total Performance	77,40%

Explanation:

- Results 76% - 100% categorized as good
- Results 51% - 75% categorized quite well
- Results 25% - 50% categorized as unfavorable

Based on table 3 shows that the performance appraisal results in the corporate contribution perspective to get a value of 78.80%, so for this criterion can be categorized well. While the results of performance appraisal in the user orientation perspective get the value of 79.20%, so for this criterion can also be categorized well. Next to the results of performance appraisal in the operational excellence perspective get the value of 75.80%, so for this criterion can be categorized well. And the last is for the results of performance assessment in the future orientation perspective shows the value of 75.80%, so for this criterion can be categorized well also for the results.

ISBN : 978-602-99806-3-9

4. CONCLUSION

Based on the result of measurement of performance of Information Technology System Unit at Municipal Water Company of Surabaya City, it can be concluded that in four assessments perspective that have been done to get the average value of 77.40% so that for the criteria can be categorized well. But for the two perspectives that exist is the operational excellence perspective and future orientation perspective needs to be improved again because it still get the value of 75.80, So it needs to be improved again the performance of Information Systems Technology Unit at Surabaya Regional Water Company to further develop and improve the performance of TSI Unit in the future.

5. ACKNOWLEDGMENT

The authors gratefully acknowledge to Informatics Engineering, Faculty of Computer Science, Universitas Pembangunan Nasional Veteran Jawa Timur.

6. REFERENCES

[1] Kaplan R. S. and Norton D. P., "The balance scorecard – measures that drive performance," *Harvard Business Review,* vol. 70, no. 1, pp. 71-79, 1992.

[2] Kaplan R. S. and Norton D. P., "Using the balance scorecard as a strategic management system," *Harvard Business Review,* vol. 74, no. 1, pp. 75-85, 1996.

[3] Said A. A., HassabElnaby H. R. and Wier B., "An empirical investigation of the performance consequences of nonfinancial measures," *Journal of ManagementAccounting Research,* no. 15, pp. 193-223, 2003.

[4] Banker R. D., Chang H. and Pizzini M. J., "The balanced scorecard: Judgmental effects of performance measures linked to strategy," *Accounting Review,* vol. 79, no. 1, pp. 1-23, 2004.

[5] Zopiatis A., "Is it art or science? Chef's competencies for success.," *International Journal of Hospitality Management,* vol. 29, no. 1, pp. 459-467, 2010.

[6] Kartalis N., Valentzas J. and Broni G., "Balance Scorecard and Performance Measurement in a Greek Industry," *Procedia Economics and Finance,* vol. 5, no. 1, pp. 413-422, 2013.

[7] Andra G. and Robert N., "Entrepreneurs use a Balanced Scorecard to translate strategy into performance measures," *Journal of Small Business Management,* vol. 44, pp. 407- 425, 2006.

[8] Kalender Z. T. and Vayvay O., "The Fifth Pillar of the Balanced Scorecard: Sustainability," *Procedia Social and Behavioural Sciences,* no. 1, pp. 76-83, 2016.

[9] Blumenberg S. A. and Hinz D. J., "Enhancing the Prognostic Power of IT Balanced Scorecards with Bayesian Belief Networks," in *Hawaii International Conference on System Sciences*, Hawaii, 2006.

[10] Grembergen W. V., Saull R. and Haes S. D., "Linking the IT Balanced Scorecard to the Business Objectives at a Major Canadian Financial group," *Journal of Information Technology Case and Application Research,* vol. 5, no. 1, p. 23, 2003.

[11] Wati Y. and Koo C., "An Introduction to the Green IT Balanced Scorecard as a Strategic IT Management System," in *Proceedings of the 44th Hawaii International Conference on System Sciences*, Hawaii, 2011.

[12] Van Der Zee J. and Jong B. D., "Alignment Is Not Enough: Integrating Business and Information Technology Management with the Balanced Business Scorecard," *Journal of Management Information Systems,* vol. 16, no. 2, pp. 137-156, 1999.

[13] Marcos A. F., Rouyet J. I. and Bosch A., "An IT Balance Scorecard Design under Service Management Philosophy," in *Hawaii International Conference on System Sciences*, Hawaii, 2012.

ISBN : 978-602-99806-3-9

[14] Reich B. H. and Benbasat I., "Factors That Influence the Social Dimension of Alignment Between Business and Information Technology Objectives," *MIS Quarterly,* vol. 24, no. 1, pp. 81-113, 2000.

[15] Hu Q. and Huang C. D., "Aligning IT with Firm Business Strategies Using the Balance Scorecard System," in *Proceedings of the 38th Hawaii International Conference on System Sciences*, Hawaii, 2005.

[16] Bricknall R., Darrell G., Nilsson H. and Pessi K., "Aligning IT Strategy with Business Strategy through the Balanced Scorecard in a multinational pharmaceutical company," in *Proceedings of the 40th Hawaii International Conference on System Sciences*, Hawaii, 2007.

[17] Gaspersz V., Integrated Performance Management System Balanced Scorecard with Six Sigma For Business and Governance Organizations, Jakarta: PT. Gramedia Pustaka Umum, 2003.

[18] Arofah N. S. and Nisafani A. S., "Preparation of IT Balanced Scorecard For Performance Measurement IT Division At PT. Pertamina UPMS V Surabaya," *JURNAL TEKNIK POMITS* , vol. 1, no. 2, pp. 1-9, 2012.

[19] S. P., Interviewee, *Scope of PDAM (Unit TSI).* [Interview]. 2 Februari 2017.

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

Measurement maturity level of business Alignment and it (case study: University of Kartini Surabaya)

*Mohammad Idhom[1], Akhmad Fauzi[2]
[1,2] Computer Science Department, Universitas Pembangunan Nasional Veteran Jawa Timur, Indonesia

Abstract. Information Technology (IT) and business is one that we can use to get more profit from the system that is running. Information and business technology has also been utilized in education. Therefore, the authors aim to measure the maturity level of alignment of information technology and business that exist in Kartini University Surabaya to know the deeper conditions about the implementation of business alignment and information technology. The method used is Luftman method by conducting interviews with units and IT business Based on 6 criteria of maturity and alignment of IT and business. Based on the assessment of the completeness of alignment between IT with business Kartini University Surabaya is at level 2 of the Committed Process. It describes the commitment by organizations to achieve harmony between business and IT. Therefore, training needs to be improved so that the proposed strategy can be applied optimally so as to realize the harmony between top management's desire in achieving business objectives and understanding of business units and IT in order to realize business objectives

Keywords: Preprocessing, Face Recognition, Symmetrical Face, Regression Classification

1. INTRODUCTION

Another perspective put forward by Brokers (2003) in Wachid (2004) colleges is classified into the quasi-commercial industry, meaning besides providing educational services to the public, the universities also apply commercial industry management principles to obtain funding as a supporter of their livelihood. Various characteristics of universities as mentioned above, making Information Technology is very important [1].

Referring to the role of IT in the world of education is so complex of course at this time not only as support, but also as an enabler for the running of the business wheel of the organization. Many organizations that have not been able to utilize IT, some are already utilizing but not well targeted and not in line with the organization's existing business strategy. The failure of the Implementation of Information Technology (IT) in the Business Process of higher education is not due to technical factors but rather to non-technical issues (human factors, processes and work organization.

Defines business processes as measurable and structured activities to produce certain outputs for particular customers. There is a strong emphasis on "how" the work is run in an organization, unlike the focus of a product that focuses on the "what" aspect. A process is therefore a specific sequence of work activities across time and space, with a prefix and suffix, and clearly defining inputs and outputs. The definition of [2] can be considered a derivative of the Davenport definition. They define a business process as a collection of activities that require one or more inputs and produce a useful / valuable output for the customer. [3]

ISBN : 978-602-99806-3-9

SAMM (Strategic Alignment Maturity Model) is the right model to measure the success of alignment between Business and IT. The SAMM model was first introduced by Luftman since 2000 focusing on companies. This model has been adopted to measure violence or is often cited in Google's search engine [4]

This alignment model is recognized by scholars and practitioners as are becoming models that continue to be developed in their research by considering the various dimensions of business-IT maturity i.e. Communication, Competence / Value Measurement, Governance, Relationship, Scope and Architecture, and Skills that are scalable into 38 criteria items. [5] [6] [7] [8] [9]

Currently, University of Kartini IT development is in a passive state, and also there has been no significant development from before. As an example of IT systems that support web profile and academic information system (SIAMIK) which currently cannot be used and still in the development process that resulted in information from the campus for now cannot be accessed online by students, from the business side until now also still in the same conditions as before that there has been no significant development.

This study aims to determine the deeper conditions about the application of business alignment and information technology and some things that become level-level factors also along with other supporting factors at the University of Kartini this afterwards can increase the level of information technology alignment and business strategy for better at the University of Kartini by using Luftman method.

2. METHODOLOGY

Alignment of Strategy

The alignment of strategy between business and IT strategy is demonstrated through a mutually supportive two-way relationship. The alignment between business strategy and IT will lead the organization to realize the benefits of IT investment in order to create a sustainable business competitive advantage. As a note, in the context of this research, on the topic of alignment of business and IT strategies, the terms SI (Information Systems) and IT (Information Technology) will be considered the same, albeit essentially different.

Luftman Method

The Luftman method is a model of aligning the IT strategy with the business strategy, this model is a model of the alignment of the two strategies whose results can be proved true and accountable scientifically. To achieve the best way to achieve harmonization in accordance with the organization's business objectives requires the right strategy.

The importance of measurement is done so that after the maturity level is known top management can improve the alignment of IT and business to the next level. For example, when measured by the Luftman model it is known that the level of business-IT maturity maturity of a higher education institution is worth 2, then the institution will be able to increase the level of business-IT alignment maturity to level 3 with reference to the components of small value that must fixed. Luftman's IT-Business Alignment Maturity provides a maturity alignment measurement framework between business strategy and IT strategy. Luftman's business and IT alignment model focuses on corporate activities to achieve cohesive goals through IT managing units as a technical unit and business unit as a functional enterprise.

SAM (*Strategic Alignment Model*)

The concept of the Strategic Alignment Model has the basis of two assumptions. The first assumption of economic performance is directly related to management's ability to create strategic fit between the company's position in the competitive market and the design of a fixed administrative structure, to support the decisions taken. The second assumption is that the fit of strategy (strategic fit) in reality is always dynamic.

ISBN : 978-602-99806-3-9

Strategic Alignment Model (SAM) consists of four domains. Each domain consists of three components. Total SAM has 12 components that work together to determine the extent to which the level of IT strategy alignment with business strategy. The alignment model is divided into two areas, business and IT.Each area has two quadrants that define that part of the business.

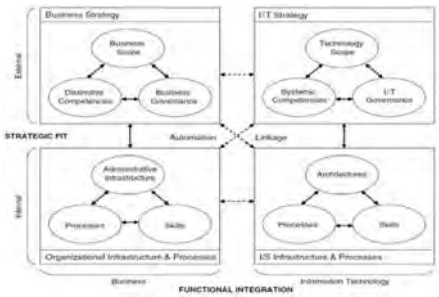


Fig. 1 SAM Model

For governance of the IT component it explains about building the authority, resources, risks and responsibilities undertaken to business partners, IT management and service providers. The process of selecting and prioritizing IT projects in business is part of this component [10].

IT- Business Alignment Maturity Criteria

The development of the Strategic Alignment Model (SAM) is the Strategic Alignment Maturity Model (SAMM) is a work framework for measuring the maturity level of bisis and IT alignment. revealed the criteria of maturity of a harmony consisting of 6 criteria as in the following figure [11] [12]. :

Fig.2 Alignment Maturity IT / IS

Maturity Criteria for Business and IT Alignment Maturity

MIS alignment and IT alignment maturity research model includes 5 levels of strategic alignment maturity, i.e. initial / ad hoc process, committed process, established focused process, improved / manage process, and optimized process.

ISBN : 978-602-99806-3-9

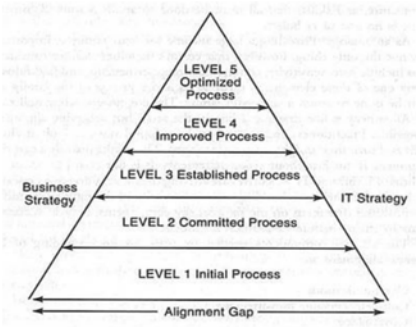


Fig 3. Alignment Maturity level IT/IS

Factors inhibiting and determining success of alignment IT / IS

Factors inhibiting alignment can be due to poor communication between business units and IT, then the absence of a decision from the organization to retain talented personnel within the company. The absence of exchanges between business staff and IT staff is also one cause of non-optimal alignment between business and IT.

Factor Enabler and Faktor Inhibitors (Luftman,1999)

Table 1 Enabler Factor and Inhibitors Factor

Enablers	*Inhibitors*
• Senior executive support for IT	• IT/business lacks close relationships
• IT involved in strategy development	• IT does not prioritize well
• IT understands the business	• IT fails to meet commitments
• Business–IT partnership	• IT does not understand business
• Well-prioritized IT projects	• Senior executives do not support IT
• IT demonstrates leadership	• IT management lacks leadership

Measurement of Maturity Level of Business Alignment and IT

Measurement of the maturity of alignment between IT strategy and business strategy by using Luftman method is done by spreading some queries which have been formulated by Luftman himself. This questionnaire will produce the data that will be analyzed by using Luftman method. Each answer of question in the questionnaire has value or point that is used to calculate the level of maturity of alignment between IT strategy and business strategy. Each answer has points from 1 to 5 which will be added and recorded.

In this chapter will be explained about the process of data collection and interview based on Luftman method which refers to the alignment of business and IT in University of Kartini Surabaya.

3. RESULTS AND DISCUSSION

IT / IS alignment measurement maturity step 1

At this stage, a questionnaire was collected which consisted of 6 criteria: communication maturity, competency / value measurement maturity, governance maturity, partnership maturity, scope and architecture maturity and skills maturity.

Questionnaires were filled based on questions asked to resource persons. After the filling then given the endorsement of the signature from the source. The first stage is completed then proceed with the second stage of writing a score for each answer of the questions posed through the questionnaire.

IT / IS alignment measurement maturity step 2

The next step is to write the score / value for each answer questionnaire given to each respondent / resource persons in tables 1 and 2 for each criterion in 2 resource persons.

ISBN : 978-602-99806-3-9

Average calculation activity of each category

Based on the answers of questions given to 2 resource persons on each criterion of maturity of business and IT alignment, then the measurement results obtained for each criteria of maturity of business and IT alignment.

The results of these measurements can be seen in the following table:

Table 2 Maturity level of business and IT alignment for each criterion

No	Criteria	Alignment Maturity Level
	Communication	2
2	*Competency/Value*	2
3	*Governance Maturity*	2
4	*Partnership Maturity*	2
5	*Scope and Architecture*	2
6	*Skills Maturity*	2

The above data is the result based on the measurement of maturity based on each Luftman criterion, it has been explained previously that the data obtained by asking the questioners answer the question in the questionnaire by choosing the right choice in accordance with existing conditions at the University of Kartini Surabaya.

The maturity of business and IT alignment

After obtaining the maturity of each criterion, the next step is to determine the maturity of the general alignment to determine the level of maturity owned by the University of Kartini. This measurement is done by finding the average value of the overall value of each criterion by using the calculation as below:

$$\textit{Maturity Level} = \frac{\textit{Level of maturity of each criterion}}{6}$$

Based on the above equation it can be determined the level of maturity of the alignment of information technology strategy to business strategy of Kartini University where the calculation as follows:

$$\textit{Maturity Level} = \frac{\textit{Level of maturity of each criterion}}{6}$$
$$= \frac{2+2+2+2+2+2}{6}$$
$$= \frac{12}{6}$$
$$= 2$$

To measure the maturity level of business maturity and alignment and IT, the value of each criterion is summed, once the value is added then divided by the number of resource persons. Each value that appears to be a decimal number is rounded down, this is done to define the conditions in the organization in accordance with the reality for the proposed strategy to increase the maturity of business and IT alignment effectively. If the decimal value is not rounded the proposed strategy can not overcome the shortcomings in the organization as a whole. Once the value is rounded down it is known

3. CONCLUSION

The results of the assessment of the maturity of alignment between IT strategy to business strategy of University of Kartini Surabaya is at level 2 of Committed Process. According to Luftman,

ISBN : 978-602-99806-3-9

Committed Process describes the commitment by organizations to achieve harmony between business and IT. The process actually has a pattern followed by all who do it, but there is no formal training and standard formulation procedures, and the implementation obligations are left to each section and rely heavily on the knowledge of each section / unit so that the consistency is low. From the result of maturity alignment analysis in the previous chapter it is proposed an improvement strategy to assist University of Kartini in improving the maturity of alignment of business strategy and IT to the next level of Established Focusses Process, Improved / Manage Process and Optimal Process. The strategy is formulated for the components

4. ACKNOWLEDGEMENTS

The authors thank the University of Pembangunan Nasional Veteran Jawa Timur, especially for informatics engineering and Computer Science Department for providing financial support for this Research.

5. REFERENCES

[1]. Brookes, M., 2003. *Higher Education*: Marketing in A Quasi-Commercial Service Industry. International Journal of Nonprofit and Voluntary Sector Marketing 8(2) 134-142.

[2]. Hammer, Michael and Champy, J. 1993. *Reengineering the Corporation:* A Manifesto for Business Revolution, Harper Business.

[3]. Davenport, T. 1993. *Process Innovation: Reengineering Work through Information Technology*. Harvard Business School Press, Boston.

[4]. Belfo, F.P., and Sousa, R.D. 2012. A Critical Review Of Luftman´S Instrument For Business-It Alignment, http://hdl.handle.net/1822/21917

[5]. Chan, Y, Huff, S, Barclay, W. and Copeland, D. 1997, *Business Strategy Orientation, Information Systems Orientation and Strategic Alignment*. Information Systems Research 8 (2) pp. 125-150.

[6]. Henderson, J and Venkatraman, N. 1999. *Strategic Alignment: Leveraging Information Technology for Transforming Organizations.* IBM Systems Journal, Vol 32, No. 1.

[7]. Sabherwal, R. and Chan, Y. 2001. *Alignment between Business and IS Strategies: A Study of Prospectors, Analyzers, and Defenders.* Information Systems Research, Vol 12 (1), pp 11 – 33.

[8]. Cragg, P., King, M. and Hassin, H. 2002. *IT Alignment and Firm Performance in Small Manufacturing Firms*. Strategic Information Systems, 11(2), pp. 109–132

[9]. Kearns, G; Lederer, A. 2000, *The Effect of Strategic Alignment on the use of Is-Based Resources for Competitive Advantage*, Journal of Strategic Information Systems, Vol 9 (4), ELSEVIER, p.p 265 – 293.

[10]. Papp, R. 1999. *Business-IT Alignment: Productivity Paradox Payoff?.* Industrial Management Data Systems Journal, Vol 99 (8), pp. 367–373.

[11]. Luftman, J., Bullen, C.V., Liao, D., Nash, E., Neumann, C. 2004. *Managing the Information Technology Resource – Leadership in the Information Age.* Pearson Education, Harlow.

[12]. Luftman, J., & Kempaiah, R. 2007. *An update on business-IT alignment*: "a line" has been drawn. MIS Quarterly Executive, 6(3), 165-177.

ISBN : 978-602-99806-3-9

Marketplace technology to reduce intervention of the horticulture trader in East Java

*** Sugiarto[1], Endang Yektiningsih[2], Kasirah[3]**

[1] Faculty Of Computer Science, Universitas Pembangunan Nasional Veteran Jawa Timur, Indonesia
[2] Faculty Of Agriculture, Universitas Pembangunan Nasional Veteran Jawa Timur, Indonesia
[3] Faculty Of Argricuture, Mayjen Sungkono University, Mojokerto, Indonesia

ABSTRACT: Agricultural products in Indonesia began to show an increase in the eastern Java region, farmers currently continues to attempt to fix the results of the farm, it is not in accordance with the sales process advancing results, the value of selling agricultural products directly sold to end consumers by farmers is still relatively small, this is caused by the still large number of trader in Indonesia, especially the eastern Java, the value of purchases from a wholesaler is relatively low in value compared to the farmers directly sell to the end consumer, so there are still many relic in East Java farmers feel that the value of the sale of the agricultural harvest this small ratio was still regarded with real production value. Information technology is currently again experiencing increased usage and knowledge of this information technology began to increase among children and adult level, development of information technology so that it can be used as one of the solutions to be able to overcome or reduce the results of production purchased by the trader.Online shopping makes one of the solutions for farmer groups to market their products through online stores, so the development of a marketplace media that specifically collects prospective buyers either independently or in groups, with a marketplace special agricultural products that are business to business is expected sales of agricultural products from the group Farmers can go directly to the end consumer and not through middlemen, because the price and target market has been determined by this marketplace media.

Keywords: Marketplace, Farmers, Horticulture Trader, East Java

1. INTRODUCTION

Indonesia is an agricultural country that is predominately agricultural sector of livelihood-eyed, the agricultural sector has a very important role in the national economy, it is visible from a large number of the population of Indonesia are the life and work of that sector. The purpose of agricultural development is to increase agricultural production to meet food needs and domestic industry, boost exports, income of farmers, expanding the land the job and encourage equitable strives to be produce the desired harvest. But often less successful is its human problems, such as producers, consumers or distributors or merchants. The number of farmers is actually quite a lot, which means it should be able to played strong enough in the market. But reality shows that farmers group is the weakest and least receive benefits from hasi of work. In marketing agricultural farmers are always in the position of the recipient of the price (price taker), while traders are in the position of deciding the price (price maker). N These weaknesses be overcome by diwadahinya farmers in farmer groups so they can be terbantukan in some activities, for example at the time of the procurement of fertilizers, reception assistance, marketing results, and in an attempt to increase the knowledge and skills through outreach. But this does not give satisfactory results, because until recently the welfare of farmers still

ISBN : 978-602-99806-3-9

have not been reached. With this information, the technology is expected to be able to increase the amount of the sale price in accordance with the wishes of the farmers group, and could reduce sales through a middleman. A marketplace tailor-made for horticultural farmers group, so in this marketplace filled by farmers and potential buyers like the businessman who has catering or business person in their field, then the concept of this marketplace could applied as busssiness to business and business to customer. With the number of industry there is competition then became more and more competitive so that it requires efforts of a marketing strategy that is well planned and targeted, among others, by creating E-commerce. Sutejo (2006) says that use of the internet can improve operational effectiveness and competitive advantage (competitive advantage). The existence of internet marketing also brings some advantages in the business of an enterprise, among others: the chance of the product/service they are known all over the world, customers have the opportunity to decide what they want, where and when, adding to the company's ability to identify the substitution products and the trend of customers as well as to test the value of the proposed or new response (Paul, 1996:29-30). The presence of e-commerce services may access and make orders from various places. The era of sophisticated technology is currently the customers who want to access e-commerce doesn't have to be somewhere, it's a big city city karenakan in Indonesia has many places that provide a facility only with internet access using a laptop using wifi technology. E-commerce will also make efforts to become efficient operational, in accordance with the opinion of the Purbo and Wahyudi (2001) explains that pengefisienan cause Ecommerce transaction costs on companies operating mainly in the number of employees and number of stock items are available so to further refine the process efficient in terms of cost.

2. FARMERS GROUP

The farmers group is a collection of farmer/rancher/planters that are formed on the basis of similarity of interests, similarity of environmental conditions (social, economic, resource) and familiarity to improve and develop the business member (regulation of the Minister of agriculture , 2007). While the Combined Group of farmers (Gapoktan) is a collection of some farmer groups are joining forces and working together to improve business efficiency and economies of scale. Farmers group which is usually inside there is a functional or some people Contact Tani, namely the Chairman or the former Chairman of farmers group that is still active as a member of the Group and acknowledged leadership in moving Members/farmers to develop his business.

Farmers group empowerment program that is conducted should be able to improve the ability of farmers group in terms of:

a. Understand the strengths (potentials) and weaknesses of the group
b. Take into account the opportunities and challenges faced in the present and the future
c. Choosing the various alternatives available to solve the problems encountered,
d. Organize group life and community serasidengan environment on a continuous.

3. SYSTEM DEVELOMENT CYCLE

When in operation the system already developed still arise problems that cannot be resolved in the maintenance system, then return a system need to be developed to address them and this process back to the first process. This cycle is called the life cycle of a system. System development life cycle can be defined as a set of activities that are carried out by professionals and users of information systems to develop and implement information systems. Information systems development life cycle is currently divided into six phases, i.e:

a. Planning system
b. System analysis
c. The design of systems in general/conceptual
d. Evaluation and selection system
e. Designing systems in detail
f. Software development and system implementation
g. Maintenance/Care Systems

ISBN : 978-602-99806-3-9

4. The Trader in Marketing Agricultural

In General, the condition of subsistence can be found on the narrow berlahan, where farmers are characterized by the production of petanian worked with the family's own power as well as a aims to meet the family's own consumption. Narrow berlahan farmers have difficulty advancing production capital drape continuity to the middleman or trader. The discrepancy over what is exchanged between a narrow berlahan with farmer may give rise to differences in power. This resulted in the post-harvest time farmers can only sell narrow berlahan his crop to the middleman or trader who already give him a loan. The formation of prices with the middleman or trader based on taste and feel free to believe because it gives a loan capital, and farmers only receive the price so that their bargaining position is weak. This form of exploitation is visible from the formation of the price that occurs from one side, that is determined from the middleman.

5. RESULT AND DISCUSSION

5.1 Markerplace Farmer Groups

Of some general problems exist in the farmers group, similar problems also appear in farmer groups Regency Pasuruan. So a team of researchers created a way that will be able to detract from the issue of farmer groups that existed in the Pasuruan District.

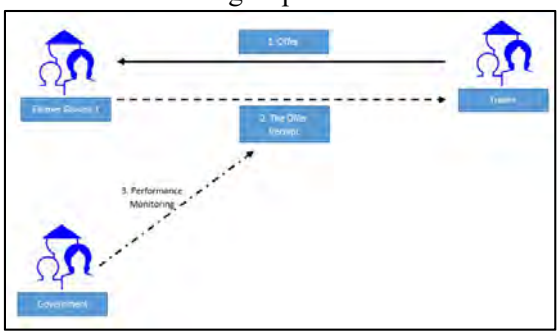


Fig.1 Flow Marketplace Technology Concept

The following explanation in figure 1

a. The holticulture trader makes a purchase offer of products that have been harvested and ready to be sold to the public
b. Farmer Group provides answers to the acceptance of the Tengkulak offerings (the majority of the answers in the price field sold are not the same among the Poktans in the region, as well as prices that are not in line with the expectations of farmers
c. Officers from relevant Offices in the District Territory can not obtain information quickly and accurately from the performance of some or all farmer groups within the supervisory area of the Service. In addition to the difficulty of obtaining information directly from the Farmers Group on the field harvest data, related officials also long received reports from the farmer group about the harvest obtained in the field

6. CONCLUSION

Based on the results of the discussion on this research, The application of information technologies currently already make some farmer groups become a necessity will promote and sell farm products traded. The proceeds from the online store currently has not reached the desired target, this is because the role of a middleman is still great when harvest arrives before the middleman is already directly buying farmland that will be on the upcoming harvest but with the sales through the online store or the markerplace it, can at least reduce the role of the agriculture trader that buys crops in traditional market.

7. ACKNOWLEDGEMENTS

The authors thank the University of Pembangunan Nasional Veteran Jawa Timur, especially for Informatics Engineering Department and Faculty Of Computer Science for providing financial

ISBN : 978-602-99806-3-9

support for this Research.

8. REFERENCES

[1] Ross, J.W., Weill, P. & Robertson, D.C. Enterprise Architecture As Strategy: Creating A Foudation For Business Execution Boston, Massachusetts: Harvard Business School Press., 2006.

[2] Minoli, Daniel, "Enterprise Architecture A to Z: Frameworks, Business Process Modeling, SOA, and Infrastructure Technology," Auerbach Publications., 2008.

[3] Online and upcoming: The Internet's impact on India, Technology, Media, and Telecom Practice, McKinsey & Company., (Accessed on 2nd November, 2014).

[4] Reddy PK, "A Framework of Information Technology Based Agriculture Information Dissemination System to Improve Crop Productivity," Proceedings of 22nd Annual Conference of Andhra Pradesh Economic Association 2004. D.N.R. College. Bhimavaram., 2004.

[5] Wikipedia. ICT in Agriculture. Wikipedia: the free Encyclopedia. Retrieved from https://en.wikipedia.org/wiki/ICT., 2013a

[6] Armstrong L, Diepeveen D, "Developing an information-driven ICT framework for Agriculture," World Conference on Agricultural Information and IT. IAALD AFITA WCCA, 2008.

[7] Cho, J, "Globalization and Global Software Development, Issues in Information Systems", Volume VIII, No. 2, 2007.

[8] Backer, M., C. D. Rosa, and E. Harel, "Planning and Delivering Service Oriented Architecture (SOA)," Lecture slides, University of California, San Diego, 2006.

ISBN : 978-602-99806-3-9

Growth and production plant chili pepper (capsicum annum) as a result of the existence pruning leaves

*** Widiwurjani Amir Tjokrosumarto [1] and Djarwatiningsih Pongki Soedjarwo [2]**
[1,2] Faculty of Agriculture, Universitas Pembangunan Nasional "Veteran" Jawa Timur, Indonesia

ABSTRACT: Pruning can be done on chili plant. Pruning aims to increase and improve production quality because the nutrients are absorbed by the roots directly distributed to the leaves as the plant so the plant stems will form a strong and upright. Too much leaves also interfere with the production process for it is also necessary to cut the leaves so the results of photosynthesis can be concentrated to the production process. This research examines methods of pruning on chili plants known for massive growth characteristics and production of chili plants before or after harvest. The method consisted of two stages. Phase 1 is testing the leaf pruning consists of cutting 25%, 50% and without pruning. Phase 2 is pruning branches on chili plants which have been harvested in the treatment phase I. Phase II consists of treatment without pruning and pruning. The results showed that treatment pruning the leaves (stage I) effect on the production of chili harvest time in quantity and quality, pruning leaves on chili plants by 50% provides an increase in production, the percentage of flowers become fruit, fruit weight and the pruning of leaves be done when a branch plant reaches about 30 branches (30-40 days).

Keywords: Characteristics, Growth, Production, Pruning

1. INTRODUCTION

Pruning plant is an effort that is practiced by farmers, researchers or managers to get the plant canopy shape that ideal, with the hope of achieving or harvest more plant with better fruit quality. Pruning basically aims to reduce the number of buds, shoots or branches that are not productive, so the growth of the fruit can be maximized. In plants that grow too dense, plant will be difficult to distribute nutrients absorbed from the soil to get to the target that is the production of fruit [1]. Plants that are too dense, causing the fruit is formed into small pieces with the maturation process are too long [2]. The treatment of pruning of the cultivated plants may also reduce interference of pests and diseases [3].

Chili plants usually sprouted a lot that grows from the leaf. These shoots are not productive and will interfere with the growth so that growth is not optimal [4]. Therefore, there should be pruning (discharge) side shoots. Prune side shoots done in chili hybrids between the ages of 7-20 days. All side shoots removed to the plants grow strong and sturdy. When the branch was formed, then trimming the buds stopped. Usually the bud pruning is done 2-3 times. Without pruning the side shoots, chili plant growth will be slow [5].

The effort to increase crop production can be done by trimming the apical bud. This is done with the hope of lateral shoots can grow. Growth can cause the formation of lateral shoots on the plant stem branch pretty much on the main stem armpit. Pruning at the top of the stem can cause stunted growth of apical buds, so further plant growth is not very high with many branches formed plant, which is expected to be a lot plant flower formation. Plant flowers that form will be a lot, it can be

ISBN : 978-602-99806-3-9

interpreted that crop production will be obtained will be higher [6].

The rejuvenation of pruning is done to stimulate the emergence of new shoots and buds that expected to be productive. The number of productive shoots that arise it is expected to extend the productive lifetime and crop production will increase [7]. Furthermore, it also explained that the trimming is done with the aim to increase the number of productive branches and form the plant canopy ideal conditions regular branching, compact, and sturdy and evenly in all directions (symmetry). Pruning consists of pruning shapes and crop maintenance. The aim is to increase crop productivity [8].

Pruning can provide some influence on physiological processes and plant biomass. Sugar content, the process of opening and closing of stomata, flowering and fruit formation is a process that can be influenced by their trimming. Pruning can stimulate the formation of chlorophyll more [9]. Sugar content in plants will decrease when performed pruning because photosynthesis result many are exposed [10]-[11]. Red chili plant is a plant that can grow more than one year. Red chili crop productivity largely influenced by the vegetative growth of the plants, whereas vegetative growth is the embodiment of the various factors that influence such as the spacing of seeds, soil fertility, climate and so on [12]-[13].

Pruning is usually done at an annual plant, but it is possible to do on crops, especially for crops that have segments where the segments will appear after trimming buds [14]. The pruning of plants kale is a seasonal plant can produce new shoots and branches where the buds and new branches were able to grow normally with the support of sufficient nitrogen fertilization [15]. Furthermore pruning is done after the first harvest, the productive lifetime of chili plants may happen again as before. New shoots will appear after pruning followed rapid vegetative growth for organs absorbing nutrients has been prepared. Builders and fertilization run normally, so the plants can be harvested again in a shorter time [16]. About 3 months-plants could be started in the harvest back to the period of 2-3 months were not significantly different production with yields 1. The production of the fruit can be improved by trimming for the cuts will emerge new shoots (rejuvenation) that enables more productive and get the ideal shape of a tree [7].

To improve efficiency, cultivation can be done through the appropriate technical culture activities, such as pruning settings. Pruning also aims to extend the life cycle of plants because by trimming can appear new shoots that productive [17]. The existence of pruning after the first harvest brings farmers does not have to replant with new plants in the next planting period. It needs to be studied fundamentally by identifying things that happen as a result of their good pruning growth at the beginning and after the first harvest period is completed [4].

In general and overall cultivation of red chilies includes several stages of the farmers needs to a) understand and know the terms grew red chili b) seed selection c) seeding d) When planting e) tillage f) mulching g) planting h) system planting i) fertilizing j) irrigation k) Weed control and harvesting. To further technological innovation also needs to be done based on research results. As for the innovations to be introduced to be applied in the cultivation of the red chili plant is cut to extend their productive so that farmers are expected to harvest crops of chili in the period is longer.

Information gained from basic research are expected to be used as the basis for applied research in the next period that is research on crop cultivation technologies more efficient and applied research on land productivity per unit time.

2. MATERIAL AND METHODS

The research was conducted in March 2016 - November 2016 in the faculty of agricultural field trials. Topics of research on pruning with the objective to assess the growth and production characteristics due to the pruning of leaves before the harvest period and branch pruning after harvest.

ISBN : 978-602-99806-3-9

2.1 Material

Chilies plant that have been 30 days after planting, scissors, NPK fertilizer, polybag and garden soil

2.2 Method

Using a completely randomized design with two phases:

Phase I is Trimming Leaves (T) consists of three levels that is without crop (T0), pruned 50% (T1) and pruned 25% (T2) and Phase II is the pruning of branches (C) after the crop is harvested Red chili consists of two levels, i.e., without pruning branches and pruned.

2.2.1 Phase One: Pruning Leaves

Pruning is done before the harvesting period is when plant is already established branches as many as 30 branches (of 1 - 1.5 months). Vegetative growth of plant in conditions of maximum. There are three levels of treatment that is without crop (T0) as a control, prune leaves 25% (T1) and prune leaves 50% (T2). The leaves that pruned are overlapping leaves that position. Pruning destination that is not too thick so the air circulation and light penetration can be evenly distributed throughout the plant and to determine how its influence on the growth and production of chili peppers. The number of leaves that pruned according to a predetermined treatment.

2.2.2 Phase Two: Pruning branches / Rejuvenation

Prune after the completion of the first harvest period (5 times the harvest). There are two levels that are without pruning and do pruning branches. Branches pruned branches are old and dried up and unproductive. Usually unproductive branches growing straight upward and the branches that grows from axillary. Pruning is done 2 weeks after the first harvest is stopped. Plants that are treated are derived from plants that were treated in the first stage. The purpose of treatment the second stage is to determine the effect of pruning branches after the first harvest period in the growth and production of chili plants and know the productive lifetime of great chili plant as a result of pruning

Parameter study consisted of observations of the characteristics of generative growth:

a. flower number : the number of flowers that have bloomed in the morning and do every day after the generative,
b. fruit number : number of fruit per plant obtained by counting the number of fruit at harvest time I (91 days after planting), harvesting II (98 days after planting), and the next harvest, and the number of total fruit crop (5 times the harvest)that is by adding up all the crops. So is the second period after crop harvest branches,
c. fruit weight and weight of fruit per plant: weight of the fruit at harvest time I, II, and so on and total fruit weight per plant (5 times the harvest) by adding the entire crop,
d. fruit length : length of fruit each harvest (5 times the harvest), in 5 grab samples chilies to represent at each plant sample the chili, then averaged.

ISBN : 978-602-99806-3-9

3. RESULTS AND DISCUSSION

3.1 Result

Table 1 Average Height of Chili Plants at Various Ages Observations

The Treatment / Age	Plant height (cm) at age ..... days after planting			
	14	21	28	35
T0	34.56	40.65	47.55	50.13
T1	33.77	37.99	45.98	48.52
T2	32.86	38.74	44.79	47.77
LSD	NR	NR	NR	NR

Note: NR: Not Real

Table 2 Average Number of Branches Chilli Plants at Various Ages Observations

The Treatment / Age	Number of branches plant on age ……. days after planting			
	14	21	28	35
T0	4.10	13,60	22.87	29.46
T1	4.21	12,21	22.11	30.22
T2	4.11	12.98	24.44	30.44
LSD	NR	NR	NR	NR

Note: NR: Not Real

Table 3 Average Diameter of the Base of Chilli Plants at Various Ages Observations

The Treatment / Age	stem diameter (mm) plant at the age of … days after planting			
	14	21	28	35
T0	33.43	43.56	62.66	75.22
T1	35.28	45.23	64.91	73,25
T2	33.67	45.12	63.56	73.22
LSD	NR	NR	NR	NR

Note: NR: Not Real

Table 4 Average Total Flowers in Various Age Observations

Treat-ment / Age	Number of Flowers at Age ..... days after planting							
	21	28	36	49	56	63	70	77
T0	19.1	68.5	100.4	134.6	150.4	160.8	161.2	162.9
T1	20.9	73.9	123.2	150.8	175.8	185.4	187.3	190.6

ISBN : 978-602-99806-3-9

T2	19.8	75.4	110.4	142.0	167.2	173.4	180.1	181.3
LSD	NR	NR	NR	NR	NR	NR	NR	NR

Note: NR: Not Real

Table 5 Average Number of Fruits on the Different Age Observations

Treat-ment / Age	Number of Flowers at Age ..... days after planting							
	21	28	36	49	56	63	70	77
T0	12.3	40.6	60.4	70.3	80.4	87.3	90.5	110.9
T1	14.4	53.2	75.8	85.2	93.3	100.7	110.5	133.6
T2	12.7	50.5	68.5	75.9	83.3	90.6	103.6	115.4
LSD	NR	NR	NR	NR	NR	NR	NR	NR

Note: NR: Not Real. The figures were accompanied by the same letters in the same column are not significantly different meaning in the stage of least significant difference test 5%

Table 6 Average Weight per Fruit Crops, Fruit and Weight Length per Fruit

Treat-ment / Age	Characteristics of Plant Production Due to The existence of Chili Pruning Leaves					
	Fruit weight (g) per plant	fruit length (cm)	weight per fruit (g)	Fruit amount	Flowers Amount	Percentage of flowers become fruit
T0	1204.1 a	11.2	10.6	113.3 a	162.9 a	69.6
T1	1416.9 b	12.8	10.5	135.7 c	190.6 c	71.2
T2	1277.9 a	11.8	10.6	120.6 b	181.3 b	66.5
LSD	83.3	NR	NR	2.7	2.5	NR

Note: NR: Not Real. The figures were accompanied by the same letters in the same column are not significantly different meaning in the stage of least significant difference test 5%

Table 7. Generative Growth Characteristics Plant after Pruning of Rejuvenation

Treat-ment / Age	Generative growth characteristics plant after pruning of rejuvenation					
	Age started flowering (10 florets)	The amount of flowers	The amount of fruits	Total fruit weight	Total harvest of stage I and stage II	Percentage of flowers become the fruit (%)

ISBN : 978-602-99806-3-9

T0P0	10.4 a	196.6 a	150.9 a	574.7 a	1778.8 a	77.15
T0P1	7.6 a	211.7 a	160.4 a	630.4 b	1834.6 a	75.85
T1PO	15.9 b	255.8 b	212.4 b	775.7 c	2192.7 b	83.01
T1P1	7.2 a	296.3 c	237.4 c	1026.0d	2442.9 c	80.17
T2P0	12.7 a	252.3 b	216.1 b	1050.9e	2328.8 b	85.60
T2P1	7.9	313.9 c	236.0 c	1050.7e	2328.6 b	75.24
LSD	6.2	20.0	19.2	20.6	24.9	NR

Note: NR: Not Real. The figures were accompanied by the same letters in the same column are not significantly different meaning in the stage of least significant difference test 5%

Implementation of pruning the leaves on the plant chili influence on vegetative growth characteristics in plants include plant height, branch number, stem diameter, and the number of productive branches. The data obtained from the study are presented in the tables 1 to the table 3.

In the table 1 we can see that there is an increase in of plant height with age plants and pruning the leaves on the plant does not affect the characteristics of chili plants. Chili plants showed that the plant height was not significantly different between the plant that pruned 25%, the plant that pruned 50% and the plant without pruning.

In the table 2 it can be seen that there are increasing number of branch plant with age plant and trimming the leaves on the plant does not affect the characteristics of the branch chili plants. Chili plants have a number of branches of plant were not significantly different between the plant that pruned 25%, the plant that pruned 50% and the plant without pruning.

In the table 3 it can be seen that there is the addition size in diameter at base plant with age plant and leaf pruning on chili plants do not affect the characteristics of stem diameter at the base of chili plants. Chili plants showed stem base diameter plant were not significantly different between the plant that pruned 25%, the plant that pruned 50% and the plant without pruning.

In the table 4 it can be seen that there is an increasing amount of interest in plants with age of the plant (up to age 77 days) and pruning the leaves on the plants affect the characteristics of on the amount of chili plants flower. Pruning leaves significant effect on the amount of interest chili plants. Number of highest flowers on pruning leaves at 25% followed by the number of flowers on chili plants pruned 50% and the lowest was in the chili plant that not pruned.

In the table 5 it can be seen that there is an increasing number of fruits on the plant due to the increasing age of the plant (up to age 84 days and 91 days) and pruning the leaves on the plants affect the characteristics of the amount of chili fruit chili plant. Pruning leaves significant effect on the number of pieces of chili plants. The highest number of fruit on a leaf pruning by 25% followed by the number of fruit on chili plants pruned 50% and the lowest was in the chili plants that not pruned.

Pruning leaves affects the production characteristics chili plants which includes the weight of fruit per plant, fruit length, fruit weight apiece total amount of fruit, flower number, and percentage of interest so the fruit. Table 6 also shows the pruning of leaves 50% (T1) to provide support for an increase in weight of fruit per plant, number of fruit crops, and the number of flowers per plant. Fruit quality can be demonstrated by the length parameter of fruit and fruit weight per fruit that not significantly different in the three treatments tested.

In the table 7 it can be seen that the life begins to flower after a period of relative pruning phase II was not significantly different than the treatment of pruning the leaves 25% of Phase I but without

ISBN : 978-602-99806-3-9

pruning stage II. Pruning phase II gives a tendency accelerate the emergence of interest so that this condition will spur the next harvest season.

3.2 Discussion

Pruning is a way to cut in order to remove unwanted parts of the plant, with the aim to create better plant growth [18].

Chili production can be improved in many various ways. One is through proper cultivation efforts, including maintenance. Among the common maintenance practices by farmers are pruning shoots that grow in the leaves. Pruning is intended to strengthen the trunk and reduce unnecessary vegetative growth at the bottom of the body plant and directed to the top, as well as to expand the air circulation and sunlight penetration to all parts of plant. It is also to expand the air circulation and sunlight penetration to all parts of the plant. Pruning is also intended to create a cleaner environment and hygiene so that the plant can be free from pests and diseases. The overall objective is that plants can deliver results and maximum fruit quality [10].

Plant growth and development can be affected by various factors, among others, is a plant growth regulator or commonly called the PGR, such as for example auxin. Auxin is formed coleoptile or part of the rod tip and root function on lengthening of the apical bud, the first shoots that grow rapidly, as a result of the apical dominant, which delays the growth of lateral buds are buds that emerge from axillary [19].

Pruning is done when the plant leaves about 30 days after planting when the plants enter the vegetative phase maximum. Characteristics of chili plants showed that the average number of productive branches, the amount of interest and the number of pieces in the period of growth before harvest not significantly different. This suggests that before trimming chili crop conditions uniform.

The amount of productive branches at various pruning treatments also showed significant differences. This shows that with the pruning of leaves affects the formation of flowers and fruit. Plants with a different number of leaves due to the trimming has photosynthesis different capabilities in supporting the formation of flowers and fruit and assimilate the use of competition that occurs between organs of chili plants can affect adversely. Without pruning means allowing existing leaves on the plant itself to compete with other organs in using assimilate while the leaves that have old and unproductive if not pruned it will tend to be parasite [20]. Leaf pruning can stimulate branches of plant more productive. The increasing number of productive branches pruning plant due caused fruit buds are formed and the number of leaves more and more productive [21].

Pruning can improve plant health, stimulate the flowering process, improve the quality and quantity of fruit, improving seed quality and can maintain a balance between growth and fruit branches, number of branches on the plant will affect the quality of the fruit and seed quality. Branch plants in small amounts, it is possible fruit and seed quality will increase. Leaf pruning performed when the plant was 30 days after planting and the characteristics of chili plants after pruning the leaves can be shown in the table 1, table 2 and table 3. Characteristics of chili plants showed that the average number of productive branches, the number of flower amount and the number of pieces in the period of growth before harvesting was not significantly different.

Pruning leaves an impact on the characteristics of chili plants produce fruit in both quantity, quality and percentage flowers into fruits were not significantly different. Pruning the leaves can cause assimilate the resulting plants can be concentrated to the fruit and there was no use assimilate competition between vegetative organs and fruits so as to obtain the crop (production) more.

In the table 6 it can be seen that the pruning leaves an impact on the characteristics of chili plants produce fruit in terms of quantity and quality as well as the percentage flowers into fruit. Pruning the leaves can cause assimilate the resulting plants can be concentrated to the fruit and there was no use assimilate competition between vegetative organs and fruits so as to obtain the crop (production) more. The dry material is supplied into the seed or fruit is the result of plant metabolism, but whether it assimilates dumped is assimilate before flowering or after flowering or when charging on seeds or fruit [22]-[23].

Pruning branches to form the chili crop canopy also affects the increased production from the sun

ISBN : 978-602-99806-3-9

as an energy source can be distributed evenly on the leaf surface [24]. Pruning shoots despite increasing the amount of fruit, which indirectly also increase the fruit weight and the weight of dry seeds per plant, but it did not affect the quality of seeds produced. This is caused by the increasing number of leaves on plants pruned bud followed by increasing the amount of fruit that is formed [21]. Thus, the increase of photosynthesis in the leaves as a source offset by increasing the amount of fruit as the user, so the balance of resources and the user will be retained as the plant that not pruned bud.

In general, the maximum net photosynthesis increases during leaf development and will reach a maximum just after full leaf development. In almost all the generative phase of photosynthesis will be used by flowers and fruit growing. Growth and development of that maximum leaf will cause flowers and fruits are well developed, thus the possibility of fall flowers or fruit to be small. Increased fruit are formed and grow at least fruit fall

Rejuvenation pruning will delay the harvest, because the plants need time for rehabilitation. Judging from the physiological aspects of plants, the pruning treatments are accompanied by cleaning all components for the assimilation of plants is an event that is very drastic and will lead to further plant growth [25]. Pruning promotes growth of new shoots quicker, which can potentially stimulate flowering. The results showed that treatment cuts the crop may increase interest yield, improve the quality and appearance of flowers or plants for the better figure. Lateral shoots are the subject observer correlation by apical buds, so if the apical bud trimmed, then only the top of the lateral buds will grow rapidly. Effect of pruning on plant growth through the shoot, was very influential, appeared shoots faster.

The maintenance pruning effectively increases the number of young fruit that survived and reduce the percentage of young deciduous fruit [26]. The disposal of plant shoots do not affect the growth plant represented by stem diameter and plant yield that represented by the amount of fruit and fruit length. Disposal of axillary buds also has no effect on the growth and yield [10].

Bean plants that are pruned can cause apical dominance to be suspended; causing auxin accumulates on top of the area. Through interactions with other growth hormone auxin accumulates in the body and affects the plant meristem at the buds so emerged lateral shoots [27].

Pruning rod can cause the dormant buds to be active and grow into a new branch as well as the expected productive branches. Pruning branches do not cause a decline in production due to the fact that pruned branch is the old branch (unproductive). Pruned branches will be replaced with the emergence of new shoots sprout. Such a condition can also occur in plants judgments. Pruning shoot tips led to the formation of lateral branches, so that the axillary buds which grow very rapidly as a whole can compensate for the loss of plant shoots, both of growth and of a given outcome [27]. Condition number of leaves were not significantly different can be influenced by the number of leaves that are a little thin or not plated. Thin leaves that occur can be thought to result from environmental influences at the time of the study. When the research carried out right when entering the dry season, so the plants adapt to environmental conditions little short of water and most of the leaves undergo accelerated aging and leads to reduced sunlight during photosynthesis so photosynthesis production declined. This is consistent with a trunk diameter of bean plants. The results showed no significant different diameter, each observation. That is because the plant observations made when plants began to enter the generative phase, so that the vegetative growth start stalled. The main benefits of pruning shoots among others, will reduce competition between the results of photosynthesis in the leaves with fruit and reduce the incidence of disease, as well as cuts in tomatoes could increase fruit size [21]. If the excessive growth of shoots pruned, the circulation of air around the canopy gets better, this situation will reduce the humidity microclimate around the plant and so will reduce the incidence of the disease. Cucumber plants are not pruned bud usually produce good fruit, but its small size, this causes the fruit to seed quality is not good.

The pruning techniques can be divided into two, heading back and thinning out. Heading back is done by cutting the shoots branch while thinning out dispose lateral branches [28]. Tomato plant parts that can be trimmed are the lateral shoots, the shoots of apical buds or stems of plants, as well as most flowers and fruits. The improvement of cultivation techniques is also important in supporting increased production tomato. The cultivation of tomatoes consists of several important stages, one of which cut shoots. Cuts are also useful in the field of breeding [29]. Plants with treatment without

ISBN : 978-602-99806-3-9

pruning shoots have higher yield potential and have a medium resistance susceptible to wilt disease. Different types of foliage, leaves the child lies on the main leaf bones, fruit shape, the cross-sectional pieces, end of the shaft, tip shape of fruit, number of fruit cavity, and shows the diversity of green fruit [30].

Pruning axillary buds have consequences on the practice of crop cultivation due to changes in plant profiles that pruned. In pepper, pruning axillary bud causes the stems of plants to be higher due to the branching pushed to the top. Weighing the top of this branching easily fall resulted in plant so needed the aid of crutches stem of the plant with the installation of marker. As a result, this pruning practice cause's additional work is not a bit like the installation work marker. This additional work has consequences for the need for additional well costs for labor and materials supply stakes for chili plants have the ability to perform high compensation against the loss of part of the vegetative organs. Losing the growth of shoots immediately transferred to the growth of axillary buds growing beside the form in significant amounts. Pruning shoot tips led to the formation of lateral branches. Their lateral branches or axillary buds that grow and develop very rushed as a whole can compensate for the loss of shoots discharge shoot tips on soybean increasing branching but did not give a positive effect on results [10].

4. CONCLUSION

Treatment of pruning the leaves on the plants affect the production of large chili red chili harvest time both in quantity and quality. Pruning leaves on a large chili plants by 50% provides an increase in production, the percentage of fruit and flowers become weight of the fruit. Pruning branches leaves performed when the plant reaches about 30 branches (30-40 days).

5. REFERENCES

[1] Subhasish Dasa, K Charan Teja, Buddhadeb Duary, Pawan Kumar Agrawal and Satya Sundar Bhattacharyaa. Impact of nutrient management, soil type and location on the accumulation of capsaicin in Capsicum chinense (Jacq.): One of the hottest chili in the world. Scientia Horticulturae , Vol. 213, 2016, pp. 354-366

[2] Francesco Orsini, Albino Maggio, Youssef Rouphael, and Stefania De Pascale. Physiological quality of organically grown vegetables. Scientia Horticulturae, Vol. 208, 2016, pp. 131-139

[3] Helen M Maffei, Gregory M Filip, Nancy E Grulke, Brent W.Oblinger, Ellis Q Margolis and Kristen L Chadwick. Pruning high-value Douglas-fir can reduce dwarf mistletoe severity and increase longevity in Central Oregon. Forest Ecology and Management, Vol. 379, 2016, pp. 11-19

[4] Alisson S C Alencar, Ajalmar R Rocha Neto and João Paulo P Gomes. A new pruning method for extreme learning machines via genetic algorithms. Applied Soft Computing, Vol. 44, 2016, pp. 101-107

[5] Luca Serino and Gabriella Sannitidi Bajaa. A new strategy for skeleton pruning. Pattern Recognition Letters, Vol. 76, 2016, pp. 41-48

[6] Norainiratna Badrulhisham and Noriah Othman. Knowledge in Tree Pruning for Sustainable Practices in Urban Setting: Improving Our Quality of Life. Procedia - Social and Behavioral Sciences, Vol. 234, 2016, pp. 210-217

[7] Hidayat R. Crop Assessment Forms And Methods Of Connecting To The Growth Of Mango Seeds Dimension. Proceedings National Seminar of Ornamental Plants, Vol. 13, 2005, pp. 8-13

[8] Andrea Hevia, Juan Gabriel Álvarez-González and Juan Majada. Comparison of pruning effects on tree growth, productivity and dominance of two major timber conifer species. Forest Ecology and Management, Vol. 374, 2016, pp, 82-92

ISBN : 978-602-99806-3-9

[9] Ephraim N and Murage Masaharu Masuda. Response of pepper and eggplant to continuous light in relation to leaf chlorosis and activities of anti-oxidative enzymes. Scientia Horticulturae, Vol. 70, 1997, pp. 269-279

[10] Muhammad Hatta. The Effect Of The Disposal Shoots And Axillary Buds On Growth And Yield Of Pepper Plants. Floratek, Vol. 7, 2012, pp. 23-29

[11] Sukarmin and Farihul Ihsan. Leaf Pruning Techniques On Plant Grafting Sirsak Ratu. Bulletin of Agricultural Engineering, Vol. 17, 2012, pp. 18-21

[12] S Rudolph, C Wongleecharoen, R M Lark, B P Marchant, S Garrée, M Herbsta, H Vereeckena and L Weihermüllera. Soil apparent conductivity measurements for planning and analysis of agricultural experiments: A case study from Western-Thailand. Geoderma, Vol. 267, 2016, pp. 220-229

[13] M L Maphoto, A R Ndhlala, P W Mashela and H A Abdelgadir. Influence of spacing and pruning on the growth and yield of Artemisia annua L. South African Journal of Botany, Vol. 103, 2016, pp. 327-328

[14] Stefano Poni, Sergio Tombesi, Alberto Palliotti, Virginia Ughini and Matteo Gatti. Mechanical winter pruning of grapevine: Physiological bases and applications. Scientia Horticulturae, Vol. 204, 2016, pp. 88-98

[15] G E Mitchell, R L McLauchlan, A R Isaacs, D J Williams and S M Nottingham. Effect of low dose irradiation on composition of tropical fruits and vegetables. Journal of Food Composition and Analysis, Vol. 5, 1992, pp. 291-311

[16] Hiroo Matsui, Takako Inui, Kaneo Oka and Nobuyuki Fukui. The influence of pruning and harvest timing on hop aroma, cone appearance, and yield. Food Chemistry, Vol. 202, 2016, pp. 15-22

[17] George D, C Cavalcanti, Luiz S Oliveira, Thiago J M, Mouraac Guilherme and V.Carvalhoa. Combining diversity measures for ensemble pruning. Pattern Recognition Letters, Vol. 74, 2016, pp. 38-45

[18] Kumaranthara Chacko Baby and Thottiam Vasudevan Ranganathan. Effect of enzyme pretreatment on yield and quality of fresh green chili (Capsicum annuum L) oleoresin and its major capsaicinoids. Biocatalysis and Agricultural Biotechnology, Vol. 7, 2016, pp. 95-101

[19] Mikel Galar, Alberto Fernández, Edurne Barrenechea, Humberto Bustince and Francisco Herrerade. Ordering-based pruning for improving the performance of ensembles of classifiers in the framework of imbalanced datasets. Information Sciences, Vol. 354, 2016, pp. 178-196

[20] Ganjare Hemlata, N W Futane, Sheetal Dagwar and Kalpana Kurhade. Growth and yield characters of capsicum in response to planting distance and sources of nutrients. Scholarly Journal of Agriculture Science, Vol. 3, 2013, pp. 386-390

[21] Sutapradja. The Effect Of Shoot Pruning On Yield And Quality Of Five Cultivars Cucumber Seeds. J. Hort, Vol. 18, 2008, pp. 16-20

[22] Chun-Sheng Wang, Sebastian Hein, Zhi-Gang Zhao, Jun-Jie Guo and Jie Zeng. Branch occlusion and discoloration of Betula alnoides under artificial and natural pruning. Forest Ecology and Management, Vol. 375, 2016, pp. 200–210

[23] Kurniawati Purwaka Putri. The Effect Of Trimming Size Of Mahogany (King) In Spurring Formation Of Buds As A Source Of Cuttings (Swietenia Macrophylla). Techno Forest Plantations, Vol. **4,** 2011, pp. 27 – 32

[24] Chun Wang and Zhongyuan Lai. Shape decomposition and classification by searching optimal part pruning sequence. Pattern Recognition, Vol. 54, 2016, pp. 206-217

[25] Lu Li, Usman Dastgeer and Christoph Kessler. Pruning strategies in adaptive off-line tuning for optimized composition of components on heterogeneous systems. Parallel Computing, Vol. 51, 2016, pp. 37-45

[26] Nuraeni and Kafrawi. Application Of Compound Fertilizers, Plant Growth Regulators Triacontanol, And Pruning Maintenance To Cope With The Raw Fruit Fall (Cherelle Wilt) On Cocoa. J. Agroplantae, Vol. 2, 2013, pp. 9-16

ISBN : 978-602-99806-3-9

[27] Dewi Indah Srirejeki, Mochammad Dawam Maghfoer and Ninuk Herlina. PGPR Application, Dekamon And Shoot Pruning To Increase The Productivity Of Bean Plants (Phaseolus vulgaris l.) the upright type. Journal of Plant Production, Vol. 3, 2015, pp. 302 – 310

[28] Hesami A, S S Khorami, S S Hosseini. Effect of shoot pruning and flower thinning on quality and quantity of semi-determinate tomato (Lycopersicon esculentum Mill.). Nat Sci Biol, Vol, 4, 2012, pp. 108-111

[29] Abdel-Razzak H, A M Ibrahim, Wahb-Allah and A Alsadon. Response of cherry tomato (Solanum lycopersicum var. cerasiforme) to pruning systems and irrigation rates under greenhouse condition. Asian J. of Crop Science, Vol. 5, 2013, pp. 275-285

[30] Rima Margareta R and Gumelar. Characterization and Side Shoot Pruning Response to Production and Fruit Quality Local Tomato Genotypes. J. Hort, Vol. 5, 2014, pp. 73-83

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

Text based maximally stable extremal regions to detect vehicle plate location

*Hendra Maulana[1], Darlis Herumurti[2] and Anny Yuniarti[3]
[1]Computer Science Department, Universitas Pembangunan Nasional Veteran Jawa Timur, Indonesia; [2,3]Institute of Sepuluh Nopember Surabaya, Indonesia

ABSTRACT: The license plate recognition strongly support intelligent infrastructure systems, such as toll and parking payment application, toll monitoring application, traffic monitoring application, and so forth. Although it has shown promising performance, but some method may fail in a more complex situation, because of the complexity of such variation of the position and orientation of the plate, different illumination, different backgrounds, and objects of non-plate. For efficiency higher visual matching, some fast keypoint detectors and corresponding descriptions have been carried out in several research, such as FAST, SURF, BRISK, Harris Corner feature. In general, plate detection systems have two problems, namely where the plate is and how big is its size. In this paper, we present the number plate localization method based on text segmentation of unstructured standard plates. The algorithm is capable of detecting large number of candidate text regions and progressively removing those that tend not to contain text. The experimental results show that from 16 images with size 4208 x 3120 pixels with a complex background is 87.5% accuracy, and the average detection time is approximately 33.25 seconds. Based on the results, the MSER feature detector can find the text area well. It holds consistent color and high text contrast.

Keywords: license plate recognition, plate location detection, text regions, feature detector

1. INTRODUCTION

The intelligent transportation system is now beginning to grow. Some applications supporting intelligent infrastructure systems include electronic payment applications (such as tolls and parking), toll road monitoring applications, traffic monitoring applications, and others. One aspect of the intelligent infrastructure support system is how to recognize a vehicle.

Vehicle license plate recognition is an important function of this system, and is an important part of our everyday lives. Based on observations, the vehicle plate has enough edges and angles of information, using edge detection, projection and morphological filters [1]. Although many of the Platform Introduction methods have shown promising performance in constrained environments, the same technique may fail in more complex situations due to complexity such as position variation and plate orientation, uneven lighting, multiple backgrounds and non-plate objects [2].

Several studies to improve plate recognition performance are focused on finding strong visual feature descriptions for changes in the environment and the plate itself. Over the last decade, a keypoint-based approach has been widely applied to visual matching [3]. One of the most successful examples is the Scale Invariant Feature Transform (SIFT) feature [3]. In this case invariant for scale and rotational changes are able to get promising results in many cases [4]. According to the results reported in reference [1][5], the SIFT-based method has been shown to detect the plate in various situations. However, for applications that require fast processing, such as mobile phones, SIFT does not meet the efficiency requirements due to comparatively slow computing speed.

ISBN : 978-602-99806-3-9

For higher visual matching efficiency, several rapid keypoint detectors and appropriate descriptions have been proposed, such as the Robust Features-Robust Features feature (SURF) [6], Binary Robust Invariant Scalable Keypoints (BRISK) [7], Harris Corner [8] and so forth, which theoretically can increase computing efficiency when applied to a vehicle number plate recognition.

In general, plate detection systems have two problems, namely where the plate is and how big its size. Typically, the position of the candidate characters in the plate is first identified, and the box area of the plate is determined later. Based on observations [9] that certain characters on different number plates can be considered as duplicates of each other, the arc model based on local features for the proposed plate detection. Because the visual words generated from the unsupervised grouping are sensitive to the noise feature of the background image.

In this paper, we focus on step detection plate location. We present the number plate localization method based on text segmentation of unstructured standard plates. In the Maximally Stable Extremal Regions (MSER) method, this character recognition algorithm detects a large number of candidate text regions and progressively removes those that are less likely to contain text. The performance of the proposed system is tested on our own set of image data.

2. MAXIMALLY STABLE EXTREMAL REGIONS

Maximally Stable Extremal Regions (MSER) algorithm is basically region detector. The MSER calculation basis begins by selecting or sorting the order of pixels from low intensity to high intensity or vice versa (eg in grayscale images having intensity (0, ..., 255)). MSER is widely used in text localization and recognition applications. In MSER, the process of selecting pixels becomes a set of regions based on the threshold of binary intensity. Areas with the same pixel value at the threshold value in the connected component pattern are the values that are considered to be most stable (maximally stable).

The MSER feature detector works well to find the text area [10]. This works well for text because consistent color and high text contrast leads to a stable intensity profile. In Figure 1 is presented the MSER workflow.

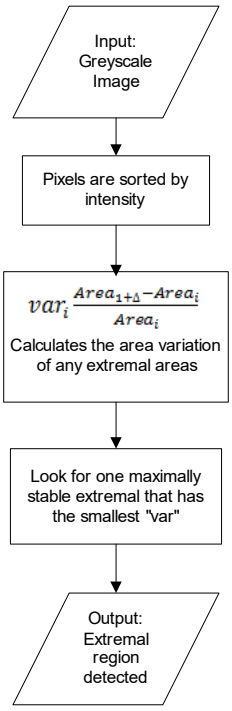


Fig.1 MSER Workflow

ISBN : 978-602-99806-3-9

The Maximally Stable Extremal Regions (MSER) algorithm consists of several major stages:

1. Sorting all pixels by intensity.
2. Placing the pixels one by one (in the order of intensity) in the image, and renewing the component link structure, coming from extremal areas
3. Calculates the area variation of any extremal areas. Using the formula: $var_i \frac{Area_{1+\Delta} - Area_i}{Area_i}$ /*
4. Where i represents extremal areas with the highest intensity values and $i + \Delta$ refers to the extension of the i-area, with the maximum intensity of $i + \Delta$, 〖var〗 _i is the relative difference of the area where there is the highest intensity from i to $i + \Delta$.
5. Through the order / extent of extremal areas. Look for one maximally stable extremal that has the smallest "var" of the main level.

3. DETECTION PLATE LOCATION

Steps for location plate detection are presented in Figure 2. The input image is made into grayscale, then imclose and imopen morphology is performed. After that detection of text area using MSER [10], because the consistent color and high contrast of text leads to stable intensity profiles. Then carried out the process of non-text area removal based on basic geometric properties.

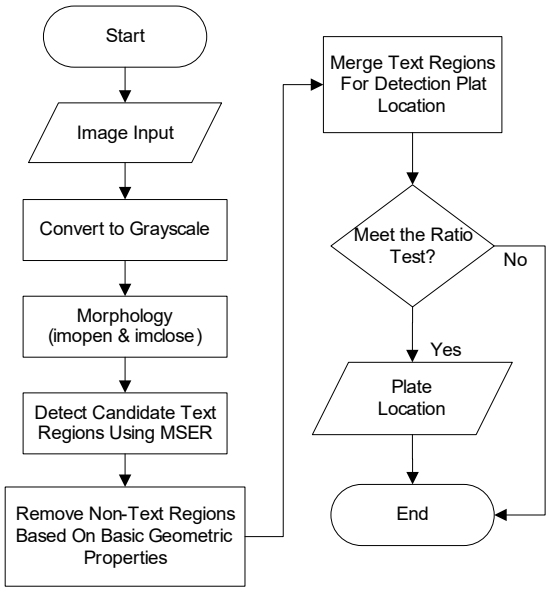


Fig.2 Flowchart System

Although the MSER algorithm selects most of the text, it also detects many other stable areas in images that are not text. A simple rule-based approach is used to filter non-text regions based on geometric properties. There are several geometric properties to distinguish between text and non-text [2,3], namely: Aspect Ratio, Eccentricity, Euler Number, Extent, Solidity. In MSER regionprops is used to measure some of these properties and then remove the region based on its property values. After that merge the text area to detect the location of the plate. One approach to combining individual text areas is to first find the neighbors text area and then form a bounding box around this region. To find neighbors areas, expand the delimiters calculated previously with the region.

Once the text regions are identified, a suitable geometric context is used to locate the plate. A bounding box will be estimated to cover the plate by defining the top, bottom, left, and right borders in sequence. After that, we get a rough estimate of the left and right boundary lines. On the plate, the ratio of plate width to height is constant. When the height of plate h is predicted, w wide plate can

ISBN : 978-602-99806-3-9

also be obtained.

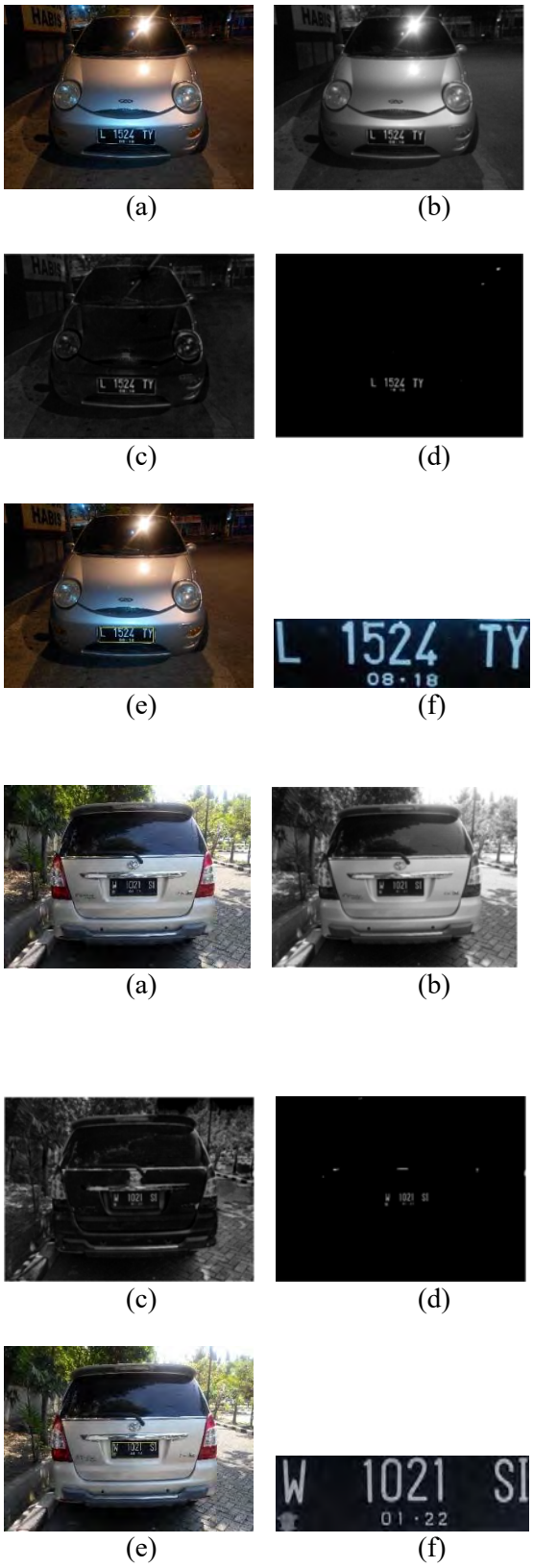


Fig.2 Input Image (a), Grayscale (b), Morphology (c), Candidate Text Regions (d), Plate Location (e), Cropping Result (f).

ISBN : 978-602-99806-3-9

4. EXPERIMENTAL EVALUATION

To perform testing in this study the authors use the application Matlab R2015a and notebook with the specification of Intel Core i3-3217U @ 1.60 GHz 1.60 GHz, 3 Gb RAM.

Table 1 Testing Result Sample

Image Number	Result	Time (s)	Image Number	Result	Time (s)
1	1	34.07	9	1	32.53
2	1	33.59	10	1	33.30
3	1	31.87	11	1	32.84
4	1	32.12	12	0	34.13
5	1	33.54	13	1	33.61
6	1	34.03	14	1	32.84
7	0	33.95	15	1	33.28
8	1	32.50	16	1	33.80

In Table 1, it can be seen that from 16 images sample data there are 14 images that can be detected plate location. Thus the value of the success accuracy of 87.5% and with an average computation time of 33.25 seconds.

5. CONCLUSION

Based on the testing results, the MSER feature detector can find the text area well. It holds consistent color and high text contrast. Therefore high-resolution number plates and various backgrounds can be done effectively. The experimental results show that from 16 images with size 4208 x 3120 pixels with a complex background detection the accuracy is 87.5%, and the average detection time is approximately 33.25 seconds.

6. ACKNOWLEDGEMENTS

The authors thank the University of Pembangunan Nasional Veteran Jawa Timur, especially for Informatics Engineering and Computer Science Department for providing financial support for this Research.

7. REFERENCES

[1] Ktata Sami, Khadharaoui Taher, Benzarti Faouzi, A.H. Tunisian License Plate Number Recognition. Procedia Computer Science, 73, 2015, pp.312-319.

[2] Wang, R., Xia, Y., Wang, G., & Tian, J. License plate localization in complex scenes based on oriented FAST and rotated BRIEF feature. Journal of Electronic Imaging, 24.5, 2015, pp.053011-053011.

[3] Lowe, David G. Distinctive image features from scale-invariant keypoints. International journal of computer vision 60.2, 2004, pp.91-110.

ISBN : 978-602-99806-3-9

[4] Yi, Zheng, Cao Zhiguo, and Xiao Yang. Multi-spectral remote image registration based on SIFT. Electronics Letters 44.2, 2008, pp.107-108.

[5] Zahedi, Morteza, and Seyed Mahdi Salehi. License plate recognition system based on SIFT features. Procedia Computer Science 3, 2011, pp.998-1002.

[6] Bay, Herbert, Tinne Tuytelaars, and Luc Van Gool. Surf: Speeded up robust features. Computer vision–ECCV 2006, 2006, pp.404-417.

[7] Leutenegger, Stefan; CHLI, Margarita; SIEGWART, Roland Y. BRISK: Binary robust invariant scalable keypoints. In: Computer Vision (ICCV), 2011 IEEE International Conference on. IEEE, 2011. pp.2548-2555.

[8] Panchal, Tejendra, Hetal Patel, and Ami Panchal. License plate detection using Harris corner and character segmentation by integrated approach from an image. Procedia Computer Science 79, 2016, pp.419-425.

[9] Zhou, Wengang, et al. Principal visual word discovery for automatic license plate detection. IEEE Transactions on Image Processing 21.9, 2012, pp.4269-4279.

[10] Chen, Huizhong, et al. Robust text detection in natural images with edge-enhanced maximally stable extremal regions. Image Processing (ICIP), 2011 18th IEEE International Conference on. IEEE, 2011, pp.2609-2612.

[11] LI, Yao; LU, Huchuan. Scene text detection via stroke width. In: Pattern Recognition (ICPR), 2012 21st International Conference on. IEEE, 2012, pp.681-684.

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

The open group architecture framework: design of information technology architecture (case study: Faculty of Economics, XYZ University)

*** Ronggo Alit, Eva Y Puspaningrum, Firza Prima A**
Faculty Of Computer Science, Universitas Pembangunan Nasional Veteran Jawa Timur, Indonesia

ABSTRACT: Competition among universities requires managers to always improve the speed of information services to all stakeholders. The speed of information services takes the biggest role in technology. The role of strategy and promotion for college at this time cannot be ignored its existence to inform the public, and maintain the continuity of the lecture. The application of enterprise architecture aims to create alignment between business and information technology for the needs of the organization. The TOGAF framework is one of the company's detailed, complete and easy-to-use corporate frameworks. This research produces a proposal to improve the application architecture and propose improvements in technology architecture in universities and by using TOGAF framework then an organization can plan an enterprise architecture that can be implemented by universities to achieve its organizational goals. This architectural model can be a basic model for higher education institutions in the development of enterprise architecture.

Keywords: Enterprise Architecture, Higher Education Institutions, TOGAF Framework

1. INTRODUCTION

As one of the faculties in a private University in Surabaya, Faculty of Economics, XYZ University used information system-based technology as the supporting activities of the organization. Information systems are used as supporting in Ministry to students, academic faculty and administration associated with the purpose of assisting the implementation of the activities of the organization.

The problems that occur when these are less effective use of information systems at the Faculty of Economics, XYZ University and lack of support for the existing business process. The core of enterprise architecture is about developing and planning IT resources, and also aligning business strategy through IT.[1]

2. ENTERPRISE ARCHITECTURE

Enterprise Architecture is a blend of organizational descriptions of integrated business and IT perspectives [2], Enterprise Architecture is a statement of how an organization initiates and generates improvement recommendations related to the implementation of IT and business processes in the Organization so that it becomes even better [3],

Enterprise Architecture continuously affects organizational and technology management within the Organization for the development of information systems and produces blueprints[4] from various disciplines both theoretically and practically. Enterprise architecture is a practice of improving management and has a very complex function for companies and information systems and infrastructure.[5]

Enterprise architecture is an important instrument in enterprise integration, combining all sections of the company principles, methods and models used in the organization's realization,

ISBN : 978-602-99806-3-9

structural design, business processes and infrastructure. [6]

Enterprise architecture is the basic knowledge that consists of elements of the internal and external business environment and the relationships that produce the outcomes used for the improvement of the IT organization.[7]

TOGAF (The Open Group Architecture Framework) is a framework consisting of a series of support tools and methods for developing enterprise architecture. The enterprise architecture development method is owned by a TOGAF framework called TOGAF ADM (Architecture Development Method) and the core of the TOGAF framework itself. TOGAF ADM is a generic method that can be used to develop and manage enterprise architecture models and is designed to handle most system and organizational needs [8]. TOGAF (Open Group Architectural Framework) is a framework for enterprise architecture developed by open groups in 1995 to the present day. TOGAF is a framework in the form of a stage method for the Organization in creating enterprise-level architecture.

TOGAF is a development of TOGAF Architecture (ADM), this method proved able to develop business enterprise framework that is detail, complete and easy to use. Business.[9]

The Open Group Architecture Framework (TOGAF): is a "Technical Architectural Framework that comes from the US Department of Defense". TOGAF was introduced in 1995 for management as well as technology. This is an easy to understand framework and, for this reason, any organization can use TOGAF freely to design EAs.[10]

3. METHOD

In Fig 1 showing the stages performed in this study consists of an analysis of business processes and business architecture modeling. Business process analysis is conducted to get an idea of what business processes are currently running in the environment Faculty of Economics, XYZ University.

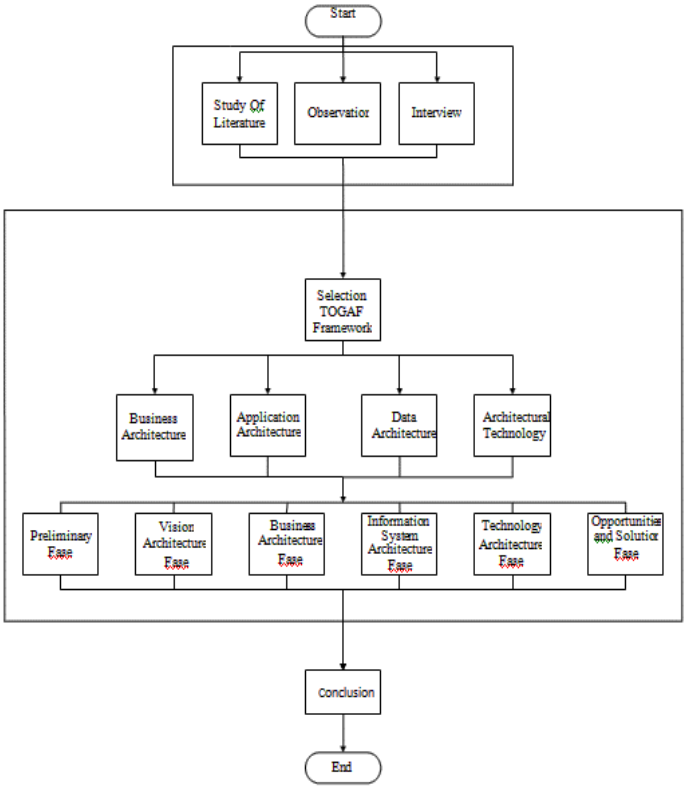


Fig.1 Research Flow

ISBN : 978-602-99806-3-9

4. RESULT AND DISCUSSION

4.1 Architecture Vision Phase

Vision: "Becoming a national-class Economics Faculty superior in economics and business in 2020."

4.2 Business Architecture Phase

The following are the business processes in the Faculty of Economics, XYZ University, which is illustrated with a diagram of the value chain. Here is a diagram of the value chain the Faculty of Economics, XYZ University.

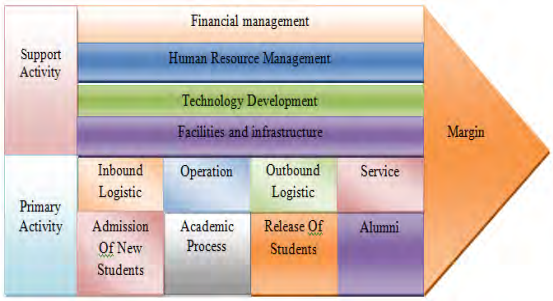


Fig.2 Value chain business area Faculty of Economics, XYZ University

The following is a description of the main activities and supporting activities the Faculty of Economics, XYZ University which are described as follows: The main activity, consisting of:

1. Inbound logistic: admissions is an activity which includes the admissions process, selection of new students, the announcement of the results of the selection of new students and new students logging.
2. Operation: of the academic process is an activity related to the management of curriculum, lectures, attendance, exams, grades, KRS, KHS and academic transcripts.
3. Outbound logistics: release of student activities related to the management of the end of the academic or the release of academic study students as of late, the start of the final project registration.
4. Service alumni is an activity that the management of alumni data, data collection where alumni work and job center management as media that help alumni in looking for job for those who have not get job or look for job vacancy installed in job center.

The supporting activities, consisting of:

1. Financial management is the activity related to the effort to provide financial management support that range on budget planning, investment and maintenance of the infrastructure with all the activities of the academic Operational.
2. Human resource management is supporting activities for the determination of needs, monitoring and allocation of human resources, especially at the academic operational activity. Including the management of staff and lecturers (professors or lecturers remained outstanding.
3. Operational and administrative as well as for educational activities.
4. Development of technology is the management of information technology for activities Facilities and infrastructure is the activity of facilities and infrastructure management support.

4.3 Information System Architecture Phase

ISBN : 978-602-99806-3-9

The result of the data architecture that is either a Data Component Diagram has a purpose and that is to identify and manage all the data used in the institution of education. The following is a Diagram of the Component Data used are described in table 1 below.

Table 1 Data Architecture

Data Code	Data Name	Data Owner
DT_1 A	Plan Card	Academic
DT_2 A	Result Card	Academic
DT_3 A	Transcript	Academic
DT_1 SR	Lecture Evaluation	Students Resource
DT_2 SR	Student Biodata	Students Resource

4.4 Application Architecture

The following analysis of the gaps in the application of the Faculty of Economics, XYZ University.

Table 2 Application Architecture

Application	Reply	Add
DPAM	Academic Division	-
LIK Online	Academic Division	-
PMB Online	Student Affairs	-
PKTS	Student Affairs	-
Bill Information	-	Administration Division

4.5 Technology Architecture Phase

Below is an overview of the proposed infrastructure technologies that are currently available or is being used by the Faculty of Economics, XYZ University of can be seen in Fig 3

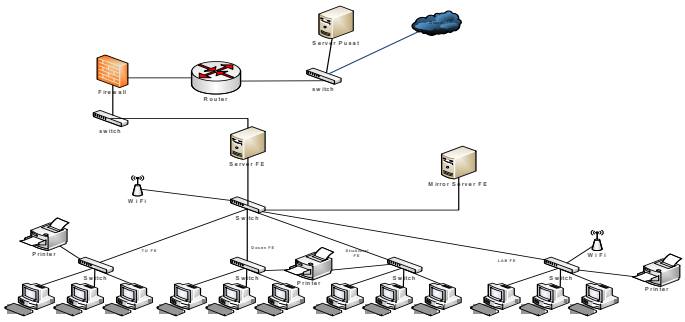


Fig 3 Proposed Technology Architecture

ISBN : 978-602-99806-3-9

4.6 Opportunities and Solution Phase

The gap analysis is useful for explaining what components should be retained or removed from the current system at the Faculty of Economics, XYZ University and to explain what components should be replaced or added (add) with new components of proposed architecture.

The gap analysis is made in matrix form, with the following conditions:

1. Placement of all components of the target architecture (future) in the first uppermost first row of the matrix. An existing system component is placed in the leftmost first column of the matrix.
2. If an existing system component exists within the target architecture component (future), then mark the intersecting cells with "retain" information (the old components are retained and used).
3. If the target architecture component (future) is not contained in the existing system components (existing), then mark the "add" description. All the components given the "add" information are new components.

5. CONCLUSION

Based on the results of the discussion on this research, retrieved some of the conclusions are:

1. It generates architectural planning information systems Faculty of Economics, XYZ University consisting of business architecture, application architecture, data architecture, and architecture technology.
2. It generates a draft proposal which includes the following :
    a. The proposed improvements to the application architecture
    b. The proposed technology architecture improvement

6. ACKNOWLEDGEMENTS

The authors thank the University of Pembangunan Nasional Veteran Jawa Timur, especially for Informatics Engineering Department and Faculty Of Computer Science for providing financial support for this Research.

7. REFERENCES

[1] V. Agievich and K. Skripkin, “Enterprise Architecture migration planning using the Matrix of Change,” *Procedia Comput. Sci.*, vol. 31, no. Itqm, pp. 231–235, 2014.

[2] D. H. Olsen and K. Trelsgård, “Enterprise Architecture Adoption Challenges: An exploratory Case Study of the Norwegian Higher Education Sector,” *Procedia Comput. Sci.*, vol. 100, no. 1877, pp. 804–811, 2016.

[3] J. W. Ross and J. W. Ross, “Enterprise Architecture as Strategy Business Execution,” no. March, 2014.

[4] B. G. Doucet, J. Gøtze, P. Saha, and S. Bernard, “Article Coherency Management : Using Enterprise Architecture for Alignment , Agility , and Assurance,” no. May, pp. 1–12, 2008.

[5] J. Lapalme, A. Gerber, A. Van Der Merwe, J. Zachman, M. De Vries, and K. Hinkelmann, “Exploring the future of enterprise architecture: A Zachman perspective,” *Comput. Ind.*, vol. 79, pp. 103–113, 2016.

[6] M. M. Lankhorst, “Enterprise architecture modelling - The issue of integration,” *Adv. Eng. Informatics*, vol. 18, no. 4, pp. 205–216, 2004.

[7] G. W. Sasmito, “Annual Performance Planning Information System with Enterprise Architecture Modelling the Secretariat of the Central Java Province Parliament Used Framework Togaf,” *Int. J. Soc. Sci. Humanit.*, vol. 3, no. 4, pp. 334–338, 2013.

ISBN : 978-602-99806-3-9

[8] P. Desfray and G. Raymond, *Togaf®*. 2014.

[9] Z. Chaczko, A. S. Kohli, R. Klempous, and J. Nikodem, "Middleware integration model for smart hospital system using The Open Group Architecture Framework (TOGAF)," *INES 2010 - 14th Int. Conf. Intell. Eng. Syst. Proc.*, pp. 215–220, 2010.

[10] M. Sajid and K. Ahsan, "Role of Enterprise Architecture in Healthcare Organizations and Knowledge-Based Medical Diagnosis System," *J. Inf. Syst. Technol. Manag.*, vol. 13, no. 2, pp. 181–192, 2016.

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

Normal leaf knowledge on soybean plant based on threshold

*** M.Syahrul Munir, Fetty Tri Anggraeny**
[1]Faculty of computer science, Universitas Pembangunan National "Veteran" Jawa Timur, Indonesia;

ABSTRACT: Soybean plants have become commonly known by the people, especially farmers in Indonesia, how not in today's processed soybean plants vary widely. From the processed start in the form of nuts, processed soy essence, to a variety of other processed foods such as: tofu and tempeh. The high public interest and soybean variety variations so that soy can be regarded as a staple food that can be used as the primary food of some people, especially the Indonesian nation. One way to measure the growth of healthy soybean plants can be done with observations of leaf color changes. Where the function of the leaves is as a place of photosynthesis so as to produce a healthy seed and not easily attacked by pest disease. This study looked at leaves that lacked phosphorus (P) by comparing leaf color values to threshold

Keywords: soybean leaf, phosphorus, threshold

1. INTRODUCTION

Soybeans known in the community are soybeans already in processed form, where rarely people have soybean crops. Soybean plant is one of the plants belonging to the type of plant legumes that grows the land of China that has existed since 2500 BC. In line with the growing trade between countries that occurred in the early 19th century, causing soybean crops also spread to various destination countries such as Japan, Korea, Indonesia, India, Australia, and America. Soybean began to be known in Indonesia since the 16th century.

Beginning of the spread and cultivation of soybeans in Java, then developed to Bali, Nusa Tenggara, and other islands. Soybean plants generally grow upright, shrubs, and is a seasonal plant. The morphology of soybean crop is supported by its main components namely, roots, stems, branches, leaves, flowers and seeds so that the growth can be optimal. Growth of healthy soybean plants with unhealthy ones can easily be observed on the leaves, because through the naked eye on soybean plants is a dominant form that can be observed especially from the color change. Normally grown soybean leaves generally have three-stalk leaves as shown in Figure 1.

Figure 1.Soybean

ISBN : 978-602-99806-3-9

Normal leaf color changes in soybean plants are said to have a healthy dark green color followed by the growth of leaves below evenly colored so that in soybean if it grows not normal can be observed from different colors in one plant. The visible color changes in differentiating the leaves under normal conditions and the strain of nutrients is the basis of research on this topic, The number of variables that affect the growth of soybean crop so that in this study will be done only focus on the color changes in the leaves. An experiment was conducted to observe the color change in the leaves by applying a threshold value.

2. METHODOLOGY

The observation research on soybean leaf can be explained in accordance with the diagram below:

2.1 Image

The image used in this research is the image data of soybean leaf. The leaf image taken beforehand has been done some treatment by consultation to expert soybean plant expert, so that soybean plant growth can be controlled. The treatments included the selection of seeds of soybean seeds, selected seedlings taken from BPTP-Malang with the type of arjuno seeds, which is a superior variety that can grow in the region of Java province, especially East Java.

Fertilization treatment is also done with soil control and type of fertilizer given on soybean crop, so that growth can be controlled for data retrieval research.

2.2. Preprocessing

At this stage the image of the leaf is taken by using a Sony lens camera, for shooting done in the afternoon for the consistency of lighting can be uniform, noise improvements in the image is also done by guided by soy expert experts by doing uniform background on the leaves. At this stage is also done grayscale process is the image that each pixel is a single sample, that is information intensity. This type of image is only formed of gray color that has different intensity. To make a full color (RGB) image change into a grayscale image, a commonly used method is:

(R + G + B)/3

where:
R: Red color element
G: The green color element
B: The element of blue color
The value generated from the above equations will be inputted each element of the basic color of the grayscale image.

2.3. Thresholding

In general, the process of thresholding to grayscale image aims to generate binary images, mathematically can be written as follows.

$$g(x,y) = \begin{cases} 1 \; if \; f(x,y) \geq T \\ 0 \; if \; f(x,y) < T \end{cases}$$

With g (x, y) is the binary image of the grayscale image f (x, y), and T denotes the threshold value. The value of T is determined by using global thresholding and local thresholding methods.

ISBN : 978-602-99806-3-9

2.3.1 Otsu Method

The purpose of the otsu method is to divide the gray level gristle histogram into two different regions automatically without requiring the user's help to enter the threshold value. The otsu method performs discriminant analysis by determining a variable by distinguishing between two or more groups naturally. The otsu method starts with the normalization of the image histogram as a probability discrete density function as:

$$Pr(rq) = \frac{nq}{n}, q = 0,1,2, \dots, L-1 \dots$$

Where :
n = total number of pixels in image.
nq = number of pixels rq.
L = total number of image intensity levels.

Then determine the value of T in the above equation by maximizing between class variance defined as follows:

$$\boldsymbol{\sigma \frac{2}{B} = \omega_0(\mu_0 - \mu_T)^2 + \omega_1(\mu_1 - \mu_T)^2} \dots.$$

where :

$$\boldsymbol{\omega_0 = \sum_{q=0}^{k-1} P_q\left(r_q\right)}$$

$$\boldsymbol{\omega_0 = \sum_{q=k}^{L-1} P_q\left(r_q\right)}$$

$$\boldsymbol{\mu_0 = \sum_{q=0}^{k-1} qp_q(r_q)/\omega_0}$$

$$\boldsymbol{\mu_0 = \sum_{q=k}^{L-1} qp_q(r_q)/\omega_1}$$

$$\boldsymbol{\mu_T = \sum_{q=0}^{L-1} qp_q\left(r_q\right)}$$

3. RESULT & DISCUSSION

In this study the introduction of nutrient deficiency of Phosphorus (P) can only be identified by soybean experts through observation of leaf morphological changes of leaves, so that observations made by local residents or who do not possess knowledge of soybean crops will be difficult, because morphological color changes are limited on the normal leaf color changes with abnormal and visible form of leaf patches that have patterns. So this research involves otsu method in analyzing spotting pattern by applying difference threshold value on soybean leaf color

ISBN : 978-602-99806-3-9

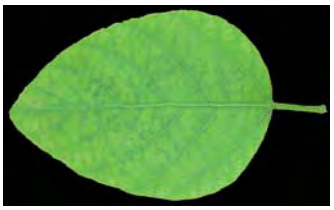


Figure 2. Normal leaves

Before the search for color threshold values on soybean leaves it is necessary to know the soybean leaf that grows normally and all the nutrients are met can be seen leaf body that grow will look young green. The color of this leaf will appear on the entire leaf (leaf body) so that the process of healthy seed formation through photosynthesis can run well. Examples of normal soybean leaves can be seen in Figure 2.

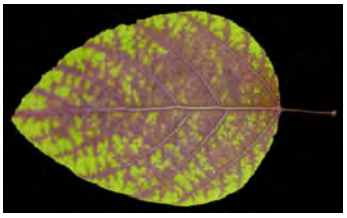


Figure 3. Leaf stricken with phosphorus

The second stage of preprocessing the treatment of soybean leaves that lack of phosphorus is done cleaning the image noise where the background part other than that needed for the research process will be eliminated, this is done in order to get the value of degradation of leaf color that is specific to the leaf body more optimum. In the body part of the leaves affected by phosphor nutrient deficiency can be seen in the brown color that creeps on the leaves so that the normal parts of the leaves are light green to brown as a whole so that when the leaves have been turned into brown whole, the plant can certainly die. An example of soy leaf stricken with phosphorus deficiency can be seen in figure 3

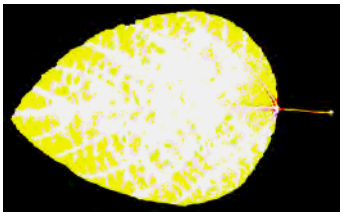
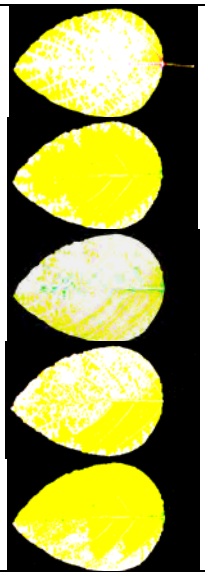


Figure 4. Leaves with the application of otsu

Determination of the color threshold value by using the threshold value of 1 then resulted in 2 parts of color, can be seen in figure 4 on the body of the leaf color white color is representative of the color element that lack of phosphorus nutrients, while the yellow spots are part of healthy leaves. The best threshold value ranges between 63-68 where experiments were performed with 5 leaves that lacked phosphorus nutrients as shown in table 1.

ISBN : 978-602-99806-3-9

Table 1 Result

Items	0tsu
	63,83
	72,80
	63,67
	68,01
	74,28

4. CONCLUSION

This study using five data leaves of soybean plant lack of phosphorus nutrients that have been consulted on soybean experts expert that changes in brown leaf spot color with green can be distinguished by using otsu method.

5. REFERENCES

[1] Lu Qing-hua and Zhang Xian-min. Multiresolution edge detection in noisy images using wavelet transform. in Proceedings of the Fourth International Conference on Machine Learning and Cybernetics. Guangzhou City. pp.5235-5240. August, 2005.

[2] Otsu, N., "A Threshold Selection Method from Gray-Level Histograms," *IEEE Transactions on Systems, Man, and Cybernetics*, Vol. 9, No. 1, 1979, pp. 62-66..

[3] Jun Pang, Zhong-ying Bai, 2011, Automatic Segmentation of Crop Leaf Spot Disease Images by Integrating Local threshold and Seeded Region Growing, IEEE, 978-1-61284-881-5/11.

[4] Shen Weizheng, Wu Yachun1 Chen zhanliang, Wei Hongda, 2008, Grading Method of Leaf Spot Disease Based on Image Processing, IEEE, 978-0-7695-3336-0/08.

[5] Dusan Heric and Damjan Zazula, Combined edge detection using wavelet transform and signal registration. Image and Vision Computing. Volume 25, Issue 5, 1 May 2007, pp. 652-662.

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

Local pixel analysis in color constancy to improve feature extraction process

***Wahyu S J Saputra and C Aji Putra**
Departement of Informatics Engineering, Faculty of Computer Science, Universitas Pembangunan Nasional "Veteran" Jawa Timur, Indonesia

ABSTRACT: The feature extraction process on a digital image uses a digital image matrix value. Digital image matrix has position information in the index of columns and rows, and the value of the degree of color within a given range of values. The 8-bit digital image has a 256 degrees color rating ranging from the lowest value 0, and the highest value is 255. Based on the combination of position information and the degree of color, more information can developed, such as information on the shape of the object. Gray images have a single dimension color. This paper used the process of feature extraction area used as the basis of information to find the resemblance of the object on two images. Feature will extracted from two digital images to compared, the image converted into gray image to speed up the computation process. The color space changes based on the base color of the RGB color space. A digital camera has an auto white balance feature that can affect the color consistency of an object in a digital image. This may affect the feature extraction process based on the color degree value. This paper proposed a method to get a consistent color configuration. The color difference value is acquire from the analysis of similar feature to the specified size. Color consistency in the image expected to improve accuracy in the process of recognizing objects based on features.

Keywords: Local Pixel, Color Constancy, Feature extraction, Digital Image Processing

1. INTRODUCTION

Image is a representation of the external form of a person or thing in art. Image can be display in digital or print form. Digital images are data stored on a matrix. The dimension of the matrix determines which digital image data can be stored, as in the gray image, a two-dimensional matrix is used, whereas in the color imagery three-dimensional matrices are used. In digital image, the value of row and column matrix is the coordinate value on the two dimensional function while the value on a matrix element is the value of the gray level of the image at the point corresponding to the real image. The matrix element in the digital image also called a pixel, so if there is a digital image with size 2046 x 800 pixels it can be said that the digital image matrix has the size of 2046 rows and 800 columns. in colored images besides having row and column dimensions there is also a third dimension matrix index, so it can be said that in color digital images there are several matrix layers of the same size in which each matrix layer is a representation of an intensity of color [1]. Each layer of matrix that has a gray intensity on each element could be incorporate to produce a color with a certain depth. The matrix layer is a matrix representing red, green, and blue or called RGB. Every element of the matrix has a gray degree value between 0 and 255, so it can be says that every matrix element is capable of storing 256 colors.

Color constancy is a capability that allows recognizing a color even under colored light. The color of an actual object is fixed but due to the reflection of the colored light it is often see to change, this is due to the surface reflection function that causes the color change, as it is influence by the light of origin. Nowadays there is an interest to do research about color constancy on digital image data. The study refers to a process whereby there are objects that have a fixed and unchanging color that is

ISBN : 978-602-99806-3-9

affect by changes in lighting when the process of digitizing takes place. Research on color constancy is necessary to support the process of artificial intelligence, especially the process of recognizing the object of a digital image based on complex colors [2]. Although it is generally that humans have a wide range of color constants but based on research on human color constancy that takes into account empirical evidence, the mechanism of color constancy can be divide into two classes namely adaptation mechanisms and simultaneous mechanisms [3]. The mechanism of adaptation is a temporal interaction mechanism because the sensitivity of the visual system especially to the chromatic channel changes in response to the change of light over time. A simultaneous mechanism, defined as the spatial interaction between chromatic channel responses to light, in simple form a simultaneous mechanism relying only on temporal parameters. An example of this mechanism is the simultaneous color contrast [4, 5, 6, 7, 8, and 9] and normalization [10]. There is data indicating that adaptation mechanisms alone or in combination with simultaneous mechanisms can result in large shifts in hue and saturation [4, 5, 6, 7, 8, and 9].

White balancing is one of the stages that affect the process of color change when the process of digitizing takes place. White balancing will adjust a color in the object according to the white composition of the image frame being retrieve. White balance process is often see in some digital optical devices such as digital cameras. White balance process is often execute automatically by the digital camera system when digital image taking takes place. Gray world and Retinex methods are common methods used for white balancing. Gray world and Retinex methods can be combine to find alternative methods [11]. Color constancy process can be used as an image repair process by observing the effect of the light source, by estimating the illumination by calculating the mean of each color space of the image [12]. In digital imagery, the digitalization process is a process performed by a digital optical device that captures the reflection of light from objects. Reflection and lighting are two very important things in image formation, gray-world and gray-edge called white patches can be used to estimate illuminant and reflectance values. Illuminant and reflectance value information is very important to support the process of color correction. Gray-world and white-patch methods have a high probability and work well on high-contrast images [13].

In the process of digital image analysis, some processes need to be done to get the desired information from an image. Digital image data is usually a matrix, so it needs to be more in-depth process to get more information including form recognition, color, or object name. Image data can also use as a basis for finding other imagery that has similar object content. Segmentation process and extraction of digital image features is use to obtain the desired information from a digital image. The Otsu method is one of the segmentation methods that used to separate the image against the background. Two outputs of the Otsu method are process with canny edge detection and color mapping, combined with the thermal threshold value of the thermal image to obtain alternative segmentation methods [14]. Feature extracts are typically use as a preliminary process to obtain information from digital imagery. Information obtained from the feature extraction process used for the introduction or classification of objects in digital images. The introduction or classification of objects is a problem that is raise in the topic of visual computer research. Identification of objects present in a frame based on extracted features. The extracted feature must be unique to distinguish one object from another. Speeded up robust features (SURF) is one of the feature extracts that used in color image data [15]. SURF is one of the feature extraction methods based on the value of the digital image matrix element. Value of the digital image matrix element is a gray degree value of the color space of the corresponding element to produce a color image. Digital images of the same object on different frames can produce different intensity of gray values due to the intensity of light as well as the composition of different additional objects. It happens due to the white balance process that automatically runs when the process of shooting or the process of digitizing takes place. The result of the digital image obtained will produce a different color composition even though there is the same object inside. This can interfere with the feature extraction process and feature matching process because the color intensity recorded on each element of the digital image matrix results in a much different value.

This paper proposed an alternative method of feature extracting process. Feature extraction in this

ISBN : 978-602-99806-3-9

study was conduct on two images that have experienced the process of color firmness. Contribution of this research is the process of color firmness based on local pixel analysis. Process of color constancy begins with a feature extraction process on two images, which then performed feature-matching analysis. Pixel area of the two images the corresponding feature then processed to obtain the color difference values of the two images. Image will adjusted by shifting the contrast to get a similar color intensity value. Improving the color intensity of the two images can improve the feature results obtained from the feature extraction process. Result of this research will be tested by using SURF feature extract, which then the results will be validated by matching process features obtained from two images. Results will compared with the extraction process without color adjustment.

2. METHOD

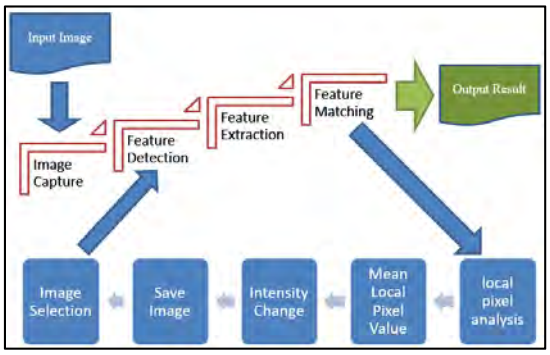


Fig.1 Research Method

Data used in this research is image data taken by using digital camera. Shooting process using auto white balance feature. The object used is a random object contained in a scenario. The analysis will be process on two images taken with different object compositions, but there are several similar objects. Stages of the process in this study seen in Fig 1. The research stages begins with taking pictures using a digital camera. Process is continue by changing the position of the object and the composition of the object, then using the same digital camera and without changing the white balance settings. Both images will then extract its features using SURF. Both features will then be match by using feature matching so the selected features match. Once the feature is match, the feature group data will be re-select by using Random Sample Consensus (RANSAC) or an estimate of the geometric transformation to analyze pixels that change due to geometric transformation. Geometric transformation such as translation and rotation. After obtaining a feature that is considered to be same feature then the selected feature point will be marked as the location area to be analyzed further. The selected area has a predetermined area. Determination of the area of selected area in this study is determined based on image size. This paper used image data with the size of 2448 x 3264 uint8 pixels so that the area used for the selected feature area is 51 x 51 pixels. The area size uses an odd number in order to specify the middle value as the feature point. Pixel analysis is continue by extracting the intensity data from the image matrix element in the specified area, the intensity data is compared to obtain the difference of the intensity value at the corresponding pixel. Average value of each feature point then used as a basis for changing the intensity value of the initial image

The intensity changes image will saved into a new image. The new image consists of two kinds, for the image that has the difference below the mean value then the intensity value on each element of the image will added with the mean value. While the image has the difference above the mean value, the intensity value on each element of the image will subtracted by the mean value. Mean values of each element of the feature area are obtained using the following formula.

$$MeanGrey = \frac{1}{(n*m)} \sum_{i=1}^{n} \sum_{j=1}^{m} (A_{i,j} - B_{i,j}) \quad (1)$$

ISBN : 978-602-99806-3-9

Where $MeanGrey$ is the average value of the difference in intensity of the two corresponding feature. $A_{i,j}$ and $B_{i,j}$ is every element in image A and image B. New image of the result of the intensity change calculated using the following formula.

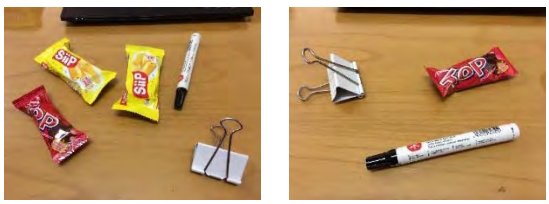
$$sValue_{i,j} = A_{i,j} - MeanGrey \quad (2)$$
$$qValue_{i,j} = B_{i,j} + MeanGrey \quad (3)$$

Where $sValue$is a new image obtained from changes in the intensity value of the first image, while $sValue$ is a new image obtained from the change in the intensity value of the second image. Next to the test process is do with the same stages as when performing detection and feature extraction, but the image data used is new image data. The test results will use cross data i.e. image A compared with $qValue$, then $sValue$ compared with image B, and $sValue$ compared with $qValue$

3. RESULT AND DISCUSSION

The data used as test data is the image obtained by using a digital camera. The image taken from a scenario by arranging objects on a table. It consists of snacks, markers, and clips as shown in Fig. 2a and 2b. Seen from Fig. 2a and 2b there is a difference in the composition of the object. Differences in the composition of the object performed to test the feature detection process, feature extraction, and feature matching process. From the two pictures in Fig. 2 there are several objects that are the same, but because the composition of the object is different, then two images show the difference in light intensity reflected by the object. From the picture shows that there are differences in intensity, especially on the object table which is the background object of the image. The table color in Fig. 2b is brighter than the table color in Fig. 2a. The difference in the value of the intensity of the local pixel will used to change the color in order to obtain a constant color of the two images.

In accordance with the method proposed in this study, the first step is to perform feature detection process in both imagery using SURF method. The features that have been obtained then extraction process followed by the feature matching process to obtain the corresponding feature data between the first image with the second image. The result of feature matching is then marked as in Fig. 3.



(a) (b)

Fig.2. (a) First Scene, (b) Second Scene

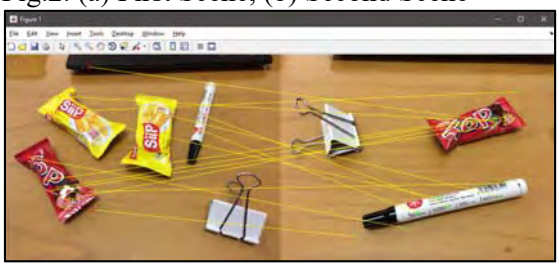


Fig.3. Mark Result of Feature Matching

The next process is a process to estimate the geometric transformation using the RANSAC method to obtain a valid feature. As shown in Fig. 3 there are still some features that considered good even though they are not compatible. The results of the geometric transformation estimation process shown in Fig. 4. It seen in Fig. 4 that there are three selected features right on the same two objects

ISBN : 978-602-99806-3-9

in different imagery. Selected features are then performed pixel analysis around the feature point of 51 x 51 pixels. Feature point then calculated the average difference in intensity of the area that has been determined. The next intensity difference used to change the intensity of the image to be lighter or darker according to the formula described in the method sub-chapter.

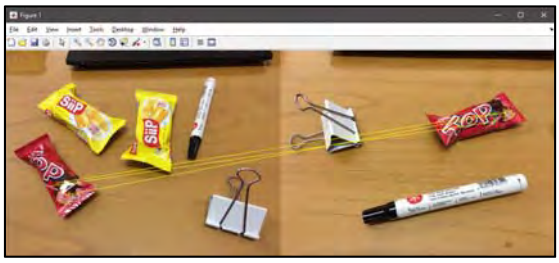


Fig.4. Result of Feature Matching After Estimate Geometric Transform

An image that has been process in intensity will have a different color from the original image. The color difference that occurs due to changes in the intensity value of each element of the matrix in each color space. The change in intensity value seen from the histogram changes from the original image compared to the image of the result. Histogram change as shown in Fig. 5 shows that the image changes to be brighter.

The next process is to perform feature detection, feature extraction, and perform feature matching using the new image data. Two new image data will used as input images by cross-comparison according to the test scenario described in the method sub-chapter. The results of the test scenarios will displayed in table form with the variable number of features as well as the number of feature matches. The number of feature matches in this research was used as a measure of the success of the proposed method. The results of the test process as shown in Fig. 6, 7, and 8, that there is a change in the number of features detected as features that have a match. In Fig. 6, we used the first image data with the second new image data, while in Fig. 7 we used the first image data with the second image data. In Fig. 8, we use new data for the first and second images.

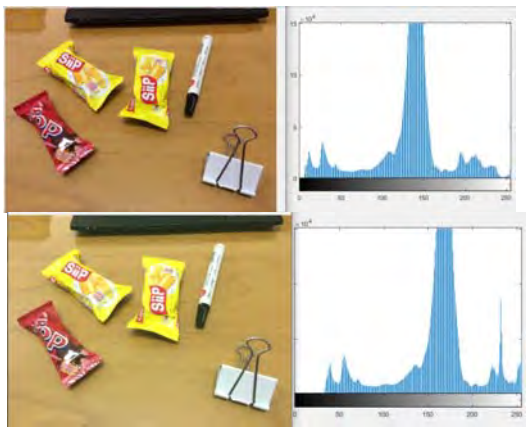


Fig.5. Result of Intensity Change

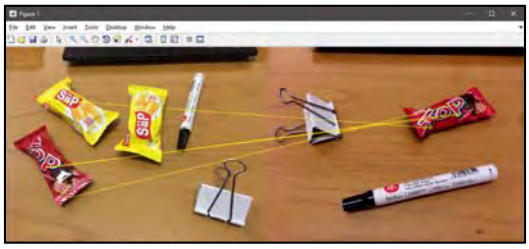


Fig.6. Result of Intensity Change

ISBN : 978-602-99806-3-9

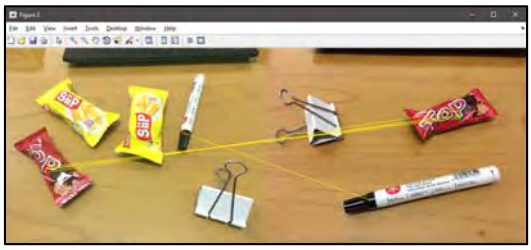


Fig.7. Result of Intensity Change

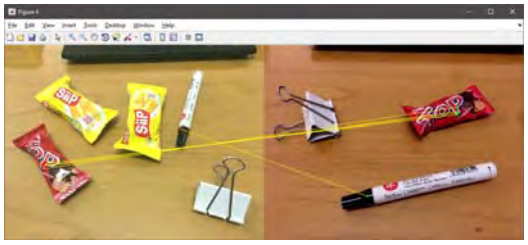


Fig.8. Result of Intensity Change

4. CONCLUSION

The proposed method has influenced the outcome of the feature detection process, feature extraction, and feature matching process. Seen from the test results performed, there are differences in the results of feature matching. The proposed method looks able to increase the number of features successfully matched. From the test results, it can concluded that the proposed method has been successful, with some shortcomings. The shortcomings of which are visible from some objects still not detected as the same object.

5. ACKNOWLEDGEMENTS

This research partially supported by University of Pembangunan Nasional “Veteran” Jawa Timur Departement of Computer Science.

6. REFERENCES

[1] Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing Third Edition, Pearson Prentice Hall, Upper Saddle River, New Jersey 07458, ISBN 0-13-168728-x, 978-0-13-168728-8

[2] Horn. B. K. P., Determining lightness from an image, Comput. Graphics Image Process. 3, 277-299 1974; D. Mdrr, Vision, Freeman, San Francisco, 1982

[3] Arend L. and Reeves A., Simultaneous color constancy, Vol. 3, No. 10 October 1986 J. Opt. Soc. Am. A

[4] Kries J. von, Die Gesichtsempfindungen, Handbuch Physiol. Menchen 3, 211 1904

[5] Helmholtz H. von, Handbuch derPhysiologischen Optik, 2nd ed. (Voss, Hamburg, 1896)

[6] Ives H. E., The relation between the color of the illuminant and the color of the illuminated object, Trans. Illum. Eng. Soc. 7, 62-72, 1912

[7] Helson H., Fundamental problems in color vision. I. The principle governing changes in hue, saturation and lightness of nonselective samples in chromatic illumination, J. Exp. Psychol. 23, 439-436 , 1938

[8] Helson H., Judd D. B., and Wilson M., Color rendition with fluorescent sources of

ISBN : 978-602-99806-3-9

illumination, Ilium. Eng. 51, 329-346 1956

[9] Wyszecki G. and Stiles W. S., Color Science, Wiley, New York, 1967.

[10] Wallach H. and Galloway A., Constancy of colored objects in colored illumination, J. Exp. Psychol. 36, 119-126, 1946.

[11] Lam E.Y. Combining gray world and retinex theory for automatic white balance in digital photography, Consumer Electronics, 2005. ISCE 2005. Proceedings of the Ninth International Symposium on 14-16 June 2005, DOI: 10.1109/ISCE.2005.1502356

[12] Waspada H. P, Peningkatan Kualitas Citra Digital Berbasis Color Constancy Menggunakan Gray World, No Book-2, 2016: Prosiding SENIATI 2016

[13] Provenzi Edoardo, Computational Color Science: Variational Retinex-like Methods, DOI: 10.1002/9781119407416.ch2, Online ISBN: 9781119407416, Published Online: 24 MAR 2017

[14] Ko Byoung Hwan and Kim Hi Seok, Using Enhanced-Color Mapping Algorithm for Object Boundary Segmentation, International Journal of Applied Engineering Research ISSN 0973-4562 Volume 12, Number 15, 2017, pp. 5187-5190

[15] Muthugnanambika M., Padmavathi S., Feature detection for color images using SURF, Advanced Computing and Communication Systems (ICACCS), 2017 4th International Conference on 6-7 Jan. 2017, DOI: 10.1109/ICACCS.2017.8014572

ISBN : 978-602-99806-3-9

Determination of chromium content in various foodstuffs

Rudiana Agustini and I Gusti Made Sanjaya
Department of Chemistry, Faculty of Mathematics and science,Surabaya State University, Indonesia
E-mail is rudianaagustini@unesa.ac.id

Abstract. Research has been conducted to identify the content of chromium in foodstuffs, including broccoli, celery, snake grass, green mustard greens, tomatoes, carrots, beans, green beans, cauliflower, chicory, cassava, potatoes, black rice, white rice, brown rice, black sticky rice, yeast (bakery yeast) and yeast extract commercial. The determination of chromium was carried out using voltammetry method, whichthe results were processed using OriginProprogram. The data were then analyzeddescriptively. The results showed that the foodstuffs containing the highest $Cr^{3+}$is cauliflower that is 280 x 10^{-4}%, but the Cr^{6+} content is83 x 10^{-4}%.The foodstuffs containing Cr^{6+} in small quantities are cassava, nuts and commercial yeast, which is about 8 x 10^{-4}% to 9 x 10^{-4}%, but Cr^{3+}content is also not very high that is about 18 x 10^{-4}% to 21 x 10^{-4}%.

Keywords: Chromium content, Foodstuffs, Chromium in foodstuffs, chromium determination

1. INTRODUCTION

Chromium is one of the seven most abundant elements in the Earth's crust and at low concentrations is an essential element for living organisms naturally. Chromium is present in various forms of compounds. In addition to being Cr metal, the chromium is found as Cr^{2+}, Cr^{3+} (trivalent chromium), and Cr^{6+} or chromium hexavalent. Cr^{3+} is known to be non-toxic, while Cr^{6+} is toxic to the human body. Cr chemicals are persistent, bio-accumulative, toxic and not readily degradable in the environment, thus accumulating in the human body through the food chain. Cr from for example the soil environment is entering the food chain through the plant.According to the World Health Organization, Cr^{6+} concentrations in soil should not be more than 0.05 mg/L or 50 ppb [1]. Cr^{6+} compounds also have genotoxic, mutagenic, and carcinogenic properties [2]. The toxicity brought by this metal can harm vital organs such as liver, kidneys, cause lung cancer, acute poisoning, chronic, irritation to the respiratory system, and irritation to the human skin [3].

Various natural ingredients including foodstuffs are known to contain chromium, both Cr^{3+} and Cr^{6+} ions. Several studies have revealed that consumption of chromium can decrease type 2 diabetes mellitus (DM). Chromium is an essential mineral that the body needs for carbohydrate and fat metabolism [4]. Diabetes mellitus type 2 (T2DM) is the most common form of diabetes found worldwide [5] [6] [7]. This is characterized by abnormalities in pancreatic insulin secretion or actions that cause hyperglycemia due to impaired metabolism of carbohydrates, fats and lipids [5][7]. T2DM prevalence worldwide is increasing and more than 366 million people are expected to be affected by 2030[5][7]. T2DM is continuing to be a public health concern, and many people are using alternative medicine using chromium.Chromium is a common supplement used by many T2DM patients for the purpose of improving glucose regulation and in 2002 sales of chromium supplements were estimated at $85 million [8].

According to the National Institute of Health: Dietary Supplement Office, adequate intake of Cr for men and women is 35 and 25 μg/day, receptively [5][9][10]. Chromium chloride is a natural

ISBN : 978-602-99806-3-9

trivalent chromium variety found in common foodstuffs sources such as: whole grains, broccoli, mushrooms and green beans. In contrast, Cr picolinateis the synthetic family of Cr chloride. Additional forms of Cr supplements can also come from Cr's yeast and brewer's yeast.Chromium is an important micronutrient associated with the regulation of many processes in the human body including glucose homeostasis.Chromium helps regulate glucose homeostasis by activating insulin receptors through chromodulin oligopeptide thus increasing insulin signal transduction and sensitivity. Cr deficiency can lead to glucose intolerance, high circulating insulin, hyperglycemia at the time of fasting, and even disruption of growth [5][11].

Chromium can be obtained from foodstuffs and is available in very small quantities (1-2 micrograms or less). Chromium in the foodstuffs has a form of chromium (III) (indicating the amount of oxidation). Trivalent chromium or chromium (III) or Cr^{3+} is the most stable chromium and most secure, including one of the least toxic. Cr^{3+} is relatively harmless and has a role in the body's metabolism, while Cr^{6+} has a potential of 100-1000 times more toxic than Cr^{3+} because it has a high oxidation potential.

The following is a list of foods rich in chromium: broccoli (18.55 mcg/1 cup), barley (8.16 mcg/0.33 cup), oats (5.38 mcg/0.25 cup), beans (2.04 mcg/1 cup), tomatoes (1.26 mcg/1 cup).Chromium has proven its involvement in the mechanism of treatment of type 2 diabetes in several ways, including by increasing glucose tolerance. Chromium supplements increase glucose tolerance in humans with type 2 of diabetes [12]. Cr supplementation with brewery yeast may provide a marginal benefit in lowering blood glucose levels in patients with T2DM compared with placebo but no effect on glycated hemoglobin [5].

It is generally accepted that chromium is an essential element for humans. Chromium deficiency has been described in both humans and animals, but a clear quantitative definition of the daily requirement of chromium in human nutrition has not been arrived at estimates that the daily minimum population mean intake likely to meet normal requirements for chromium mightbeapproximately33µg/person [1]. Results of panels related to the Food Supplement and Nutrition Source, Cr^{3+} added to food and food aimed at the general population (including dietary supplements), concluded that after oral administration, trivalent chromium is poorly absorbed. The result of in vitro bacterial mutagenic test consistently is negative. The panel concluded that in very large quantities, certain trivalent chromium compounds have been shown to be cytotoxic and cause chromosomal damage. The panel also evaluated long-term toxicity and carcinogenicity data for Cr^{3+}. Based on the facts, it is known: 1) a maximum intake level of up to 250 µg/day for additional intake, 2) that in vitro, at high levels of concentration, Cr^{3+} can cause DNA damage, 3) that DNA damage is not reflected in the in vivo genotoxicity test, 4) that Cr^{3+} is not carcinogenic, 5) that it is safe for a daily intake of 250 µg/day, equivalent to 4.1 µg/kg body weight/day for people 60 kg [13]. Although chromium is an essential trace element for humans because it helps us to use glucose. However, it is poisonous in excess.

Daily chromium intake according to US dietary guidelines is 50-200 mg for adults, 30-35 mg for adult males and 20-25 mg for adult women [14][1].. About 2% of Cr^{3+} or trivalent chromium can be absorbed and the rest is excreted in the stool.Amino acids, vitamin C and niacin can increase the absorption of chromium by channels of the intestine. These minerals further accumulate in the liver, bone, and spleen. Trivalent chromium is found in a variety of foodstuffs, including wheat products, processed meats, cereals, coffee, beans, green beans, broccoli, spices, and some brands of wine and beer. Most fruits and vegetables and dairy products contain only low amounts.

2. METHODOLOGY

2.1 Preparation of materials

Foodstuffs identified about their chromium content are broccoli, celery, snake grass, green mustard, lettuce, tomatoes, carrots, beans, green beans, cauliflower, chicory, cassava, and potatoes, black sticky rice, white rice, brown rice, black rice, yeast (bakery yeast) and yeast commercial extract. The foodstuffs cut into small pieces, then weighed each 5 grams. The next step of each

ISBN : 978-602-99806-3-9

foodstuff is heated in a furnace at a temperature of 700ºC for 7 hours to obtain ash. The obtained ash is dissolved in 1 ml of the concentrated HNO_3 and 1 ml of the concentrated HCl. Each solution is ready to determine its chromium content.

2.2 Determination of chromium content

Determination of chromium content is done by using voltammetry method. Instrument used is Voltammeter.The chromium to be determined is Cr^{3+} and Cr^{6+}. The first step taken on the determination of this chromium content is to make a standard solution. The standard solution used was prepared by dissolving $K_2Cr_2O_7$ and $CrCl_3.6H_2O$ in variations of 5, 10, 20, 40 and 80 ppm. Measurements were made using Silica Carbon Electrode with scan rate of 50mV/sec [15]. Measurement of standard solution using voltammeter produces voltammogram, which then processed using Origin-Pro program and made standard curve between concentration versus current, so obtained linear regression equation y = a + bx. Then measured each sample solution or foodstuff, the result is incorporated into the equation.

3. RESULT AND DISCUSSION

Figures-1 and -2 show the standard curves of Cr^{3+} and Cr^{6+} in variations of concentrations of 5, 10, 20, 40, and 80 ppm. The regression equation obtained from the standard measurement of Cr^{3+} is Y = 3.370798x + 0.004378 and the regression equation obtained from the standard measurement of Cr^{6+} is Y = 3.139306x + 0.008648.

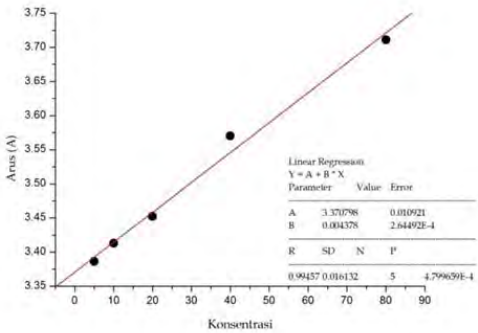


Figure-1 Standard Curve of Cr^{3+}

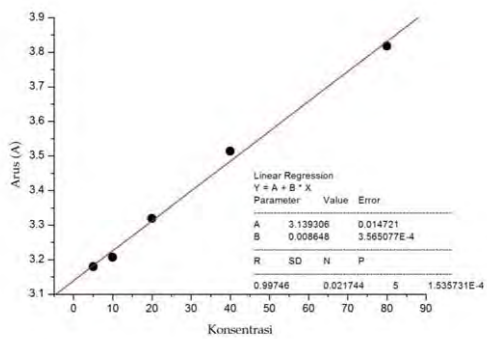


Figure-2 Standard Curve ofCr^{6+}

By entering the data from the current strength obtained from each sample or foodstuff tested using voltammeter into the equation Y = 3.370798x + 0.004378 for the determination of Cr^{3+} and Y = 3.139306x + 0.008648 for the determination of Cr^{6+} then the data obtained as shown in Table-1 and -2.

ISBN : 978-602-99806-3-9

Table 1 Content of Cr^{3+} Determined from Various Foodstuffs.

Groups	Name of foodstuffs		**Cr^{3+} (10^{-4}%)**
Vegetable group	Broccoli	Brassica oleraceavaritalica	116
	Celery	Apiumgraveolens L	96
	Snake grass	*Clinacanthusnutanslindau*	82
	green mustard	Brassica rapavarparachinensis	96
	lettuce	Lactuca sativa	136
	Cauliflower	Brassica oleraceavarBotrytis	280
	Chinese cabbage	Brassica juncea	176
Group of fruit	Tomatoes	Licopersicumesculentum	141
	Carrots	Daucuscarota	110
	Long beans	Vignasinensis	20
	Chili	Capsicum frutescens	70
Group of rice /cereals	black rice	Oryza sativa L	20
	Black sticky rice	Oryza sativa varglutinosa	21
	Brown rice	Oryzapunctata	19
	Green beans	Oryza sativa	18
	White rice	Phaseolusaureus	20
	Red beans	Vignaangularis	18
Group of tubers	Potatoes	Solanumtuberosum L	83
	Cassava	Manihotutilissima	41
Group of yeast	Yeast (bakery's yeast)	Saccharomyces cerevisiae	16
	Yeast extract commercial sample	Saccharomyces cerevisiae	18

Table 2 Content of Cr^{6+} Determined from Various Foodstuffs.

Groups	Name of foodstuffs		**Cr^{6+} (10^{-4} %)**
Vegetable group	Broccoli	Brassica oleraceavaritalica	54
	Celery	Apiumgraveolens L	45
	Snake grass	*Clinacanthusnutanslindau*	39
	green mustard	Brassica rapavarparachinensis	45
	lettuce	Lactuca sativa	64
	Cauliflower	Brassica oleraceavarBotrytis	83
	Chinese cabbage	Brassica juncea	39
Group of fruit	Tomatoes	Licopersicumesculentum	66
	Carrots	Daucuscarota	132
	Long beans	Vignasinensis	52
	Chili	Capsicum frutescens	33
Group of rice /cereals	black rice	Oryza sativa L	9
	Black sticky rice	Oryza sativa varglutinosa	10
	Brown rice	Oryzapunctata	9
	Green beans	Oryza sativa	9

ISBN : 978-602-99806-3-9

	White rice	Phaseolusaureus	9
	Red beans	Vignaangularis	9
Group of tubers	Potatoes	Solanumtuberosum L	19
	Cassava	Manihotutilissima	8
Group of yeast	Yeast (bakery's yeast)	Saccharomyces cerevisiae	8
	Yeast extract commercial sample	Saccharomyces cerevisiae	9

Based on the data in Tables-1, and Table-2, it appears that for the vegetable group Cr^{3+} content ranges from 82 x 10^{-4}% to 280 x 10^{-4}%. Cauliflower has the highest Cr^{3+} content, which is 280 x 10^{-4}%.While snake grass, has the smallest content, which is 82 x 10^{-4}%. Snake grass is a local crop that is believed to be useful for treating diabetes mellitus. Groups of fruits contain Cr^{3+} ranging from 20 x 10^{-4}% to 141 x 10^{-4}%. Tomato fruit has the highest Cr^{3+} content, which is 141 x 10^{-4}%. While the long bean, has the smallest content, which is 20 x 10^{-4}%. The black rice has the highest Cr^{3+} content, which is 21 x 10^{-4}%. While green beans and red beans, has the smallest content, which is 18 x 10^{-4}%. Tuber groups contain Cr^{3+} ranging from 41 x 10^{-4}% to 83 x 10^{-4}%. Potatoes have the highest Cr^{3+} content, which is 83 x 10^{-4}%. While cassava has the smallest content, which amount to 41x 10^{-4}%.The yeast group has Cr^{3+} content ranging from 16 x 10^{-4}% to 18 x 10^{-4}%.The commercial yeast extract which is thought to be made of brewery yeast has the highest Cr^{3+} content, which is 18 x 10^{-4}%. While yeast (bakery yeast/yeast bread), has the smallest content, which is 18 x 10^{-4}%. Based on the findings in this study, it can be concluded that the vegetable group has the highest Cr^{3+} levels among the foodstuffs tested, especially cauliflower.

Based on the data in Table -2, it can be seen that for the vegetable group Cr^{6+} content ranges from 39 x 10^{-4}% to 83 x 10^{-4}%. Cauliflower has the highest Cr^{6+}content, which is 83 x 10^{-4}% while the chicory and snake grass have the smallest content, which is 39 x 10^{-4}%. The fruit group contained Cr^{6+} ranging from 33 x 10^{-4}% to 132 x 10^{-4}%.Carrot fruit has the highest Cr^{6+} content, which is 132 x 10^{-4}% while chili has the smallest content, which is equal to 33 x 10^{-4}%. The rice/cereals group contained Cr^{6+} ranging from 9 x 10^{-4}% to 10 x 10^{-4}%. Black rice has the highest Cr^{6+} content, which is 10 x 10^{-4}% whereas white rice, brown rice, black sticky rice, green beans and red beans contain 9 x 10^{-4}%. Tuber groups contain Cr^{6+} ranging from 8 x 10^{-4}% to 19 x 10^{-4}%. Potatoes have the highest Cr^{6+} content, which is 8 x 10^{-4}% while cassava has a content of 19 x 10^{-4}%. The yeast group has a Cr^{6+} content ranging from 8 x 10^{-4}% to 9 x 10^{-4}%. Commercial yeast extract has the highest Cr^{6+} content, which is 9 x 10^{-4}% while yeast (bakery yeast/baker yeast) is 8 x 10^{-4}%. Based on the findings in this study, it can be concluded that carrots have the highest Cr^{6+} content among the foodstuffs tested.

4. CONCLUSION

The results showed that foodstuffs containing the highest Cr^{3+} were cauliflower having 280 x 10^{-4}%, but Cr^{6+} was 83 x 10^{-4} %. Foodstuffs that have a small Cr^{6+} content are cassava, nuts and commercial yeast, which range from 8 x 10^{-4}% to 9 x 10^{-4} % but Cr^{3+} content is not very high, ranging from 18 x 10^{-4}% to 20 x 10^{-4}%.

5. REFERENCES

[1] World Health Organization, Trace elements in human nutrition and health. Geneva, 1996..

[2] Ertürün KEH, Yilmaz M, Kilic E., Construstion of an anion selective electrode: Dichromate-selective electrode. Sensors and ActuatorsB, 127, 2007, pp. 497-504

[3] Slamet et al..Pengolahan limbah organik (fenol) dan logamberat (Cr VI atau Pt VI) secara simultan dengan fotokatalis TiO2, ZNO-TiO2, dan CDS-TiO2. Makasra Teknol, 9,2005, pp. 66-71.

[4] Wilson BE, Gondy A., Effects of chromium supplementation on fasting insulin levels and

ISBN : 978-602-99806-3-9

lipid parameters in healthy, non-obese young subjects. Diabetes Research and Clinical Practice,1995.

[5] Yin, R.V. and Phung, O.J., Effect of chromium supplementation on glycated hemoglobin and fasting plasma glucose in patients with diabetes mellitus. Nutrition Journal14, 14, 2015.

[6] Yeghiazaryan K, Schild HH, Golubnitschaja O., Chromium-picolinate therapy in diabetes care: individual outcomes require new guidelines and navigation by predictive diagnostics. Infect Disord Drug Targets vol.12, issue 5,2012, pp. 332–9.

[7] Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. Diabetes Care27,2004, pp. 1047–53.

[8] Nutrition Business Journal, NBJ's Supplement Business Report. San Diego, CA: Penton Media Inc., 2003.

[9] Rabinovitz H, Friedensohn A, Leibovitz A, Gabay G, Rocas C, Habot B., Effect of chromium supplementation on blood glucose and lipid levels in type 2 diabetes mellitus elderly patients. Int J VitamNutr Res., Vol. 74, Issue 3, 2004, pp. 178–82.

[10] National Institute of Health, Chromium: Dietary supplement fact sheet, 2013 .

[11] Vincent J.B., Elucidating a biological role for chromium at a molecular level, AccChem Res., Vol. 33, Issue 7,2000, pp. 503–10.

[12] Evans GW., The effect of chromium picolinate on insulin controlled parameters in humans. Int J Biosocial Med Res., 11, 1989, pp. 163-80.

[13] EPSA Panel, Scientific Opinion on the safety of trivalent chromium as a nutrient added for nutritional purposes to foodstuffs for particular nutritional uses and foods intended for the general population (including food supplements. EFSA Panel on Food Additives and Nutrient Sources, DOI: 10.2903/j.efsa.2010.1882, 2010.

[14] Trumbo, P. et al., Dietary reference intakes : Vitamin A, Vitamin K, Arsenic, boron, chromium, copper, iodine, iron, manganense, molybdenum, nickel, silicon, vanadium and zink. Journal of the Amarican Dietetic Association, 2001.

[15] Yulianto, E. and Setiarso, P., Making of Chitosan Modified Carbon Paste Electrode for Cr (VI) Metallic Analysis With Ion Interfering Fe (II) and Zn (II) By Cyclic Stripping Voltammetry. Surabaya: Chemistry , Surabaya State University, 2014.

Proceeding International Joint Conference
on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

The development of teaching material of concept maps based on inquiry as an effort to trained high-order thinking skills of chemistry education students

Ismono, Sri Poedjiastoeti, Suyatno
ismono.sains@gmail.com or ismono@unesa.ic.id
orcid.org/0000-0003-3047-4904

Abstract. Higher order thinking skills (HOTs) are needed by the students of chemistry education, because they will become teachers who will be able to teach HOTs to the students. Teaching materials on selected learning tools are isomers (structural and stereochemistry isomers) because these subject matter are rich concepts with abstract characteristics and interrelated concept - concept, so to study it required the ability to higher order thinking, Such as the ability to analyze, evaluate, and synthesize (create). This research is in the form of research of development of teaching material of concept map based on inquiry with the subject research of 5 experts (content validation) and 30 students of chemical education year 2015 (empirical validation). The purpose of this research is to know the role of teaching material in: (1) to increase student's of HOTs and (2) ability to retention of HOTS. The results showed that the teaching material to developed: (1) has the effectiveness, because capable of improving learning achievement and higher level thinking skills shown by the increasing score gain in the category of medium to high; (2) The students had relatively good HOTs retention capability after retention test within two months after post test
Keywords: high order thinking skills (HOTs), Concept map, inquiry strategy

Introduction

Education in Indonesia today are faced with some very strategic issues, among others: (a) learning should involve learners actively in finding and building knowledge through higher order thinking and inquiry, problem solving and collaborative work and collaborative learning [1] ; (b) learners should possess the ability to think critically, to reason, to apply conceptual knowledge and procedures to solve problems, and presents the linkage concept of the material on lessons learned effectively and creatively [2, 3].

Based on these strategy issues, then in studying science (chemistry), the chemistry teacher and candidates of teacher must have the ability to higher order thinking skills, inquiry, and understand the concepts of chemistry that will be taught in depth and strongly, which in turn they will be able to teach their students.

Numerous reports support the view that the interplay between studying the chemistry concepts with inquiry and higher order thinking is a source of difficulty for many chemistry learners: (a) The concept of the chemical abstract it is necessary for higher level thinking skills in order to obtain a correct understanding. Rote learning (recall) is a relatively difficult learning to use in studying the chemistry concepts are abstract and difficult. Meaningful learning is a learning model that fits in studying chemistry teaching materials, the researchers found evidence that when students use rote learning, it will experience a misunderstanding understand chemistry concepts. [4]; (b) Chemical content (organic

ISBN : 978-602-99806-3-9

chemistry) generally have a lot of concepts that are abstract, organized hierarchically, and often between concepts are having relationship [5]; (c) Studying the chemistry concepts (concept in organic chemistry) is often perceived as a difficult subject, because the concept of abstract and require higher order thinking skills [5. 6]; (d) Learning of Chemistry (organic chemistry), requires much of inquiry, higher order thinking skills, and comprehension of concept, because teaching material in chemistry is many contains of abstract concepts, the concepts are arranged hierarchically, and generally between concept - concept have relationships [7]; (e) the acquisition of knowledge isomers (structural and stereo chemical) is very difficult and concepts confuse learners [8]; (f) The understanding of the teaching material of isomer especially of stereochemistry, learners are often difficult to understanding and confusing [9,10]; (g) In order to improve students' understanding of conceptual knowledge can use learning strategies that engage students in higher order thinking skill through of inquiry activities, collaboration learning, discussions, brainstorming, argument, and simulation [11]; (h) The learning process should be able to engage students actively in building of knowledge through activities to identify, analyze, synthesize, and evaluate learning materials studied, and simulate or explain back to the audience and onshore apply knowledge in other situations. Teaching strategies that can be used may be learning and work collaboratively in both the investigation and discussions, brainstorming, simulation, and implementation [12]; (i) The presentation of knowledge of concepts of students with concept mapping strategy can be enhances their performance and academic achievement in organic chemistry and retention of the knowledge [13]; (j) by introducing students of instruction based on concept with to use concept map to universal themes and engaging of students in active learning: (1) creates connections new knowledge with students' prior knowledge; (2) facilitates deeper understanding of content knowledge; (3) facilitates for students to respond of problems to use higher order thinking; (4) will be able to improve the ability to learning outcomes, higher order thinking skills of Bloom's taxonomy, and the ability to communicate [14]; (k) The concept maps (Cmaps) are valuable tools for assessing the effectiveness of the conceptual changes provoked by engagement activities of students and inquiry done of teaching materials at the classroom [15]; (l) the strategy of inquiry is one way to achieve conceptual understanding for students [16]; (m) Angelo and Cross (1993) indicate that the use of concept maps develop students' abilities to draw inferences from observations, analyze, evaluate, synthesize and integrate information. Concept mapping also enables students to make meaning out of information, make judgments and develop informed opinions [17].

Based on the opinion of several experts at above, then to study teaching materials chemistry which is rich with abstract concepts, arranged in a hierarchy, and often a relationship between concepts, it is necessary to meaningful learning with the strategy of inquiry and the ability to higher order thinking skills. The learning process should use the strategy of inquiry with collaborative learning to engage students actively in the activities of observing, analyzing, synthesizing and evaluating key concepts teaching materials, discussing, and brainstorming, so it will be able to provide concrete and meaningful experiences for students. The learning outcomes of concept map with strategy of inquiry are can expected to improve learning achievement, higher order thinking skills, communicate, and can have a retention time longer retain of concepts in cognitive long-term memory.

According to some experts, the concept is: (1) a process of mental functions and is used as a tool to facilitate communication and express ideas, (2) an order or relationship in a group of objects or events indicated by the word or words, signs or symbol. The concept has five essential elements: (a) the name of the concept, (b) the definition of the concept, (c) attributes determinants such as the attributes of critical and attributes variables, (d) the value, and (e) examples [18, 19, 20]. The process the find of concept is often referred to the concept of assimilation concept or acquisition concepts [21]. Alice and Glenda (2009), in detail found based learning acquisition and understanding of the concept of a multi-step process including: (1) specifies the name of the critical (main) feature concept; (2) mentions some additional features of the concept of (critical attributes and attribute variables); (3) the type of concept, (4) provide an example or non-sample or prototype or non-prototype concept (5)

ISBN : 978-602-99806-3-9

identify and hierarchy of concepts (main concept, super ordinate, ordinate, subordinate, sub-subordinate).Teachers can help by alerting students when a key concept is being introduced, and identifying the explicit characteristics of the concept [22]. Students need to understand whether the concept is concrete, abstract, verbal, nonverbal, or process. In any subject area, students should be aware of the key concepts they must learn. The students must be able to identify, analyze, synthesize, and evaluate key concepts and they must be practice them [23].

Learning theory of learning that can be used in learning concept that has characteristics that are abstract concepts, organized hierarchically, and the relationship between the concepts of having a theory of meaningful learning [24. (25]. Meaningful learning theory has three principles: (1) when the learner can visualize these concepts and classifying it in the cognitive structure of learners; (2) classification of the concept starts from the concept of the most general to the most specific; (3) the readiness of learners that includes the knowledge that learners have today and receive knowledge/new concepts and linking with prior of knowledge [20].

Based on the theory of meaningful learning that the concepts are arranged hierarchically and inter-concept has can be used in learning concept map (CM). CM is the visualization of relationships between concepts in the form of two-dimensional graphical representations and concepts are represented by rectangles or circles. The linkage between two or more concepts will be connected with the line of arrows (→ labeled conjunctive) called with a proposition that meaningful relationships between concepts [26]. Learning of concept map suitable for use on the knowledge they have the characteristics of a declarative (conceptual) and procedural. Declarative knowledge is knowledge that requires explanation; whereas procedural knowledge is organized procedures such steps hierarchically organize concepts. The steps in preparing a concept map requires investigation (inquiry) capabilities, the invention of the concept contained in teaching materials and higher order thinking skills [27]. The higher order thinking skills include of analyzing, evaluating and synthesizing [28]. Vygotsky (1978) states there are four principles of constructivist learning theory underlying concept mapping, namely: (1) students to actively construct knowledge through relationships between concepts/ideas and experience / prior knowledge; (2) learners will personally create meaning through analyzing and synthesizing the experience so that new understanding can be constructed; (3) learning activities should foster the integration of thoughts, feelings and activities (actions) that help learners in the development process of meaning; (4) learning is a social activity that can be enhanced through learning and collaborative investigation between facilitators and learners or between learners with other learners. [29].

Piaget (1964) sees cognitive development as.... while at the formal operational stage (12 years and above), they can engage in formal thinking as well as abstraction. Piaget believed that the process of thinking and the intellectual development has also two on-going processes: assimilation and accommodation. There is assimilation when a child responds to a new event in a way that is consistent with an existing schema. There is accommodation when a child either modifies an existing schema or forms an entirely new schema to deal with a new object or event [30]. Ormrod, J.E. (2012) in the model Piaget developed in stage three, he argued that intelligence develops in a series of stages that are related to age and are progressive because one stage must be accomplished before the next can occur. For each stage of development the child forms a view of reality for that age period. At the next stage, the child must keep up with earlier level of mental abilities to reconstruct concepts. Piaget conceived intellectual development as an upward expanding spiral in which children must constantly reconstruct the ideas formed at earlier levels with new, higher order concepts acquired at the next level [31]. Based on the theory of Piaget, the teaching learning based on concept map is an appropriate learning in developing the ability to construct and relate the concept of linkages between concepts has a hierarchical structure. Piaget believed that learners who have over 12 years of age have been able to be invited to formal thinking to understand concepts such abstract concepts contained in the science of learning materials, such as concept isomer of organic chemistry.

ISBN : 978-602-99806-3-9

A concept map is used to help students organize and represent knowledge of a subject. Concept maps begin with a main idea (or concept) and then branch out to show how that main idea can be broken down into specific topics. Concept mapping used as learning and teaching technique, concept mapping visually illustrates the relationships between concepts. Often represented in circles or boxes, concepts are linked by words and phrases that explain the connection between the concepts, helping students organize and structure their thoughts to further understand information and discover new relationships. Most concept maps represent a hierarchical structure, with the overall, broad concept first with connected sub-topics, more specific concepts.

Concept mapping is a powerful way for students to train of higher order thinking skills and to reach high levels of cognitive performance. A concept map is also not just a learning tool, but an ideal evaluation tool for educators measuring the growth of and assessing student learning. As students create concept maps, they reiterate ideas using their own words and help identify incorrect ideas and concepts; educators are able to see what students do not understand, providing an accurate, objective way to evaluate areas in which students do not yet grasp concepts fully. Concept mapping serves several purposes for learners: (1) helping students brainstorm and generate new ideas; (b) encouraging students to discover new concepts and the propositions that connect them; (c) allowing students to more clearly communicate ideas, thoughts and information; (d) helping students integrate new concepts with older concepts; (e) enabling students to gain enhanced knowledge of any topic and evaluate the information. Learning of concept map with inquiry strategies can be done at level 3 [32], in which learners must investigate and find their own concepts (No condition) in teaching materials or topics under the guidance of educators. This level is suitable for a given learners who "experienced" or students in the second year and above (Figure 1).

The means to training for the learners to understand the preparation of concept maps can be done on 2 levels (list of concepts), namely educators provide 15 to 20 key concepts, and then learners to construct of concept maps based hierarchy concepts. Whereas developed of learning model of EASCI for the training of higher order thinking skills used concept maps level 3 “no conditions”. Students in the learned process of concept map “no conditional” will be identify of the key concepts, analyze, evaluate from handout and synthesis to create/building of hierarchy concept map. Evaluation at concept map level 3 (no condition) is used way of Markham, et.al, 1994 [33] as a result of the development of the rubric developed by Novak and Gowin [34], with a scoring rubric as follows: concept (1); preposition (1); linked (1); cross linked (10); level (5), and example of concept (1).

Based on strategic issues currently of developing learning and learning theory developed meaningful learning (Ausubel), theory of cognitive development and constructivist (Piaget and Vygostky), information processing theory, and the concept map (Novak and Canas) above, it is necessary to develop innovative learning models. Learning to engage learners actively in the investigation, identification, analysis, synthesis, evaluation, discussion, brainstorming, communication, collaboration to understand, construction concepts, and has the ability to maintain an understanding of concepts (retention) is relatively long in structure learners cognitive learning model offered by the "*PAKSI” (Pelibatan, Asimilasi-akomadasi, Kolaborasi, Simulasi, dan Implementasi, Indonesia language*) or ”EACSI” with the following five syntax; (Engagement, Assimilation-accommodation, Collaboration, Simulation, implementation).

Model EACSI and teaching materials (containing are an outline plan of lectures, student handbook, student activity sheets, student activity observation sheet, and an evaluation sheet) to be developed that are organic chemical material (isomers), because teaching materials of isomers are materials that are rich in abstract concepts organized, the concept is generally arranged hierarchically, and there is often a relationship between concepts that require higher order thinking skills and inquiry of learners [35]. Prospective teacher or a chemistry teacher who studied chemistry (science) must have the ability in inquiry, higher order thinking skills, and understand the concepts of chemistry (organic chemistry) correctly, because they will be taught to students. In connection with the foregoing, this

ISBN : 978-602-99806-3-9

study aims to determine the feasibility study of learning model EACSI with teaching materials with eligibility based on three indicators: (1) validity; (2) effectiveness; and (3) practicality [36].

"We have been referring to quality of educational products from the perspective of developing teaching model and learning materials. However, we consider the three quality aspects (validity, practically and effectiveness) also to be applicable to a much wider array of educational product."[36].

Learning model of EASCI and teaching material as feasible if each criterion of the three criteria is fulfilled as of: (1) the validity of (at good or a minimum score of > 3); (2) effective when the increase in gains scores (minimal medium or 0.7> (<g>)> 0.3 [37] and retention scores (there was no significant difference between the posttest and retention test, significance level of 95%) and; (3) scores practicality (minimal good > 0.70).

EXPERIMENTAL SECTION

Materials

The materials used in this research among others: (1) handbook of isomer developed based on EACSI; (2) Student Worksheet, (3) syllabus and lesson plan; (4) learning outcomes assessment rubric and; (5) Learning of media such as LCD, PPT

Instrumentation

instruments used at this research are: (1) validation sheet of learning models for focus group discussion (FGD); (2) validation sheets of learning device; (3) observation sheets of learning process; (4) observation sheet of student activity during the learning process; (5) questionnaire sheet for student response; (6) instrument for academic test (objective and subjective test) for pretest, posttest, and retention test.

Procedure

This research design is a research and development (R & D), to test the feasibility (validity, effectiveness, and practicality) of learning models and teaching of developed that are used, by adopting and adapting of the research design developed by Nieveen [38], shown in the Figure 2.

This model is expected to be able to answer the problem formulation of the feasibility study learning model of EACSI (PAKSI) and teaching material. The development stage design of learning model can do theoretical validation by experts that includes validation of the contents and construction with the involvement of 7 experts (5 professors and 2 doctors, where 2 professors and 1 doctoral competent in accordance with the field). Validation was conducted to determine the validity of theoretical learning model that was developed based on the theory of learning and the impact that may occur when the model is tested to the learners. The validity of theoretical learning model includes six (6) components, namely: 1) learning objectives; 2) the social system; 3) Support System; 4) Reaction principle; 5) The impact of instructional and impact accompanist, and 6) Syntax [38]. Based on the theoretical of teaching learning and then learning model development EACSI (PAKSI) has five syntax: engagement, assimilation-accommodation, collaboration, simulation, and implementation. While the validation of teaching material to perform by 3 experts who are competent in the field, namely two professors and one doctor. instrument validation to used for validation of teaching material device that adoption and adaptation of the instrument validation teaching material was adoption and adaptation from developed by The Ministry of National Education Republic of Indonesia [39], which has been through a validation process of 2 experts are competent in accordance with the field.

Based on the results of theoretical validation, model of learning by teaching materials tested empirically on 24 students of chemical education' 2015 who follows off course of organic chemistry 1 (subject matter isomers). Empirical validation test is used to determine the practicality and effectiveness of teaching materials and learning models EACSI (PAKSI). The relationship between

ISBN : 978-602-99806-3-9

the data required and the methods and instruments used to collect data and research success criteria can be seen in Table 1.

RESULTS AND DISCUSSION

Validity of the theoretical learning model of EACSI and teaching material

The results of theoretical validation from 7 experts on learning model of EACSI consisting of (a) content validity: rational of issues, learning theories that support, student-centered, and curriculum; and (b) construct validation: learning objectives, social system. Supporting the system, reaction principle, the impact of instructional and impact accompanist, and syntax can be seen in Table 2 and Table 3.

Based on the results of content validation and construct validation of the learning model as in Table 2 and Table 3 above, it appears that each components of content validity and construct validation of learning models of EASCI have met the criteria, because each components are given a score>3.5 (> 3,0), thus gaining feasible criteria (40) . Although there are several proposals specific improvements in components such as: the principle of reaction and accompanist impact.

Validation of teaching material performed by 3 experts to validate the feasibility of theoretical of teaching materials device includes to the validity of the concept, regularity of concepts, grammar/ sentence, layout of picture and the format. The results of theoretical validation of teaching materials can be seen in Table 4.

Based on the results of the validation of each component obtained an average score of 3.3 – 4.00 (> 3.0) with category feasible, however, it still needs to be improvement as several small parts concept, grammar, typo. And layout drawings isomeric form.

The results validate of empiric of Learning Model of EACSI and Teaching materials

Practicality

The model and the learning device can be viewed from two components, namely the implementation of learning and questionnaire results learners. Observations were due by 3 observers. Result of observation. Involvement of Students College in the learning process by using EACSI learning model can be seen in the following Table 5.

Based on data from the Table 5, it appears that each component of teaching model EACSI i.e. engagement, assimilation-accommodation, collaboration, simulation, and implementation with support teaching material of obtain a score between 3.60-3.89 above score 3.50 in the category very good. This means that learning with the learning model EACSI able to motivate and to activate/engage learners in activities of discussion, expressing an opinion/ideas, collaborate, communicate the results of good performance through simulation and implementation, and the ability of higher-order thinking such as analyzing, evaluating concepts and synthesize (create) a concept map.

Overview of the activities of the learning model of EACSI (Engagement, Association – accommodation, Collaboration, Simulation, Implementation) can be seen in Figure 3.

Data from Table 5 is also supported by data from a questionnaire that can be shown in Table 6. Based on Table 6, shows that students college gave of a positive response to the learning process EACSI model of learning and the teaching materials used, obtain a score of 93-100% (> 61%). Therefore, based on tables 5 and 6, the learning model EACSI has practicality for use in HOTS training for Students College of chemical education, though it still needs to be improved.

Effectiveness

Effectiveness refers to the extent that the experiences and outcomes with the intervention are consistent with the intended aims (40). Effectiveness of learning model of EACSI in terms of two criteria, namely the increase in gain scores and retention test. The Limited test of learning model of EACSI to conducted on 24 students of higher education chemistry in an effort to improve HOTS. Test

ISBN : 978-602-99806-3-9

scores are used to determine the gain increase between pretest to posttest. The result of an increase in the gain scores on each component such as analysis, evaluation and synthesis can be seen in Table 7.

Based on table 7 shows that the students: a) in analytical (C4), the ability of analysis (C4) there are as many as four students (16.7%) who experienced an increase in gain scores with low category, nine students (37.5%) with medium categories, and eleven students (45.8%) with a high category. When viewed from the increase in gains scores of categories medium – high were 20 students (86%, 3%), yet still there are 13 students (54.2%) who have not mastery in the test of the ability to analyze, and average normalized gain <g> = 0.65 (medium category); b) in evaluation (C5), the ability of evaluation (C5) there are as many as sixteen students (66.7%) who experienced an increase in gain scores with medium category, and eight students (33.3%) with a high category, yet still there are 17 students (71%) who have not mastery in the test of the ability to evaluation and average normalized gain <g> = 0.67 (medium category); c) in synthesis/create (C6), the ability of synthesis/create (C6) there are as many as five students (20.8%) who experienced an increase in gain scores with medium category, and nineteen students (79.2%) with a high category, yet still there are seven students (29.2%) who have not mastery in the test of the ability to synthesis/create, and average normalized gain <g> = 0.74 (high category).

Therefore, based on the limited test EACSI learning model developed has been able to increase significantly the value of obtaining the analysis, evaluation and synthesis skills. Fixed to each component of the analysis, C4 (54.2%). evaluation, C5 (71%), and synthesis/create, C6 (29.2%) have not been able to mastery learning. So learning model of EACSI are still not able to classical mastery learning, because there are <75% of the number of students in the classroom have not reached a score of 75. This is consistent with the theory of Piaget and Novak that the students are still in the stage of "semi-beginner" to analysis and evaluation of key concepts from teaching materials and to construct of concept map from key concept. so the student are need for more intensive training to conduct an analysis of key concepts contained in teaching materials, evaluation of key concepts, and create a concept map. according of Vygotsky that it is necessary for the training stage by stage (scaffolding) to students so that they can be trained to analyze, evaluate key concepts in teaching materials and draw up a hierarchy of concept maps is good and right. Some examples of the results of the synthesis/create of concept maps can be seen in Figure 4.

The retention test was conducted to determine the high-order thinking skills of learners in keeping his knowledge after 3 months retention test. The results of retention test can be seen in Table 8 (analysis with SPSS 16, Figure 5). Based on the table 8, it appears that the learners after retested after a period of three months after the posttest, using test instruments equivalent to instruments post test, learners are able to maintain (retention) of each of the components of thinking skills such high levels analysis, synthesis, and evaluation. It is seen that the value of Sig (0.00-0, 02) <α (0.05), it can be concluded that there is a significant correlation between the results of the posttest – retention test. There are differences in average significantly between test scores post-test and retention test, and tends to increase high order thinking skills.

This indicates that the knowledge of higher order thinking skills of learners enter into long-term memory of learners. This premise is supported by the information processing theory to explain when the knowledge (concepts) are frequently used and have entered into long-term memory cognitive learners, then such knowledge will be stored in long term memory of students. While based on the constructivist theory and learning from Ausubel, knowledge learners will be able to continue to grow when the learner is able to link the knowledge that has been owned previously by new knowledge. Knowledge then this knowledge has entered into long-term memory of students, then such knowledge will be presented again when the time taken back again.

ISBN : 978-602-99806-3-9

CONCLUSION

Based on data obtained from the validation of theoretical and empirical validation of the above, it can be concluded that "learning model EACSI along with teaching material can be said to be feasible to use in the experiment is limited (24 students) because it has met:

1. validity of the construction and validation of content: (a) each component of the six components of the model of learning, such as learning objectives, the social system, supporting the system, reaction principle, the impact of instructional and impact accompanist, and syntax, given a score > 3:50 (feasible category); (B) each component in the validation of teaching material, namely Eligibility contents and feasibility of construction obtained a score of> 3.50 (feasible category).
2. Practicality, the sixth component of learning from the learning model of EACSI that engagement, assimilation-accommodation, collaboration, simulation, and implementation has met the criteria of practicality with a score above 3.50 (very good category). Students College of chemistry education gave of a positive response to the learning process EACSI model of learning and the teaching materials used, obtain a score of 93-100% (> 61%).
3. Practicality of teaching models of EACSI in terms of differences in gain scores and the ability to maintain a high level thinking skills (retention). Practicality EACSI models have a relatively good practicality because: (a) is able to increase the average score gain the ability to think critically learners i.e. for analytical skills, average normalized gain <g> = 0.65 (medium category), evaluation, average normalized gain <g> = 0.67 (medium category), and synthesis / create, average normalized gain <g> = 0.74 (high category); (b) based on spss 16 test, learners are able to maintain (retention) of high order thinking skills.

However, the learning model of EASCI with teaching material still needs to be tested or disseminated for the classes are larger root of the obtained results more evolved again to be used as learning models in the study of teaching materials that are rich in abstract concepts are arranged hierarchically and can to used of train ability of high order thinking skills for of learners.

ACKNOWLEDGEMENTS

Herewith we would like to thank the honorable: Prof. Dr. Sri Poedjiastoeti, M.Si; Prof. Dr. Suyatno, M.Si; Prof. Dr. Tukiran, M.Si; Prof. Dr. Muslim Ibrahim, M. Pd; Prof. Dr. Suyono, M.Pd, Dr. I Wayan Dasna, M.Si, M. Ed; and Dr. Erman, M, Pd, which have provided comments and suggestions in the development of learning model EACSI in FGD activities, and teaching materials. Observers and a chemical education student who is the subject of this research. Hopefully they get the reward deserving from Alloh SWT.

REFERENCES

1. Harris Iskandar. 2015. *Preparation of test Higher Order Thinking for senior high school* (*Penyusunan Soal Higher Order Thinking Sekolah Menengah).* Directorate of Senior High School. The Ministry of National Education and Culture of the Republic of Indonesia.
2. OECD, 2013. *PISA 2012: Assessment and Analytical Framework Mathematics, Reading, Science, Problem Solving and Financial Literacy.* Paris: OECD Publishing.
3. Henuk Yusuf L. 2014. *The Paradigm of Learning in the 21st Century and Higher Education in Indonesia in the Era of Globalization* (*Paradigma Belajar Abad 21 dan Pendidikan Tinggi di Indonesia dalam Era Globalisas*) ISBN: 978-602-8547-81-9. http://ylhnews.com/opini/kualitas-doktor-lulusan-luar-negeri, akses Feb 2015.
4. Bodner G. M. and Domin D. S., (2000), Mental models: the role of representations in problem solving in chemistry, *Univ. Chem. Educ., 4, 24-30.*
5. Taber BER, K. S. (2002). *Chemical misconceptions - prevention, diagnosis and cure: Theoretical background* (Vol. 1). London: Royal Society of Chemistry.

ISBN : 978-602-99806-3-9

6. Zoller Uri and David Pushkin. 2007. Matching Higher-Order Cognitive Skills (HOCS) promotion goals with problem-based laboratory practice in a freshman organic chemistry course. *Chemistry Education Research and Practice*, 2007, **8** (2), 153-171. J. The Royal Society of Chemistry.
7. Sirhan, Ghassan (2007): Learning Difficulties in Chemistry: An Overview, *Journal of Turkish Sciences Education*, Volume 4, Issue 2, pp2-20.
8. Boukhechem. Mohamed-Salah, Alain Dumon, and Mohamed Zouikri. 2011. The acquisition of stereochemical knowledge by Algerian students intending to teach physical sciences. *Chem. Educ. Res. Pract.*, 331–343. *The Royal Society of Chemistry.*
9. Kurbanoglu, N. I. , Y. Taskesenligil and M. Sozbilir. 2006. Programmed instruction revisited: a study on teaching stereochemistry. *Chemistry Education Research and Practice, 2006, **7** (1), 13-21. J. The Royal Society of Chemistry*.
10. Zohar, A. (2004). *Higher order thinking in science classrooms: Students learning and teachers' professional Development* . Nether land: Kluwer Academic Publisher.
11. Tan Shin Yen and Siti Hajar Halili. 2015. Effective Teaching of Higher Order Thinking (HOT) in Education. The Online Journal of Distance Education and e-Learning, April 2015 *Volume 3, Issue 2. www.tojdel.net Copyright © The Online Journal of Distance Education and e-Learning.*
12. Arokoyu, A, A, and Obunwo. Juliana C. 2014. Concept Mapping: An Instructional Strategy for Retention of Organic Chemistry concepts. *International Journal of Scientific Research and Innovative Technology Vol. 1 No. 3; October 2014.*
13. Hidi, S., & Renninger, K. A. (2006). The four-phase model of interest development. *Educational. Psychologist*, *42*, (2), 111–127.
14. Erickson, H.L. 2012. *Concept-based teaching and learning.* IBO Position Paper. www.ibo.org/.../inquiry-and-language-teaching-embracing-a-c. Access on July 2016.
15. Gabel, D. (1993). Use of the Particle Nature of Matter in Developing Conceptual Understanding, *Journal of Chemical Education*,70(3), 193.
16. Njoku, M.I. & Bekinwari, B.R. (2013). Concept mapping teaching strategy in a biology classroom for eradication of malaria. In O. *Abonyi 54th annual conference proceeding of the Science Teachers' Association of Nigeria* (pp. 229 – 234). Ibadan: HEBN Publishers.
17. Solso, R.L., Maclin, O.H., Maclin, M.K. (2008). Cognitive psychology (8th Ed).Boston: Allyn & Bacon.
18. Woolfolk, A. (2016). *Educational psychology (13th ed.).* Boston, MA: Allyn & Bacon.
19. Safdar Muhammad, Azhar Hussain, Iqbal Shah, Qudsia Rifat. (2012). Concept Maps: An Instructional Tool to Facilitate Meaningful Learning European *Journal of Educational Vol. 1, No. 1, 55-64 Vol. 3, No. 3, July 2008, xx-xx* ISSN 2165-8714, Copyright © 2012 EUJER. http://www.akademikplus.com/eujer/index.html.
20. Herron J.D., Cantu, L. L., Ward R. 1977; Problems Associated with Concept Analysis. J. *Science Education, 61(2), 185-199.*
21. Thomas, A., and Thorne, G. (2009). How To Increase Higher Order Thinking. Metarie, LA: Center for Development and Learning. Retrieved Dec. 7, 2009, from http://www.cdl.org/resource-library/articles /HOT.php?type=subject&id=18.
22. Collins, 2014 (23) Collins Robyn. 2014. Skills for the 21st Century: Teaching higher-order thinking. *This article originally appeared in the April 2014 edition of* ISQ Briefings, *a publication of Independent Schools Queensland. Republished with permission. www.curriculum.edu.au/.../teaching_higher_order_thinking,*
23. Ausubel, D.P., Novak, J.D., and Hanesian, H., (1978). *Educational Psychology: A Cognitive View* ,Holt, Rhinehart and Winston, New York.

ISBN : 978-602-99806-3-9

24. Novak, J.D. (2005). Results and implications of a 12-year longitudinal study of science concept learning. Research In Science Education. 35(1): 23-40.
25. Novak, J.D. & Cañas, A.J. (2006). Theoretical Origins of Concept Maps, How to Construct Them and Uses in Education. Reflecting Education, Vol. 3(1). (On-line Journal at:http://www.reflectingeducation.net/index.php/reflecting.
26. Clary, R.M., & Wandersee, J.H. (2009). All are worthy to know the Earth: Henry De la Beche and the origin of geological literacy. *Science and Education*, *18* (10), 1359-1376.).
27. Wandersee, J. (2000). Using concept mapping as a knowledge mapping tool. In Fisher, K., Wandersee, J., & Moody, D. (Eds.), Mapping biological knowledge (pp. 127 – 142).Dordrecht: Kluwer.
28. Anderson and Krathwohl. 2001. *Bloom's Taxonomy Revised, Understanding the New Version of Bloom's Taxonomy, A succinct discussion of the revisions of Bloom's classic cognitive taxonomy and how to use them* effectively. http://www4.uwsp.edu/education/lwilson/curric/newtaxonomy.htm (2001, 2005), revised 2013.
29. Charlotte Hua Liu and Robert Matthews. 2005. Vygotsky's philosophy: Constructivism and its criticisms examined. *International Education Journal*, 2005, 6(3), 386-399. ISSN 1443-1475 © 2005 *Shannon Research Press*Piaget, Jean." Encyclopædia Britannica. 2008. Encyclopædia Britannica Online. 3 November 2008 search.eb.com.
30. Ormrod, J.E. (2012). Essentials of Educational Psychology: Big Ideas to Guide Effective Teaching. Boston, MA: Pearson Education Inc.
31. Strautmane, M. (2012). Concept map-based knowledge assessment tasks and their scoring criteria: An overview. In Concept maps: Theory, methodology, technology. Proceedings of the fifth international conference on concept mapping (Vol. 2, pp. 80–88).
32. Markam, K. M., Mintzes, J. J., & Jones, M. G. (1994). The concept map as a research and evaluation tool: Further evidence of validity. *Journal of Research in Science Teaching, 31*(1), 91-101.
33. Novak, J.D. & Gowin, D.B. (1984). *Learning How to Learn*. Cambridge and NY: Cambridge University Press. Also published in Spanish, Italian, Portuguese, Finnish, Arabic, Thai, Japanese, and Chinese.
34. Sirhan, G. (2007). "Learning difficulties in chemistry: An overview." *Journal of Turkish science education* 4.2: 2.
35. Nieveen, N. 1999. Prototyping to Reach Product Quality. Dalam Plomp, T; Nieveen, N; Gustafson, K; Branch, R.M; dan van den Akker, J (eds). *Design Approaches and Tools in Education and Training.* London: Kluwer Academic Publisher.
36. Hake Richard R.. 1998. Interactive-engagement versus traditional methods: A six-thousand-student survey of mechanics test data for introductory physics courses. *American Journal of Physics* ***66****, 64 (1998*); doi: 10.1119/1.1880.
37. Plomp Tjeerd & Nieveen Nienke 2007. An Introduction to Educational Design Research Proceedings of the seminar conducted at The East China Normal University, Shanghai (PR *China*), November 23-26, 2007.
38. Joyce, B., Calhoun, E., and Hopkins, D. (2003). *Models of Learning (5th Ed).* Prentice.HaII of India. New DeIhi. ISBN-81 -203-1174-4.
39. The Ministry of National Education Republic of Indonesia. 2008. *Development of teaching materials*. Ministry of National Education, Jakarta.
40. Van den Akker. (1999). *Principles and Method of Development Research*. London. Dlm. van den Akker, J., Branch, R.M., Gustafson, K., Nieveen, N., & Plomp, T. (pnyt.)". *Design approaches and tools in educational and training.* Dordrecht: Kluwer Academic Publisher.

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

A conceptual system for supply chain management: agricultural products distribution in Indonesia

Syurfah Ayu Ithriah[1], Rizka Hadiwiyanti[2], Doddy Ridwandono[3]
[3] Department of Information System, Faculty of Computer Science, University of Pembangunan Nasional "VETERAN" Jawa Timur, Surabaya
E-mail: syurfah.ayu@upnjatim.ac.id

ABSTRACT: The agricultural sector in Indonesia face many problems, such as small-scale farming, minimum fund, the lack of technologies utilization, reliance on the season, limited access to credit loans, and market monopoly. This study will discuss a conceptual system which can provide access toward supply chain information in agriculture. This concept are offered to overcome the problems, particularly in terms of agricultural products local marketing and reducing market monopoly, by considering the requirement of three main parties: sellers, buyers and transportation carrier. The developed conceptual system is expected to become a basis for the development of an IT-based supply chain system that can accommodate the needs of the parties in the agricultural product supply chain system.

Keywords: Agricultural product, supply chain, distribution

1. INTRODUCTION

The agricultural sector plays a strategic role in the Indonesian economy. According to BPS in 2013, the number of farmers in Indonesia for food crops alone is around 20 million. However, the agricultural sector is still not able to show its full potential, it is seen from the level of welfare of farmers and their contribution to national income. This certainly is ironic because in general the economists argue that investing in agriculture sector is one of the solutions to reduce poverty, inequality and hunger [15]. There are some obstacles encountered in this sector, especially in Indonesia. Among them are small-scale farming, lack of capital, use of technology, relying on the season, limited market, the issue of financing, and the last, the monopolization of the market. In addition there are the problem relating specifically to the problems of distribution of agricultural products, some of them are, the price differences is high, long lines supply chain, profit margins are disproportionate and the difficulty of maintaining the quality and availability of products [20]. Studied in this research is the access to supply chain information that is expected to contribute to solving agricultural products market. In particular the relationship between sellers - intermediaries (distributors - transportation service providers) and the buyer.

In general, the actors in the supply chain in agriculture consists of suppliers, farmers, collectors, food processing industry, agents, resellers or retailers, and consumers [22]. If one party does not have enough information then the choice and decisions that can be taken is limited. Vice versa, a good information provides an opportunity for a party to get the best options that will ultimately improve the productivity and welfare.

Information required by each party in the supply chain in agriculture is very diverse, including but not limited to product information from suppliers such as fertilizers, farm equipment, agricultural products information, information for prospective buyers and information of delivery services

ISBN : 978-602-99806-3-9

providers [22]. Until today, in Indonesia, there is no system that can integrate the information of the parties in the supply chain in agriculture, especially a dedicated system to be used by many people and parties. On the other hand, there is a need of an Intelligent Systems in the field of logistics – a customer oriented system – to overcome the existing challenges [14], [16].

A web-based system allows all parties to be interconnected. The simplest example is e-commerce. Through this system, seller and buyer can be interconnected, thereby removing the distance between retail distributors and end users. The same concept can be applied in the field of agricultural commodities. A farmer can sell at any party anywhere. However, compared to non-agricultural goods, agricultural goods have a very different characteristics, because the agricultural products experienced a permanent modification, from the moment the product is harvested until the processing phase [2], [17]. Some agricultural products lifespan is short, some products must be packaged in special packaging [3], [14], the weight of agricultural products is quite large, and the production sites are in a very diverse place. For example, agricultural products which is produced in Java Island can be delivered to Sumatra Island through various parties, the manufacturer - retailer - consumer. The goods can be delivered by a variety of transportation modes. The fastest travel time is by airplane, another alternative is using trucks with a longer travel time and other alternative is using sea transportation modes [10]. In Sulawesi Island there is a solution to distribute agricultural products by using a motorcycle. The last transportation mode is using a combination of transportation modes/intermodal, although there were challenges when it is applied [6]. The difficulty in determining transportation modes and delivery services provider bring opportunities for both organizations and individuals to get involved in the supply chain. Thus, there are at least three parties in the supply chain that can be included in the study, sellers, distributors and buyers.

Research conducted by [1] aims to facilitate the distribution of information generated by farmers where the system can be accessed by anyone via the Internet. In that study, the system can provide information of commodities prices, products, product sales offer and bids for products, but not address the problem of distribution. The concept used in the study is known as crowdsourcing. An emerging concept in the field of business in 2005 explains the concept of the process of achieving a goal of both goods and services through online media from the contributions of many parties.

Research conducted by [4] focuses on making supply chain systems which cover manufacturing to shipping route. However, the study was built only to be used by one particular organization, not to accommodate the interests of many people or other organizations. From the description in the introductory part, it can be concluded that agricultural sector in Indonesia need a system that can be used by many parties that will ultimately benefit many parties. As an analogy and description of the system that is needed, the system is a combination of systems: 1. e-commerce; 2. Services of transport / distribution which allows many parties to be involved, which is currently is a trend like Uber, Grab Bike, etc. [21]. In other words, we need an Intelligent System that can provide information needed by seller, distributor and buyer which is integrated into a system that support crowdsourcing. This paper will discuss the potential solutions, both from the standpoint of the seller, buyer and distributor and also will be described a web-based system that has been developed using the programming language PHP and database MySQL that can be a place for sellers, buyers and distributors to have a transaction and has the capability to provide recommendations of the most suitable distributor to deliver the product in accordance with its characteristics.

2. LITERATURE REVIEW

This section will explain some of the literature studies that have been done that is used as a basis to make the supply chain system of agricultural products in Indonesia, which in this case focusing on the solution of transportation / distribution. This section is divided into 4 parts: supply chain scheme, current conditions of transportation in Indonesia, collaborative transportation and evaluation criteria of transportation performance.

2.1 Supply Chain Scheme

ISBN : 978-602-99806-3-9

The literature study is done to determine the condition of ideal scheme supply chain that exists today, where it can be used as a reference of supply chain scheme in Indonesia. In [17] mentioned about approaches to introduce the concept of 4PL. A 4PL is a neutral provider of various services within the supply chain. This provider does not supply assets but endeavors to utilize all provided resources efficiently and sustainably while integrating all involved actors [13], [19], and [23]. One objective of the 4PL is to minimize individual inefficiencies and, at the same time, increase the efficiency of the entire actor network. The main task is to plan both the supply chain process and transportation. This planning is accomplished by employing IT networking and platforms (Mammitzsch and Francyk, 2012). Therefore, industry-specific agencies must be taken into account, and corresponding knowledge is required [8].

Similar form offered by [9] which is described in the paper was that there is a need for a parties to integrate the actors involved in the supply chain system, the parties are called "consolidator". Consolidators are agents, export companies, consortium or brokers that provides a complex set of services to agro-food SMEs. These services are carried out by receiving orders from big foreign buyers, identifying local suppliers, consolidation, collections of many goods to be sent to the same market and placing of products on the market. The consolidator must, therefore, know all issues related to both the origination and destination markets, have the trust of foreign buyers in order to ensure stable relations and have many contacts with local SMEs to ask for supplies of goods.

Based on the two of these studies it can be concluded that a system that allows for parties to organize the existing supply chain is needed. A web-based system which integrates Sellers, Buyers and Distributors can accommodate those needs. For more about the features needed by distributors can be found in the next sections.

2.2 An Overview on the Challenges of Transportation in Indonesia

Indonesia is an archipelagic country, but unlike Japan, there are very few bridges or tunnels between the islands of the Indonesia [7]. Ferry services growth has already reached many areas. However, the reputation of these shipping companies is severely tarnished, as in Indonesia and Bangladesh by the frequency and severity of accidents in recent 25 years. It has become essential to improve the logistics of food transportation across the archipelago to ensure quality supplies to the capital region, and provide outlets for the farm productions of the country's poorer regions, all while fostering the growth of agro-industrial activities.

Another problems are lack integration transport modes, both intra and inter-modal in areas that have modes of land transport, distance of the small islands in the archipelago province varies, sea and air transport accessibility is exist but the frequency of services to small island very limited.

In spite of the problems that exist, ITS (Intelligent Transportation Systems) Indonesia developments is emerging by [18], although unfortunately it is still not synchronized and coordinated. Information heterogeneity of ITS Indonesia becomes an obstacle to provide interoperability. They also suggest establishing Cloud ITS based on cloud computing, it is feasible to accommodate transportation information sharing platform.

It can be concluded that Indonesia has challenges in terms of the infrastructure that supports the transportation and distribution of goods. But it is believed that a system that can distribute information about the parties in the supply chain can help optimize existing infrastructure today.

2.3 Collaborative

Fernández in [12] states that collaborative transportation is regarded as one of the major trends in transportation research. Indeed, increasing carrier insurance and fuel costs combined with a more intense market competition lead carriers to look for new and more efficient solutions. Based on interviews that have been conducted, a buyer can change their supplier if the price change significantly. Switching to other suppliers can occur even if the location of another supplier is hundreds of kilometers apart. On the other hand, the seller can sell and deliver their products to distant locations with more expensive modes of transportation such as by plane if the selling price is

ISBN : 978-602-99806-3-9

high. This high level of flexibility requires a system that can integrate seller, buyer and distributor that enables collaboration among them, especially the distributors, which in turn it can increase the effectiveness and efficiency of product distribution.

2.4 Evaluation Criteria of Transportation Performance

Literature study in this section is conducted in regard for knowing what factors or criteria that can be used to assess the distributor – transportation service provider. Baran & Zak in [5] specify the criteria that can be used. Among them, which will be used in this research are:

a. Transportation costs, which is composed of two sub criteria, fleet utilization cost and ton kilo metre costs.
b. Delivery time. This minimized criterion is defined as an average time of delivering orders to strategic customers located within 100 km radius from the company's headquarter (depot). This criterion depends on the distance of a given enterprise from its key customers and the average technical speed of the vehicles available in the fleet.
c. Fleet modernity. This criterion is defined as an arithmetic average of the age of all vehicles used in the company.
d. Transportation reliability, which is composed of two sub criteria, timeliness of deliveries and Fulfillment of deliveries.
e. Transportation Quality, which is composed of two sub criteria, failure-free transportation (deliveries) and Share of deliveries of unspoiled goods.

3. RESULT AND DISCUSSION

3.1 SCM in Indonesia-The Concept of an Ideal Condition

This section will explain the proposed plan of the ideal supply chain system concept implementation that can be developed. In general, a system that can accommodate the supply chain in Indonesia can be seen in Figure-1. It can be seen that the three entities embodied to the supply chain system which in this case is a web-based system. The system is expected to "simplify" the entities involved. For example, Seller are the parties who offer products e.g. Farmers and Wholesaler. Buyer is the parties who need the product, for example, the end user. Keep in mind that a party may be the Seller and Buyer, in different phases. Wholesaler for example, can become a seller when selling their products to the end user, or they can act as buyer, when purchasing products from Farmers.

Fig 1. Supply Chain in Indonesia

The existence of the system is expected to streamline the communication between entities. In general, the relationship between Seller and Buyer in the proposed system is the same as the relationships that occur in the online shop system. However, with the involvement of distributors, the process for selecting the most suitable Distributor, in accordance with the desired characteristics becomes easier. Figure 2 shows that the Seller, Buyer and Distributor can communicate with each other. This is necessary because there are customary in Indonesia that the buyer is a party to bear the costs of distribution.

ISBN : 978-602-99806-3-9

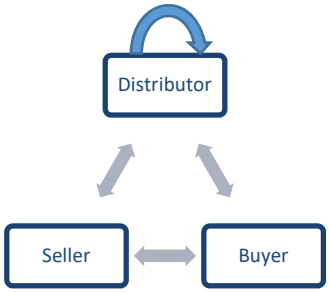


Fig 2. Collaborative - Intermodal

Other forms of relationships that can be developed is a management system that enables collaboration among distributors. This approach is urgently needed in Indonesia given the geographical situation which is archipelago. With the existence of this collaboration, the implementation of supply chain involves Intermodal is expected to occur, so that efficiency can be achieved. Example: A product is delivered with from City A to City B through distributors who use Truck mode, then shipping the product from City B City C through distributors who use an airplane to transport the product. See Fig. 3. At the end of the development, it is hoped that the system can accommodate the entity that serves to integrate all entities involved in the supply chain.

Fig 3. Collaborative - Intermodal

4. REFERENCES

[1] Afandi M. I., Nugroho B. & Hadiwiyanti R., Community-Based Collaborative Information System for Agricultural Using Social Media Technology. Bali, The 3rd Bali International Seminar on Science and Technology (BISSTECH), 2015

[2] Ahumada O. & Villalobos R., Application of planning models in the agri-food supply chain: A review. European Journal of Operational Research, Vol. 196, 2009, pp. 1-20.

[3] Albaar N., Budiastra I. W. & Hariyadi Y., Influence of Secondary Packaging on Quality of Carrots During Transportation. Agriculture and Agricultural Science Procedia, Vol 9, 2016, pp. 348-352.

[4] Arkeman Y. & Dharma R. A., Intelligent Decision Support System for Managing Supply Chain in Horticulture Agro-Industry. Journal of Agricultural Industrial Technology, 19(3), 2011, pp. 152-163.

[5] Baran J. & Zak J., Multiple Criteria Evaluation of Transportation Performance for Selected Agribusiness Companies. Procedia - Social and Behavioral Sciences, Vol. 111, 2014, pp. 320-329.

[6] Benoit M., Toward a Physical Internet: meeting the global logistics sustainability grand challenge. Logistics Research, 3(2), 2011, p. 71–87.

[7] Boquet Y., Moving Around The Philippines : Challenges And Dynamics Of Inter- Island Transportation In A Developing Country. Hong Kong, International Conference Of Hong Kong Society For Transportation Studies. 2012.

ISBN : 978-602-99806-3-9

[8] Bourlakis C. & Bourlakis M., Information technology safeguards, logistics asset specificity and fourth-party logistics network creation in the food retail chain. Journal of Business & Industrial Marketing, 20(2), 2005, pp. 88-98.

[9] Caiazza R., Volpe T. & Stanton J. L., 2016. Global supply chain: The consolidators' role. Operations Research Perspectives, Vol. 3, pp. 1-4.

[10] Chopra S. & Meindl P., Supply Chain Management: Strategy, Planning, and Operation. 5 ed. New Jersey: Pearson, 2013.

[11] Fahmy K. & Nakano K., Effective Transport and Storage Condition for Preserving The Quality of 'Jiro' Persimmon in Export Market. Agriculture and Agricultural Science Procedia, Vol. 9, 2016, pp. 279-290.

[12] Fernández E., Fontana D. & Speranza M. G., On the Collaboration Uncapacitated Arc Routing Problem. Computers and Operation Research, Vol. 67, 2016,p. 120–131.

[13] Hingley M., Lindgreen A., Grant D. B. & Kane C., Using fourth party logistics management to improve horizontal collaboration among grocery retailers. Supply Chain Management: An International Journal, 16(5), 2011, pp. 316-327.

[14] Jeong J. S. & Hong P., Customer orientation and performance outcomes in supply chain management. Journal of Enterprise Information Management, 20(5), 2007, pp. 578-594.

[15] Lowder S. K., Skoet J. & Raney T., The Number, Size, and Distribution of Farms, Smallholder Farms, and Family Farms Worldwide. World Development, Vol 87, 2016, pp. 16-29.

[16] McFarlane D., Giannikas, V. & Lu W., Intelligent logistics: Involving the customer. Computers in Industry, Vol. 81, 2016, pp. 105-115.

[17] Mehmann J. & Teuteberg F., The fourth-party logistics service provider approach to support sustainable development goals in transportation – a case study of the German agricultural bulk logistics sector. Journal of Cleaner Production, Volume 126, 2016, pp. 382-393.

[18] Muhammad M. A. & Supangka, S. H., Cloud ITS Indonesia: Transportation Information Sharing Platform. Bandung, International Conference on Cloud Computing and Social Networking (ICCCSN) 2012, 2012, pp. 1-4.

[19] Mukhopadhyay S. K. & Setaputra, R., The role of 4PL as the reverse logistics integrator: Optimal pricing and return policies. International Journal of Physical Distribution & Logistics Management, 36(9), 2006, pp. 716-729.

[20] Perdana, Y. R.,. Logistics Information System for Supply Chain of Agricultural Commodity. Procedia - Social and Behavioral Sciences, Vol. 65, 2012, pp. 608-613.

[21] Speranza M. G., Trends in transportation and logistics. European Journal of Operational Research, 2016.

[22] Sulistyo B., SCM IT-Based Agricultural Products. s.l., National Seminar on Information Technology Application, 2004.

[23] Win A., The value a 4PL provider can contribute to an organisation. International Journal of Physical Distribution & Logistics Management, 38(9), 2008, pp. 674 - 684.

ISBN : 978-602-99806-3-9

Automatic ontology construction from short text: a proposal

Prisa Marga Kusumantara[1], Yesi Novia[2], Doddy Ridwandono[3]
[1]Information System Department, Universitas Pembangunan Nasional "Veteran" Jatim, Indonesia
E-mail is prisamarga@gmail.com

ABSTRACT: Ontology is widely implemented in knowledge repository applications by utilizing the semantic search feature. In some application development techniques, ontology construction has been defined before. So the semantic annotation is intended only to gain new knowledge. If ontology has not been defined before, then ontology is built based on existing knowledge, making it flexible against knowledge. This paper has purpose to contsruct ontology automatically from a short text by using open web service. It uses some pattern that form Subject-predicate-object from noun, verb, adjective/adverb, etc, that taken from sentences. It makes use of open web service parser. The results shown that this pattern generated ontology successfully and SPARQL query was answered correctly. The accuracy reached 91.7%.

Keywords: Ontology, short-text.

1. INTRODUCTION

Ontology is widely implemented in knowledge repository applications by utilizing the semantic search feature. The semantic web vision relies on domain ontologies to describe content and make it understandable by software agent [7]. The explosion of textual information on the Read/Write Web coupled with the increasing demand for ontologies to power the Semantic Web have made (semi-)automatic ontology learning from text a very promising research area [6]. Applying ontology generated from text seems to be avenue to study [7].

In some application development techniques, ontology construction has been defined before. So the semantic annotation is intended only to gain new knowledge. If ontology has not been defined before, then ontology is built based on existing knowledge, making it flexible against knowledge. Several studies construct ontology by simply taking some important concepts from text as [1]. Usually applied to search engines. The machine just needs to know the important concepts of the document. But some other research constructs Ontology from the full text (usually in the form of a reading). Ontology constructed for each sentence from the text. The goal is to enrich ontology and the information obtained is more complete and detailed. Exploiting all sentences is also useful for getting as many as possible semantic relationship [7].

An investigation of the structure of existing ontologies via the Swoogle [2] ontology search engine has shown that domain ontologies very occasionally model verbs as relations holding between their concepts [5]. After all, relation could be other things like adverb, adjective or to be.

Sanabila (2014) conducted a research that construct ontology for Indonesian Wayang mythology. This reserach used relation extraction method to get relation of concepts or entity. Entities are tagged based on a gazetter consisting of two types: general and detail entities. General entities detect entities by their type, whether they are people, weapons or mantras. While detailed entities, tagged entities by type in more detailed. For example, a person's entity can be inherited as Gods, monkeys, relatives of Ayodya, etc. Word analysis is done by analizing the words that exist between two entities to get

ISBN : 978-602-99806-3-9

relation. This concept is applied in this propsed study.

Schutz [5] proposed a methodology called Relext. Ontology is enriched by finding the relevant triple automatically. Relevant terms and verb extracted to find the relationships between concepts through statistic an linguistic calculation combination. This proposed study expand Schutz works, by taking into account every word that exist between noun (entities).

Zouaq [7] proposed a system called TEXCOMON. TEXCOMON stands for Text Concept Map Ontology. Concept maps was used as intermediate knowledge. Intermediate knowledge improve knowledge structure, that make it easily unrstood. TEXCOMON was constructed for educational purpose.

This paper structured as follows. In the next section, explain the research objectives. Followed by Methodology section. Result is explained Result and discussion. Last but not least, the conclusion and direction for the future research will be describe in Conclusion.

2. OBJECTIVES

This paper has purpose to contsruct ontology automatically from a short text by using open web service.

3. METHODOLOGY

Methodology of this research is shown on figure 1. This methodology is divided into two steps are :

- Pattern Filtering
- Ontology Construction

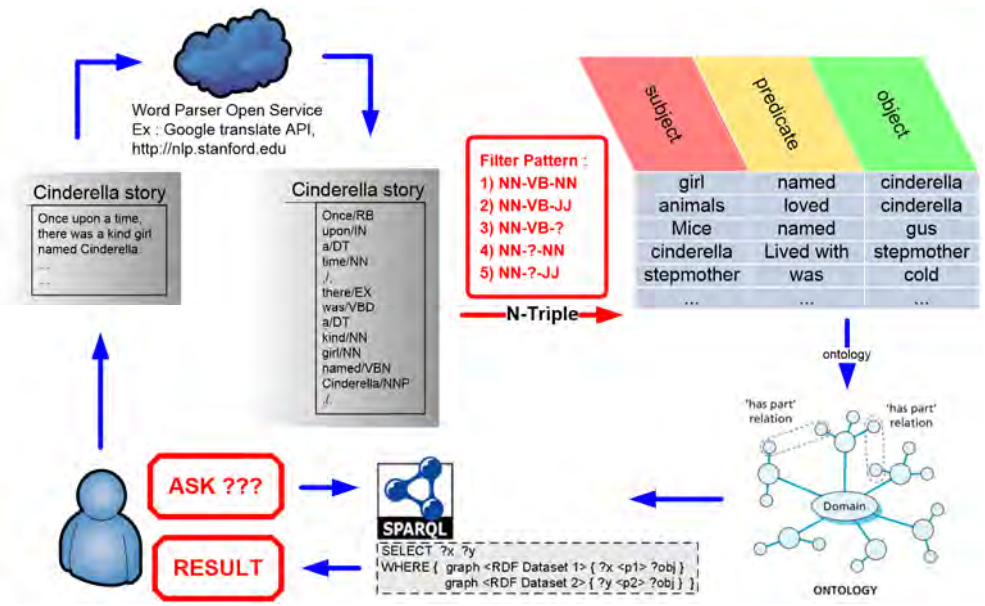


Figure 1. Methodology

3.1 Pattern Filtering

User enter an English short text into the application. Text was broke into sentences. Sentences were inserted into the parser to determine every word type, whether it is a noun, a verb, or an adjective. From the parser results, applicatin choose words by words sequentially that hold one of the following patterns:

ISBN : 978-602-99806-3-9

a. Noun-verb-noun
b. Noun-verb-adjective
c. Noun-verb-?
d. Noun-?-noun
e. Noun-?- adjective

Question mark indicated application took other words before or after noun. This rsearch used University Stanford parser as the web open service parser (http://nlp.Stanford.edu).

To understand the step, the example given. The teks was came from a folktale Called Cinderella (http://princess.disney.com/cinderellas-story) :

1. Sentence :
   Once upon a time, there was a kind girl named Cinderella.

   Parser result :
   Once/RB *upon*/IN *a*/DT *time*/NN ,/, *there*/EX *was*/VBD *a*/DT *kind*/NN *girl*/NN *named*/VBN *Cinderella*/NNP ./.

   Filter result :
   Time-was-kind girl (noun-verb-noun-noun)
   Kind girl-named-cinderella (Noun-verb-noun)

2. Sentence :
   All of the animals loved her, especially two mice named Gus and Jaq. They'd do anything for the girl they called Cinderelly.

   Parser result :
   All/DT *of*/IN *the*/DT *animals*/NNS *loved*/VBD *her*/PRP ,/, *especially*/RB *two*/CD *mice*/NNS *named*/VBD *Gus*/NNP and/CC *Jaq*/NNP ./.

   Filter result:
   Animals-loved-cinderella (Noun-Verb-noun)
   Cinderella-?-mice (noun-?-noun)
   Mice-named-gus (noun-verb-noun)
   Mice-named-jaq (noun-verb-noun)

Then filtered result processed to construct ontology. Parser code could be seen on http://nlp.stanford.edu:8080/parser/index.jsp

3.2 Ontology Construction

Each filtered result was sorted by Subject-Predicate-Object pattern to get n-triple format. SPARQL Query was used to evaluate the proposed method.

4. RESULT AND DISCUSSION

The ontology construction results are shown in figure 2. It contains the entire n-triple list from Cinderella text story.

There were some ontology faults. For example, let's take a look for triple "Drizella were mean". Two Cinderella stepsisters should appeared as subject. Next faults lies on triple "She- enjoyed

ISBN : 978-602-99806-3-9

giving- Cinderella". She refers to Cinderella whereas it should refers to Lady Tremaine. There are 4 errors from 48 n-triple that construct from Cinderella story. False n-triple was marked with small red square on the right. So the accuracy value was 91.8 %.

Fig 2. Result of n-triple Cinderella's story

The next test was done by creating a SPARQL query. In this experiment, three query models are created, that is one layer, two layer, and three layer.

Query 1 : **How is Lady Tremaine's character?**

```
Select ?c
Where{
      ?a ?b ?c .
      ?c rdf:type adjective .
      FILTER regex (?a, "lady tremaine") .
}
```

Result : **cold, cruel, jealous**

Query 2 **: With whom does cinderella live?**

```
Select ?e
Where{
      ?a lived ?c .
      ?c ?d ?e .
  ?c rdf:type noun .
      ?e rdf:type noun .
      FILTER regex (?a, "cinderella") .
      }
```

Result : **anastasia, drizella, lady_tremaine**

Query 3 **: What is Cinderella alias?**

```
Select ?f
Where{
      ?a ?b ?c .
      ?c ?d ?e .
  ?e called ?f .
  ?c rdf:type noun .
      ?e rdf:type noun .
```

ISBN : 978-602-99806-3-9

```
FILTER regex (?a, “cinderella”) .
}
```

Result : **Cinderilly**

The answer for each SPARQL query is correct.

5. CONCLUSION

Ontology can be constructed by considering the Subject-Predicate-Object of the sentence. The sentence pattern consists of Noun-verb-noun, noun-verb / tobe-? and noun-adjective / adverb. The results shown that this pattern generated ontology successfully and SPARQL query was answered correctly. The accuracy reached 91,7%. This is strongly influenced by the writing style of the source text writers, as well as the references error of pronoun (her, they, etc.). Construction method needs to be developed to enrich the ontology, even from unstructured source text.

6. REFERENCES

[1] Atina, V., Sediyono E., & Isnanto R. R. Information Retrieval System for Indonesian Manuscript using Semantic Web. Information Retrieval, 170(8) 2017.

[2] Ding L., Finin T., Joshi A., Pan R., Cost R.S., Peng Y., Reddivari P., Doshi V.C., Sachs J.: Swoogle: A Search and Metadata Engine for the Semantic Web. In: Proceedings of the Thirteenth ACM Conference on Information and Knowledge Management, ACM Press 2004

[3] Jiang X., Tan A. H. CRCTOL: A semantic-based domain ontology learning system. *Journal of the Association for Information Science and Technology*, *61* 1, 2010, 150-168.

[4] Li Q., Wu Y.-F. B. Identifying important concepts from medical documents. Journal of Biomedical Informatics, 39, 2006, 668–679.

[5] Schutz, Alexander, and Paul Buitelaar, "Relext: A tool for relation extraction from text in ontology extension." International semantic web conference. Vol. 2005.

[6] Wong W., Liu W., Bennamoun M. Ontology learning from text: A look back and into the future. *ACM* Computing Surveys (CSUR), 44 4, 2012, 20.

[7] Zouaq A., Nkambou R. Building domain ontologies from text for educational purposes. IEEE Transactions on learning technologies, 1(1), 2008, 49-62.

ISBN : 978-602-99806-3-9

Decision support systems: transportation mode selection for agricultural product distribution

Rizka Hadiwiyanti*, Doddy Ridwandono, Syurfah Ayu I, Rendra Irwanto
Department of Information System, Universitas Pembangunan Nasional "Veteran" Jawa Timur, Surabaya, 60294, Indonesia
E-mail: rizkahadiwiyanti.si@upnjatim.ac.id

ABSTRACT: Agriculture sector in Indonesia encounters several problems, two of them are distribution and long marketing chain. In Indonesia, system that can integrate the information of the parties in the distribution chain in agriculture is limited. This research contributes in the form of an E-Market which not only accommodate sellers and buyers, but also the distributor which provides transportation mode to deliver the agriculture product. Decision Support System feature allow the most suitable distributor, as well as its transportation mode, is selected by the users based on the common evaluation of transportation mode using Analytic Hierarchy Process (AHP) method. The advantages of this system are the seller can be independently determine its market and the buyers can search for potential producers and distributors as preferred.

Keywords: Four or five keywords (First characters of each word are in capital/uppercase letters), Italic

1. INTRODUCTION

Agriculture sector in Indonesia encounters several problems, two of them are distribution and long marketing chain [1]. Problems in distribution are caused by the natural geographical features, since Indonesia is an archipelagic country, and some agricultural sites are in secluded locations. This circumstance requires the availability of decent distribution chain consisting of various modes of transportation. Therefore, system that can integrate between sellers, buyers and distributors is necessary to shorten distribution chain. Given such a system, there will be a large selection of distributors with multi-modal options.

The agriculture products can be delivered by a variety of transportation modes. The fastest delivery time is by airplane, another alternative is by trucks, with a longer travel time, and other alternative is using water transportation modes [2]. In Sulawesi Island there is a solution to deliver agricultural products by a motorcycle. The last transportation mode is using a combination of transportation modes/intermodal, although there were challenges when it is applied [3]. The difficulty in determining transportation modes and delivery services provider bring opportunities for organizations and individuals to get involved in the supply chain.

In Indonesia, marketing and distribution of agricultural products activities are controlled by government organizations, in particular department of agriculture. The advantage is farmers as well as the organization have permanent customers and distributors. The disadvantage is farmers will have limited sales coverage, the organization must be fully responsible for marketing and distribution, and finally the distributor cannot contribute vigorously in supply chain. Several systems are developed

ISBN : 978-602-99806-3-9

to ease the seller (the farmers) for searching potential buyers, and vice versa, where the product distribution is controlled by the buyer. The advantages are the seller can be independently determine its market and prospective buyers of the product can also search for potential producers as preferred. The disadvantage is that the seller does not have a definite market and the prospective buyer usually has difficulty determining the right distributor (which is usually passive).

Research conducted by [4] aims to facilitate the distribution of information generated by farmers where the system can be accessed by anyone via the Internet. In that study, the system provides information of commodities prices, products, product sales offers and bids for products, but not address the problem of distribution. The concept used in the study is known as crowdsourcing. An emerging concept in the field of business in 2005 explains the concept of the process of achieving a goal of both goods and services through online media from the contributions of many parties. ITS (Intelligent Transportation Systems) Indonesia developments is emerging by [5], although unfortunately it is still not synchronized and coordinated. Information heterogeneity of ITS Indonesia becomes an obstacle to provide interoperability. They also suggest establishing Cloud ITS based on cloud computing, it is feasible to accommodate transportation information sharing platform.

This research contributes in the form of an E-Market which not only accommodate sellers and buyers but it can also accommodate the distributor and has a Decision Support System feature that can provide the most suitable distributors and transportation mode based on the characteristics of products traded. Characteristics of agricultural products that will be used as objects in this study is limited to horticultural crops. This type of plant is selected because it is decayed more quickly and it needs special handling due to fluctuating selling prices. The decrease in the quality of horticultural products is also related to the activities during the distribution process, especially related to the time factor, distance or temperature and transportation facilities in each distribution chain.

2. LITERATURE REVIEW

2.1. Decision Support Systems

Decision Support Systems are a computer-based system that supports choice by assisting the decision maker in the organization of information and modelling of outcomes [6], [7]. The concept of decision support systems comes from a balance between human judgement and information process by a computer. There are three fundamental components of decision support systems. First, there is database management system (DBMS) which serves as a data bank for the system. The second component is model-based management system (MBMS). The role of MBMS is analogous to that of a DBMS and, the third is the method of dialog generation and management system (DGMS).

2.2. Analytics Hierarchy Process Method

AHP (Analytic Hierarchy Process) was proposed by (8) to model multi-criteria problems in a hierarchical system. Hierarchy in AHP method consists of an overall objective, a set of preferences or alternatives for attaining the objective, and a set of factors or criteria that relate the alternatives to the objective. The criteria is able to be decomposed into sub criteria, sub-sub criteria, and so on, in as many levels as the problem requires.

AHP method generates a weight, denoted by w, for each evaluation criterion according to the decision maker's pairwise comparisons of the criteria. Each weight represents the quantified strength of the compared element against another, on the standard "1 – to – 9" measurement scale. The higher the weight, the more important the corresponding criterion. Then, a score to each preference is assigned, according to the decision maker's pairwise comparisons of the preferences based on the criterion. The higher value shows the performance of the preference, with respect to the considered criterion, is better. The criteria weights and the preference values are combined, thus the global value for each preference are determined. The global value for a given preference is a weighted sum of the values obtained with respect to all the criteria.

ISBN : 978-602-99806-3-9

The important element of the AHP method is measuring the consistency ratio (CR) of matrices of relative weights on each level of hierarchy. Since the numeric values are derived from the subjective preferences of individuals, there is possibility of inconsistencies in determining the weights. Based on [8], a consistency ratio (CR) of 10% or less is acceptable to continue the analysis. Otherwise, it is necessary to revise the judgments to discover the cause of the inconsistency and correct it.

3. RESULTS

There are 8 criteria used in determining the distribution of agricultural product delivery. Among them are transportation costs, delivery time, fleet modernity, transportation reliability, transportation quality, safety, and fleet utilization (Baran and Jacek, 2013). And also based on the results in the field, the horticultural type of agent prefer the three criteria that they consider important is the delivery time, shipping costs, and the capacity of modes of transportation.

3.1 Delivery Time

Delivery time is dominant in the distribution of products such as horticultural crops. The nature of horticultural crops that are more susceptible to decay should be immediately reached to the destination to get further treatment.

Table 1 Delivery Time

Delivery Time Interval (Hours)	Saaty Scale
$X \leq 3$	9
$3 < X \leq 5$	7
$5 < X \leq 7$	5
$7 < X \leq 9$	3
$X > 9$	1

3.2 Mode Capacity Transportation

Capacity accommodated in the mode of transportation is chosen to be the next criteria, because if it has a very fast delivery time but inadequate capacity will also be a waste. The greater the capacity of transportation modes, the greater the likelihood of transporting large quantities of horticultural products.

Table 2 Mode Capacity

Mode Capacity Interval (Kg)	Saaty Scale
$Y \leq 100$	1
$100 < Y \leq 300$	3
$300 < Y \leq 500$	5
$500 < Y \leq 700$	7
$Y > 700$	9

3.3 Shipping Costs

Shipping costs also have a vital role in the products distribution like horticultural crops. Two important things that cannot be separated is the delivery time and shipping costs. Cost and delivery time has an upside-down ratio, the lower of the cost and the delivery time, the higher the buyer's satisfaction level. Vice versa if the higher the value of cost and delivery time, the lower the level of customer satisfaction.

ISBN : 978-602-99806-3-9

Table 3 Shipping Costs

Shipping Costs Interval (Rp)	Saaty Scale
Z ≤ 500.000	9
500.000 < Z ≤ 1.000.000	7
1.000.000 < Z ≤ 1.500.000	5
1.500.000 < Z ≤ 2.000.000	3
Z > 2.000.00	1

4. CONCLUSION

Decision support system using AHP Method has been successfully established. This system has a distributor selection feature using AHP method. This system is used to facilitate and support the agent (buyer) in making the decision to select the appropriate distributor so that buyers feel helped by this system.

5. ACKNOWLEDGEMENTS

The research has been supported by Research and Community Services of UPN "Veteran" Jawa Timur through fundamental research scheme funding. This support is gratefully acknowledged. The authors would like to express their appreciation for the valuable and insightful comments made by an anonymous reviewer.

6. REFERENCES

[1]. Perdana YR. Logistics Information System for Supply Chain of Agricultural Commodity. Procedia - Social and Behavioral Sciences. 2012 Dec 3;65:608–13.

[2]. Chopra S, Meindl P. Supply Chain Management: Strategy, Planning, and Operation. 6th ed. Pearson Education; 2015. 529 p.

[3]. Montreuil B. Toward a Physical Internet: meeting the global logistics sustainability grand challenge. Logist Res. 2011 May 1;3(2–3):71–87.

[4]. Afandi M. I., Nugroho B., Hadiwiyanti R., Community-Based Collaborative Information System for Agricultural Using Social Media Technology. In: Proceedings of the 3rd Bali International Seminar on Science and Technology (BISSTECH). Bali, Indonesia; 2015.

[5]. Muhammad M. A., Supangkat S. H., Cloud ITS Indonesia: Transportation information sharing platform. In: 2012 International Conference on Cloud Computing and Social Networking (ICCCSN). 2012. p. 1–4.

[6]. Ocalir-Akunal E. V., Decision Support Systems in Transport Planning. Procedia Engineering. 2016 Jan 1;161:1119–26.

[7]. Yazdani M., Zarate P., Coulibaly A., Zavadskas E. K., A group decision making support system in logistics and supply chain management. Expert Systems with Applications. 2017 Dec 1;88:376–92.

[8]. Saaty T. L,. How to Make a Decision: The Analytic Hierarchy Process. Interfaces. 1994 Dec 1;24(6):19–43.

Proceeding International Joint Conference on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

Classification of broiler chicken eggs using support vector machine (svm) and feature selection algorithm

Intan Y. Purbasari, Fetty T. Anggraeny and Nikolaus R. Harianto
Department of Informatics, Faculty of Computer Science, Universitas Pembangunan Nasional "Veteran" Jawa Timur, Indonesia 60294
E-mail: intanyuniar.if@upnjatim.ac.id

ABSTRACT: According to the National Standardization Agency of Indonesia, consumed chicken eggs are classified based on their eggshell color and weights. This research aimed to incorporate computer vision and machine learning technology to eggs' categorization process as an alternative to the standard and manual method. We used Hue Saturation Value (HSV) to store the eggs' color space and Support Vector Machine (SVM) as the classification algorithm because of its robustness in learning data. A feature selection algorithm, Wrapper, was also applied to increase classification accuracy. The dataset used consists of 60 egg data with eight noted attributes (four of numeric type and four of nominal type with the last attribute as the class): H-value, S-value, V-value, weight, color, density, area, and weight class. The feature selection algorithm evaluated a total number of 29 subsets and found one subset as the candidate, consisting of only one attribute: Area. There were six support vectors found, and the coefficients of the vectors were: 1, 0.668, 0.334, 0.1289, 0.0684, and 0.4688. The classification results with three experiment scenarios have accuracy values of 100%, which was an improvement of the result of the previous work by the authors. This shows that SVM is a good and robust algorithm for classification.

Keywords: Egg Classification, Support Vector Machine (SVM), Wrapper Feature Selection

1. INTRODUCTION

Chicken eggs are one of the many foods consumed by families in Indonesia. According to Statistics Indonesia (Badan Pusat Statistik), the average weekly consumption of chicken egg per capita is 0.194 kg (approximately two eggs per week per capita) in 2015 [1].

The National Standardization Agency of Indonesia classified consumed chicken eggs based on the eggshell's color and weights according to SNI 3926:2008 [2], by US Eggs Grading Manual. Two factors which define an egg's quality: exterior and interior. Exterior assessment includes size, shape, and eggshell's cleanness, while the interior assessment includes air pocket, albumen, and egg yolk's conditions. According to its shell's color, eggs can have white, light brown, or brown color. Egg weight is categorized into three classifications: small (<50g), medium (50-60g), and large (>60g).

Eggs' classification is usually an easy task for human experts, but it is subjective to each expert, and it might take quite some time to sort manually. An egg-grading machine was already invented to

ISBN : 978-602-99806-3-9

help this sorting process done automatically. It consists of several parts: roller, feed conveyor, steering conveyor, sort conveyor, egg sorter, and exit conveyor [3], [7]. In line with the development of image processing technology, several types of research have been done to include image processing and artificial intelligence in the classification process of eggs' sorting.

Research using K-Nearest Neighbor has already been performed to classify egg's quality based on its shell's cleanness with the highest accuracy of 88.89% [4]. Another experiment used image segmentation and regression analysis to predict the weight of broiler chicken eggs [5]. The classification accuracy reached 100%. However, the weight prediction correctness was only 42%. Another research was conducted, which also focused on egg's mass [7]. There were three classifications, and egg's mass was predicted using a function of some variables, and it recommended some values of length and diameter of eggs to be considered in predicting egg's weight based on outer dimensions.

This research focused on the use of image processing tasks and a learning algorithm, Support Vector Machine (SVM) [8] to classify broiler chicken eggs based on the shell's color and the area of the images. SVM has been recognized as a high-performance algorithm for classification and thus is expected to give accuracy rate higher than 85% on the dataset used.

2. METHODOLOGY

Dataset was obtained by taking images of eggs using a digital camera Canon EOS 500D from 30 cm vertical distance. Egg's position was horizontal and on a black background. Twenty images were taken with a high resolution (3456 x 2304), and they were duplicated twice and had a resolution reduction (1800 x 1200 and 320 x 213), so a total of 60 (sixty) images were collected. A sample of the image is given in Figure 1.

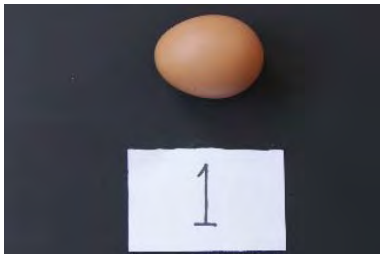


Fig.1 Sample of an egg's image

The images underwent several preprocessing steps:

1. Representing each egg's image with HSV color model
2. Grayscale conversion
3. Applying Sobel filter, dilation, and filling holes

We also took note of each egg's image resolution, color, area, and weight. Table 1 lists twenty four values (out of all sixty data) for all eight attributes where the last attribute is the class attribute. Resolution feature is categorized into three categories: Large (3456 x 2304), Medium (1800 x 1200), and Small (320 x 213). Area attribute is counted as the number of pixels in each image and grouped into three classes: Large (>41000), Medium (35000 - 41000), and Small (<35000). The Class attribute is made into two categories: True and False. Entries in True class are eggs which weigh less than 60g, while those in False class weigh more than 60g.

ISBN : 978-602-99806-3-9

Table 1 Eggs Dataset

H	S	V	Color	Resolution	Area	Weight	Class
0.4879	0.2162	0.3128	Light Brown	Small	Medium	70	F
0.513	0.1662	0.3286	White	Small	Small	60	T
0.5165	0.2266	0.3143	White	Small	Small	60	T
0.4728	0.1946	0.3421	White	Small	Large	80	F
0.4999	0.2324	0.3126	Light Brown	Small	Medium	70	F
0.4986	0.2418	0.3095	Light Brown	Small	Medium	70	F
0.4733	0.2004	0.3398	White	Small	Large	70	F
0.4978	0.2346	0.2914	Light Brown	Small	Medium	70	F
0.4785	0.2238	0.3268	Brown	Medium	Medium	70	F
0.5003	0.1706	0.3441	White	Medium	Small	60	T
0.5038	0.2359	0.3297	Brown	Medium	Small	60	T
0.4569	0.2014	0.363	White	Medium	Large	80	F
0.4878	0.244	0.329	Brown	Medium	Large	70	F
0.4823	0.2503	0.326	Brown	Medium	Medium	70	F
0.4567	0.207	0.3614	Brown	Medium	Large	70	F
0.4854	0.243	0.3059	Brown	Medium	Medium	70	F
0.4504	0.2346	0.3474	Brown	Large	Medium	70	F
0.4758	0.1691	0.3646	White	Large	Small	60	T
0.4789	0.2452	0.3472	Brown	Large	Small	60	T
0.4245	0.2062	0.391	Brown	Large	Large	80	F
0.4605	0.2544	0.3496	Brown	Large	Medium	70	F
0.4541	0.2567	0.3482	Brown	Large	Medium	70	F
0.4237	0.2069	0.391	Brown	Large	Large	70	F
0.459	0.2493	0.3257	Brown	Large	Medium	70	F

Before the classification algorithm was applied to the dataset, we performed a feature selection algorithm. The chosen algorithm was Wrapper since our previous review on various attribute selection algorithms in data mining classification [9] highlighted that Wrapper was a prominent method compared to five other methods investigated despite its time-consuming drawback. In this research, the Wrapper also used Support Vector Machine algorithm as its evaluator (Logistic function as calibration method, using Polynomial Kernel with exponent value of 2, and Best First as the search algorithm). Equation (1) shows the SVM scoring function to compute a score for new input for every data point from i to m [12]:

$$\sum_{i=1}^{m} \alpha_i y^{(i)} K\left(x^{(i)}, x\right) + b \qquad (1)$$

where

- $x^{(i)}$ and $y^{(i)}$ represent the i-th training example (x is an input vector, and y is the class label)
- α_i is the coefficient related with the i-th training example
- x is the input factor to be classified
- K is the kernel function
- b is a scalar value

ISBN : 978-602-99806-3-9

From all sixty data, we experimented with three test options:

1) Use all 60 data as training set and also test set
2) Use cross-validation with ten folds
3) Use 66% data (about 40 data) as training set and 34% (about 20 data) as test set

3. RESULTS AND DISCUSSION

The whole feature selection and classification process were performed using WEKA (Waikato Environment for Knowledge Analysis) version 3.8.1.

3.1. Attribute Selection Result

The Wrapper attribute selection algorithm used in pre-processing was first run on the dataset. At this stage, the process started with no attributes (empty set) and gradually added the primary attribute into the set, also known as forward search direction. We also used SVM as the learning scheme for the Wrapper class with a Linear Kernel. The SVM in WEKA is an implementation of the Sequential Minimal Optimization (SMO) algorithm for training a support vector classifier [10]. All other parameters were set to default values.

The algorithm evaluated a total number of 29 subsets and found one subset as the candidate, consisting of only one attribute: Area. Thus, the number of non-class attributes had been reduced from six to one attribute. Using only this attribute, we then proceeded to the classification process. Table 2 lists the selected attribute:

Table 2 Selected Attribute *Area*

	Label	Count	Weight
1	Medium	32	32.0
2	Small	18	18.0
3	Large	10	10.0

Table 2 showed that 32 data have Medium area, 18 data have Small area, and 10 data have Large area, with each data accounts for one to the total weight.

3.2. Classification Result

After we applied the attribute selection algorithm, the classification process continued by using Support Vector Machine (SVM) algorithm. Again, the implementation used is the SMO algorithm.

There were six support vectors found, and the coefficients of the vectors were: 1, 0.668, 0.334, 0.1289, 0.0684, and 0.4688. Of those six support vectors, two of them belong to the positive class (support vectors with coefficient 1 and 0.334), and the rest belong to the negative class. The value of is 0.333. Figure 2 showed the output of support vector values:

```
  1     * <0 1 0 > * X]
-   0.668  * <1 0 0 > * X]
+   0.334  * <0 1 0 > * X]
-   0.1289 * <0 0 1 > * X]
-   0.0684 * <0 0 1 > * X]
-   0.4688 * <0 0 1 > * X]
-   0.333
```

Fig.2 Output of Support Vector Values

ISBN : 978-602-99806-3-9

Plugging in the values back to Eq. (1) results in Eq. (2):

$$\boldsymbol{Score\ Function} = (\mathbf{1})(\mathbf{1})(x_2)^2 + (-\mathbf{1})(\mathbf{0.668})(x_1)^2 + (\mathbf{1})(\mathbf{0.334})(x_2)^2 + (-\mathbf{1})(\mathbf{0.1289})(x_3)^2 + (-\mathbf{1})(\mathbf{0.0684})(x_3)^2 + (-\mathbf{1})(\mathbf{0.4688})(x_3)^2 + \mathbf{0.333} \quad (2)$$

If we look at the data, entries in the Positive class (True value) are those having Area=Small, while entries in the Negative class (False value) have Area=Medium and Area=Large. Therefore, we can assume that Area=Medium and Area=Large fall into the same attribute value. Let us suppose that Area=Small equals $\boldsymbol{x}$ and (Area=Medium and Area=Large) equals $\boldsymbol{y}$. Thus, Eq. (2) can be rewritten in Eq. (3):

$$\mathbf{Score\ Function} = \mathbf{1.334}(\mathbf{x})^2 - \mathbf{1.3341}(\mathbf{y})^2 + \mathbf{0.333} \quad (3)$$

Figure 3 showed the plotting of Score Function which revealed that the decision boundary is a linear plane:

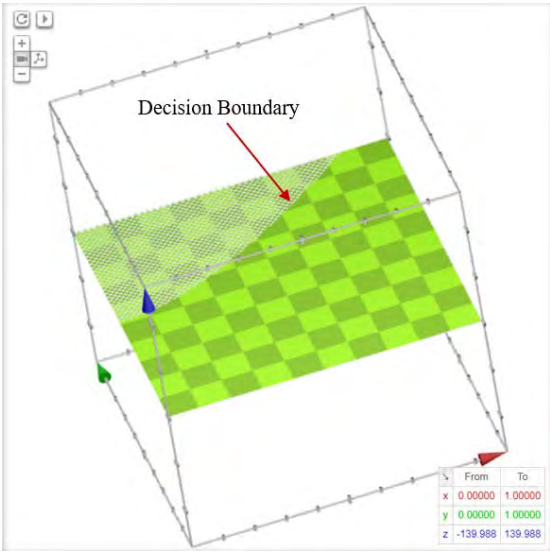


Fig.3 Plotting of Scoring Function

Data above the decision boundary (in the positive y direction) falls into Positive Class (Area=Small), while those under the decision boundary falls into Negative Class (Area=Medium and Area=Large).

(1) The result of using all 60 data as training set and also test set

Table 3 listed the confusion matrix of experiment scenario 1:

ISBN : 978-602-99806-3-9

Table 3 Confusion Matrix of Experiment Scenario 1

	PREDICTED	
	False	True
ACTUAL False	42	0
ACTUAL True	0	18

The accuracy value of scenario 1 is 100%, precision is 100%, and recall is 100%.

(2) The result of using cross-validation with ten folds

Table 4 listed the confusion matrix of experiment scenario 2:

Table 4 Confusion Matrix of Experiment Scenario 2

	PREDICTED	
	False	True
ACTUAL False	42	0
ACTUAL True	0	18

The accuracy value of scenario 2 is 100%, precision is 100%, and recall is 100%.

(3) The result of using 40 data (66%) as training set and 20 (34%) as test set

Table 5 listed the confusion matrix of experiment scenario 3:

Table 5 Confusion Matrix of Experiment Scenario 3

	PREDICTED	
	False	True
ACTUAL False	15	0
ACTUAL True	0	5

The accuracy value of scenario 3 is 100%, precision is 100%, and recall is 100%.

In all three experiment scenarios, the classifier gave a perfect accuracy value. There is no difference in results for these scenarios. The Area attribute selected by the feature selection algorithm can predict the class for each instance accurately. It is expectable because Area is regarded to define the size of each egg. Thus, the less area an egg has, the lighter the egg's weight.

The size of the small dataset used also contributed to the high accuracy value, despite the fact that Support Vector Machine is already known for its robust performance. This strong result was also an improvement of the previous work by the authors which used the same dataset but with ID3 classification algorithm [11]. In the research report, accuracy value achieved was 80%, precision 100%, and recall 75%.

The selection of which kernel functions used apparently also determines the classification results. Polynomial Kernel and Pearson VII function-based Universal Kernel gave 100% accuracy, while Gaussian Kernel only gave 70% accuracy. Considering Gaussian Kernel uses a normal distribution at each data point, the low accuracy percentage might happen because the data distribution is not normal in the dataset used. Therefore, it is necessary to perform a statistical summary on the dataset before applying any feature selection or classification algorithms.

ISBN : 978-602-99806-3-9

4. CONCLUSION

We have experimented on predicting broiler chicken eggs using feature selection algorithm Wrapper and also Support Vector Machine as the classification algorithm. The achieved accuracy value is 100%, which was an improvement of the result of the previous work by the authors.
The Wrapper feature selection algorithm used has successfully selected a single feature most important to determine the class, which was Area. There was no known run time problem because the dataset's size was small.

5. REFERENCES

[1] Statistics Indonesia (Badan Pusat Statistik), Per Capita Weekly Average Consumption of Several Food Items, 2007-2015, 2017, https://www.bps.go.id/linkTabelStatis/view/id/950

[2] National Standardization Agency of Indonesia, Consumed Fresh Eggs, 2008 http://sisni.bsn.go.id/index.php?/sni_main/sni/detail_sni/4363

[3] Sidiq S.A. and Irmawati D., Image processing for egg's identification based on size, J. Electr., Inf., and Voc. Edu. *(ELINVO)* Vol. 1, 2016, pp. 151-156

[4] Trisnaningtyas P.R. and Maimunah, Egg's classification based on shell's cleanness using K-Nearest neighbor, Proc. of Informatics National Conf. Oct 22, 2015 (Bandung: ITB) pp. 241-245

[5] Wijaya T.A. and Prayudi Y., Computer vision implementation and image segmentation to classify broiler chicken eggs, Proc. of National Seminar of Appl. Inf. Tech. (SNATI), June 19, 2010 (Yogyakarta: UII) pp. G1-G5

[6] Rashidi M. and Gholami M., Modeling of egg mass-based on some geometrical attributes American-Eurasian J. Agric. & Environment Sci., 2011, Vol. 10, Issue 1, pp. 9-15

[7] Nopriandi F., Design and Performance of Egg Grading Machine, Postgraduate Thesis, 2015 (Bogor: Postgraduate School-Bogor Agricultural Institute)

[8] Cortes C. and Vapnik V., Support-Vector Networks V. Mach. Learn, 1995, 20:273. https://doi.org/10.1007/BF00994018

[9] Purbasari I.Y. and Nugroho B., Attribute Selection Algorithms Benchmarking in Data Mining Classification, Proc. of National Seminar on Inf. Tech. and Multimedia (SNASTIA), Sept 21, 2013 (Surabaya-University of Surabaya) pp. C47-C54

[10] Platt J.C., Fast training of Support Vector Machines using Sequential Minimal Optimization, Adv. in Kernel Methods – Support Vector Learning, 1998, (Cambridge, Massachusetts: MIT Press) https://www.microsoft.com/en-us/research/publication/fast-training-of-support-vector-machines-using-sequential-minimal-optimization/

[11] Harianto N.R. and Purbasari I.Y., Classification of Broiler Chicken Eggs using Iterative Dichotomizer 3 (ID3) Algorithm, Undergraduate Thesis, 2015 (Surabaya: UPN "Veteran" Jawa Timur)

[12] McCormick C., SVM Tutorial – Part 1, Web article retrieved from http://mccormickml.com/2013/04/16/trivial-svm-example/ April 16, 2013 Accessed: August 29, 2017

ISBN : 978-602-99806-3-9

Why indonesian users visiting youtube an exploration of uses and gratification theory

Tri Lathif Mardi Suryanto[1], Nur Cahyo Wibowo[2], Syurfah Ayu Ithiriah[3], Asif Faroqi[4], Deny Fatkhur[5]
1,2,3,4,5 Universitas Pembangunan Nasional "Veteran" Jawa Timur, Surabaya-Indonesia
Trilathif.si@upnjatim.ac.id

ABSTRACT: YouTube is the famous social media site for video sharing in the digital age. In Indonesia, YouTube got the first rank for the most visited site. This fact shows us that especially in Indonesia YouTube is the site with most visitor. What makes YouTube being the most popular site in Indonesia is interesting to be explored strictly. With Use and Gratification Theory (UG), this experiment trying to give the empirical approach about the factors that influencing YouTube user to use it again. The amount of sampling deterination in this experiment is using Slovin formula. Meanwhile the questioner is spreaded online with non-probability random sampling method in order to gain 400 responden whom usually visiting YouTube regularly. WarpPLS 0.5 is the tools used to convert UG Model into Path Analysis Counting. We found that easiness of service utility and it's practices of using YouTube makes Convenience as the strongest variable to raise people's intention to using / visiting YouTube.

Keywords: UG, YouTube, Intention to use, WarpPLS

1. INTRODUCTION

YouTube is social media network built for seeing videos online. This site is the 2nd popular site visited in the world after Google (Alexa 2017), cara sitasi pakai angka?. As one of Social Network Service (SNS), YouTube holding a lot of function as information source, entertainment source, learning source and its biggest intention is as the place to share videos. YouTube give it's user a lot of easiness for promoting, advertising, and campaign by visual videos. Any kind of advertisement target can be done in order to gaining all kind of society. Politicans, news organization, education organization, business, film and music artist, and all kind of society is using YouTube nowadays (Khan, M.L., 2017).

In Indonesia, YouTube is taking the first rank defeating all of it's social media business competitor (Alexa, 2017). SNS Site not only connecting people with same interest and activities beyond geographical barriers, but also changing itself as commercial social platform for business in last few years (Huang & Benyoucef, 2013; Phang, Zhang, & Sutanto, 2013). By this expansion, YouTube not only bonding peoples with same interest and needs but in last few years YouTube also changing itself into the site which is influencing social and business interest broadly in society.

YouTube make it possible for its users to interacting with its site in any ways, which is participating in the site needs deeper meaning (Khan, M.L., 2017). All of it's user can give their view (like or dislike), uploading their own videos, commenting on the videos uploaded and share it also. This

ISBN : 978-602-99806-3-9

phenomenon has giving bigger control for social media user, by comment section. This, can motivate interaction and discussion between users which can gaining active image for the site. People can discuss anything about the content, and by this way also giving the credibility point for the site (Kraut & Resnick, 2011).

Various content offering at YouTube give it various reason for person to use and exploit the site. By applying motivation construction to find out the participation motive and user exploitation at YouTube, we wish we can deliver deeper information about diversity reasons for people using YouTube. That's why we apply Uses and Gratification Theory (UG) for this experiment. UG is a stable work frame for experiment internet usage which shows us psychology needs and personal sarisfaction (Papacharissi, Z., Rubin, A., 2010).

Seeing and observing at rapid Youtube growth phenomenon in Indonesia, a site which become a united platform for Social interaction, information, news, entertainment, so it is important to know the characteristics requirement that make Youtube Interesting for Indonesian people, why and how Indonesians YouTube users can participate and interact into social society, and also how society's role that will use YouTube again in a long term will be analyzed in detail. That is why theoretical challenge and real discussion arranged by Writer to explaining developing phenomenon of YouTube in Indonesia.

2. Literature Review.

2.1 YouTube

Our mission is to give everyone a voice and show them the world. "We believe that everyone deserves to have a voice, and that the world is a better place when we listen, share and build community through our stories." (Youtube, 2017). YouTube is giving whole new experience about watching television in modern technology, such as the freedom to choose any kind of channel wanted, giving like or dislike about the videos, and also commenting online at the real time. This is what makes YouTube become stronger at giving their users using experience (Burgess, J.E., & Green, J.B., 2009). This site is focusing at self promote culture, self airing, and because of its various topics, their users have more option to subscribe at a lot of video channel. YouTube's great name is taking its part into stronger label, so a lot of marketing team is rely on YouTube for promoting their products (Smith, A. N., Fischer, E., & Yongjian, 2012). Compared with other social media platform oriented with special connection like Facebook, YouTube which focusing on video viewing offering unique online situation for visitors with some interesting interactive features such as like and dislike button (Kraut & Resnick, 2011).

2.2 Uses and Gratification Theory

Ini ukuran bisa beda? Baran and Davis as cited by Amy Hicks dkk defines Uses and Gratification theory as an approaching about media study that focusing on media using and their satisfaction from the activities (Hicks, A., et al., 2012). Even, not only trying to understand the media impact of personal user, Uses and Gratification Theory explain if people using media because they are trying to fulfill the needs they need to fill. In Uses and gratification perspective, media viewer is never considered as passive user, but considered as active because they are looking for the specific kind of media which can help them fulfill their specific needs. Furthermore, Uses and Gratification Theory also used for online media communication. Internet is a big platform included a lot of function and also maybe can fulfill almost every various needs such as interpersonal communication and searching for entertainment and information (Papacharissi, Z., & Rubin, A., M., 2000).

Some experiment at online media using Uses and Gratification theory is Amanda E. Krause whom doing an experiment about Facebook music listening application user (Khan, M. L., 2017). Another experiment using Uses and Gratification perspective is user motivation analysis of M-Commerce (Stafford, T. F., & Gillenson, M. L., 2004), satisfaction identification which pushing people to use mobile version of social media site (Wook, Y.,, et al., 2015). In this experiment, Writer use Uses and

ISBN : 978-602-99806-3-9

Gratification approach to find out users motivation for visiting Youtube.

2.3 Intention to Use

Intention to use is define as an assumption to catch motivation factors which influencing people's personal intention to visit (Ajzen, 1991). In a lot of main theory about technology adoption, intention to use is the actual main factor. Intention to use is the main mediator between actual use and another factors in technology adoption. This is supported by the experiment of Taylor and Todd which trying to removing intention variable from 3 models of technology accepting theory (Taylor & Todd, 2001). The experiment shows us that when intention variable is removed, what happened next is the behavior predicted by statistical fit is decreasing dramatically. In other experiment (Suryanto, T.L.M., Budiyanto, S.D., & Asif, F., 2016) giving work frame construction for applying intention succeed into system quality developing.

2. RESEARCH METHODS

This experiment is aiming Indonesian YouTube users whom surveyed online by giving the questionnaire using Google Form. Sample collecting activities is done between Januari-Maret, 2017 (questioner is spread online and random by the researcher using simple random sampling.) By determining sampling formula using Slovin:

(N = 1.000.000.000 / (1 + 1.000.000.000 x (0.05)2) = 399.999 = 400 sample)

Writer collecting 400 answered questionnaire out of 475 questioner spread. For supporting the good results, this experiment is using literature study of Uses and Gratification Theory (U&G) as a basic experiment for thinking frame. The scale uses for computing the data is Likert Scale. This experiment is using WarpPLS 5.0 software for analyzing data needs and statistic method use Path Analysis.

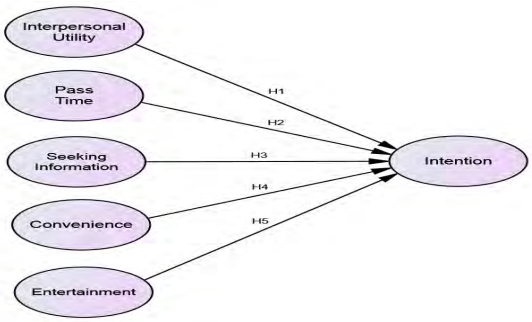


Figure 1. Model Hypotesis

3. RESULT AND DISCUSSION

3.1 Sample characteristics

With 400 sampling collected, Writer find out the consistency of male respondent as much as 218 and female respondent as much as 182, average young aged between 12-25 years old. As much as 219 respondent says that they have YouTube account but Writer found that there's a lot of respondent doesn't have YouTube account. By this findings, this study can be served proportionally from user's point of view.

ISBN : 978-602-99806-3-9

3.2 Test discriminant validity

Table 2. Combined loadings and cross-loadings

Latent Construct	Item	Laten Construct						SE	P value
		IU	PT	SI	Con	Ent	Int		
	X1	0.606	0.087	-0.105	0.083	-0.321	0.122	0.046	<0.001
	X2	0.646	0.094	-0.149	0.213	-0.389	-0.017	0.045	<0.001
	X3	0.667	0.225	-0.179	0.063	-0.099	-0.179	0.045	<0.001
	X4	0.653	0.041	-0.261	-0.072	0.085	-0.123	0.045	<0.001
	X5	0.696	0.013	-0.336	0.348	-0.089	-0.155	0.045	<0.001
	X6	0.578	0.373	-0.044	-0.183	0.108	-0.034	0.046	<0.001
	X7	0.401	-0.366	0.327	-0.533	0.607	0.328	0.047	<0.001
	X8	0.411	-0.204	0.154	-0.545	0.565	0.333	0.047	<0.001
	X9	0.663	-0.208	0.105	-0.01	0.014	0.142	0.045	<0.001
	X10	0.56	0.156	0.557	-0.144	0.117	-0.001	0.046	<0.001
	X11	0.677	-0.111	0.097	0.239	-0.198	-0.067	0.045	<0.001
	X12	0.707	-0.224	0.094	0.063	0.057	-0.075	0.045	<0.001
Pass Time (PT)	X13	0.056	0.872	0.027	-0.209	0.152	-0.05	0.044	<0.001
	X14	-0.014	0.903	-0.028	0.046	-0.161	0.168	0.044	<0.001
	X15	-0.041	0.881	0.002	0.16	0.014	-0.122	0.044	<0.001
Seeking Information (SI)	X16	0.2	-0.043	0.654	0.008	-0.085	0.041	0.045	<0.001
	X17	-0.077	-0.334	0.858	-0.093	0.15	0.157	0.044	<0.001
	X18	-0.059	0.025	0.878	0.054	-0.052	-0.056	0.044	<0.001
	X19	0.038	0.09	0.875	-0.003	-0.048	-0.021	0.044	<0.001
	X20	-0.057	0.267	0.804	0.038	0.018	-0.117	0.044	<0.001
Convenience (Con)	X21	0.451	0.25	0.047	0.548	-0.44	-0.196	0.046	<0.001
	X22	-0.06	-0.317	-0.143	0.725	0.026	0.044	0.045	<0.001
	X23	-0.089	0.018	0.18	0.799	0.168	-0.185	0.044	<0.001
	X24	-0.177	0.105	-0.088	0.747	0.118	0.3	0.045	<0.001
Entertainment (Ent)	X25	-0.061	0.364	0.084	0.003	0.825	-0.104	0.044	<0.001
	X26	-0.07	-0.46	-0.072	-0.004	0.692	0.203	0.045	<0.001
	X27	0.114	0.021	-0.022	0	0.865	-0.064	0.044	<0.001
Intention	X28	0.177	-0.495	-0.04	-0.28	0.227	0.525	0.046	<0.001
	X29	-0.176	0.055	0.018	0.485	-0.012	0.742	0.045	<0.001
	X30	0.05	0.291	0.01	-0.283	-0.147	0.753	0.045	<0.001

Results from Table 4.2 show us that the load from each indicator is passing the requirement of convergen validity, which is above 0,6 and significant, not included X6, X7, X8, X10, X21 and X28 indicator which having point under 0.6. According to (Sholihin, 2016) in some case, load requirement is not fulfilled, especially for new-developed questionnaire. For that, load number between 0,40 - 0,70 is defended, but for indicator load under 0.40 must be deleted from the model

ISBN : 978-602-99806-3-9

3.3 Test convergent validity

Table 3. Correlations among l.vs. with sq. rts. of AVEs

Latent Construct	IU	PT	SI	Con	Ent	Int
Interpersonal Utility	IU	0.614	0.435	0.605	0.557	0.396	0.358
Pass Time	PT	0.435	0.885	0.498	0.378	0.506	0.527
Seeking Information	SI	0.605	0.498	0.818	0.492	0.575	0.51
Convenience	Con	0.557	0.378	0.492	0.711	0.553	0.528
Entertainment	Ent	0.396	0.506	0.575	0.553	0.798	0.544
Intention	Int	0.358	0.527	0.51	0.528	0.544	0.682

Discriminant Validity in this experiment instrument is also fulfilled. This is shown by Table 3 where AVE root in diagonal column is higher than correlation between latent variable in other tables except diagonal.

3.4 Test measurement model

Table 4. Model Fit and Quality Indices

Statistic	Value	Conclution
Average path coefficient (APC)	0.239	Acceptance
Average R-squared (ARS)	0.687	Acceptance
Average adjusted R-squared (AARS)	0.683	Acceptance
Average block VIF (AVIF)	3.306	Acceptance
Average full collinearity VIF (AFVIF)	1.912	Ideally
Tenenhaus GoF (GoF)	0.627	Large
Sympson's paradox ratio (SPR)	1	Ideally
R-squared contribution ratio (RSCR)	1	Ideally
Statistical suppression ratio (SSR)	1	Ideally
Nonlinear bivariate causality direction ratio (NLBCDR)	1	Ideally

Besides that, fit model index has fulfill the requirement with significant APC, ARS, and AARS with p score is below 0.001 and AVIF score is below 5. Model Fit experiment results is shown on table 4.

3.5 Test Results of Research Hypothesis

Table 5. **Result of Hypothesis Testing**

H	Relation	Path Ccoeficient	P value	Result
H1	IU → Int	0.183	<0.001	Supported
H2	PT → Int	0.261	<0.002	Supported
H3	SI → Int	0.23	<0.003	Supported

ISBN : 978-602-99806-3-9

H4	Con → Int	0.364	<0.004	Supported
H5	Ent → Int	0.157	<0.005	Supported

Hypothesis testing is done by testing structural model. Structural model is evaluating the connection and the connection value between independent latent variable to dependent latent variable. Figure 2 shows us the result of structural model SEM-PLS in this experiment. Full result about structural model evaluation in this experiment is shown in table 5.

Table 7. Effect Sizes for Path Coefficients

	IU	PT	SI	Con	Ent	Int
IU						
PT						
SI						
Con						
Ent						
Int	0.094	0.138	0.136	0.225	0.093	

Beside path coefficient value, test result SE-PLS also producing effect-size value. Effect-size output showing the result of *f-squared* effect size. According to Kock and Hair in their experiment which cited by (Sholihin, 2016), effect size can be separated to 3 categories, that is weak (0,02), medium (0,15) and strong (0,35). Effective size value under 0,02 is showing that latent variable predictor impact is very weak from practical side of view although it has significant p value. Table 7 is summarized size effect predictor latent variable to criterion latent variable.

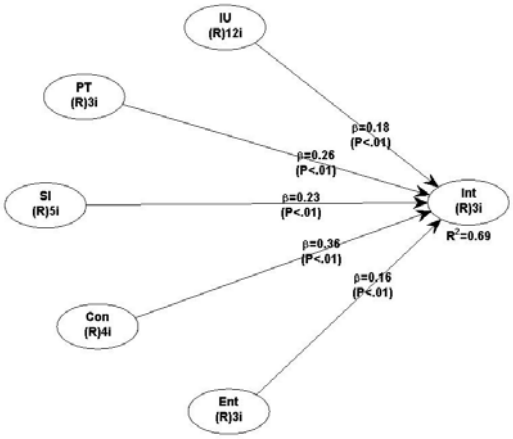


Figure 2. Results Model

Hypothesis testing is analyzed from SEM-PLS testing result which is looking at path coefficient value. Figure 2 is showing about the connection between independent variable to dependent variable is all having p score below 0,001. That condition is indicating that the connection between independent variable or predictor variable to dependent variable or criterion variable is al significant. By this, every hypothesis in this experiment is accepted. In other side, effect size result in all hypothesis is indicating that predictor variable influence is medium from practical view.

4 CONCLUSION AND RESEARCH IMPLICATION

The huge amount of internet users in Indonesia is giving significant change to YouTube using (pola). Dynamic (masyarakat) life is giving a huge chance for all kind of (kalangan) to actualize

ISBN : 978-602-99806-3-9

themselves with YouTube. This is also (dirasakan) by a lot of respondent who using YouTube as communication place and social community. By huge amount of YouTube characteristic connection with people's intention to re-using YouTube again in long term, we find that easiness in operating YouTube for users and also supported by the practical in founding videos/ information is the main factor for people doing their activities by YouTube page in long term. This far, finally YouTube succeed to gaining positive response from (masyarakat) and also winning SNS market competition in Indonesia.

5 REFERENCES

1. Ajzen I., The Theory of Planned Behavior. Organizational Behavior and Human Decision Processes, 1991, pp. 179-211.
2. Alexa, the top 500 sites on the web. https://www.alexa.com/topsites/countries/ID, 2017
3. Burgess J. E. & Green J. B., The entrepreneurial vlogger: Participatory culture beyond the professional-amateur divide. The YouTube Reader, 89-107, 2009.
4. Hicks A., Comp S., Horovitz J., Hovarter M., Miki M. & Bevan J. L., Why people use Yelp.com: An exploration of uses and gratification. Computers in Human Behavior, 28(6), 2012, 2274-2279.
5. Huang Z. & Benyoucef, M., From e-commerce to social commerce: A close look at design features. Electronic Commerce Research and Applications, 12, 2013, 246-259.
6. Khan M. L., Computers in Human Behavior Social media engagement: What motivates user participation and consumption on YouTube? Computers in Human Behavior, 66, 236–247, 2017.
7. Krause, A. E., North, A. C., & Heritage B., Computers in Human Behavior, 39, 2014, 71–77
8. Kraut R. E. & Resnick P., Encouraging contribution to online communities. Building successful online communities: Evidence-based social design, 21-76, 2011.
9. Papacharissi, Z., & Rubin, A., M. , Predictors of Internet use. Journal of broadcasting & Electronic Media, 44, 2000, 175-196
10. Sholihin, M. & Ratmono, D., Analisis SEM-PLS dengan WarpPLS 3.0, untuk Hubungan Nonlinier dalam Penelitian Sosial dan Bisnis. Yogyakarta: Andi Offset, 2016.
11. Smith A. N., Fischer E. & Yongjian C., How does brand-related usergenerated content differ across YouTube, Facebook, and Twitter? Journal of Interactive Marketing, 26(2), 2012, 102-113.
12. Stafford T. F. & Gillenson M. L., Motivations for Mobile Devices: Uses and Gratifications for M-Commerce. Washington, D.C., December 10-11, Proceedings of the Third Annual Workshop on HCI Research in MIS, 2004, p. 70–74.
13. Taylor, S. & Todd, P. A., Understanding Information Technology Usage: A Test of Competing Model. Information System Research, 6(2), 1995, pp. 144-176.
14. Tri S., Mardi L., Budiyanto S. D. & Asif F., Analysis of the Effect of Information System Quality to Intention to Reuse of Employee Management Information System (SIMPEG), 3001 , 2016.
15. Wook Y., Kim J., Libaque-saenz C. F. & Chang Y., Telematics and Informatics Use and gratifications of mobile SNSs: Facebook and KakaoTalk in Korea.. Telematics and informatics, 32(3), 2015, p. 425–438.
16. Youtube, Our mission is to give everyone a voice and show them the world, 2017, Retrieved from: https://www.youtube.com/yt/about/\

Proceeding International Joint Conference
on Science and Technology (IJCST) 2017

ISBN : 978-602-99806-3-9

Modeled early detection of pregnancy risk based on Poedji Rochjati score card using relief and neural network

Fetty Tri Anggraeny*, Faisal Muttaqin and M. Syahrul Munir
Faculty of Computer Science Universitas Pembangunan Nasional "Veteran" Jawa Timur, Indonesia

Abstract. The safety and healthy of pregnant women and their babies is very important. An anticipatory action should be prepared as early as possible to prevent or reduce the high risk of pregnancy. The Poedji Rochjati Score Card (PRSC) is one of the methods that can be used to know the pregnancy risk used by doctors and midwives. This research proposed modeling PRSC using artificial neural network (ANN) method and select the most important factor in determining the pregnancy risks using ReliefF algorithm. The results of early pregnancy risk detection using ANN is expected to assist the process of checking the risk of pregnancy, either by pregnant women or by health workers. Experiment show that the best configuration was using 4 neighborhood parameter of ReliefF algorithm and 5 hidden neuron parameter of Neural Network. And the significant feature are bleeding during pregnancy, baby dies in uterus, never failed pregnancy, had caesarean section, too late pregnant, first pregnancy when age 35th, age<= 16th, too soon pregnant again, diabetes, blood deficiency, had given birth and was given infusion / transfusion, age> = 35th, pregnant twins 2 or more.

Keywords: pregnancy risk, Poedji Rochjati Score Card, ReliefF, neural network.

1. INTRODUCTION

The meaning of pregnancy according to Astuti Maya is the time when a woman carries an embryo or fetus in her body. Early pregnancy occurs when the female ovum breaks off and enters the ovarium [1]. Maternal health is very influential on fetus growth. In addition, good maternal health during pregnancy is also helpful when it comes time to give birth and also breastfeeding newborns. Maternal health influenced by several factors such as age, education, psychological, nutritional knowledge and activities.

Based on the data from Indonesian Demographic and Health Survey (SDKI) in 2012 [2], the maternal mortality ratio in 1997 was 390 deaths per 100,000 live births, in SDKI 2002-2003 was 307 deaths per 100,000 live births, and in the SDKI 2007 was 228 deaths per 100,000 births live. However, this number figure increases in the SDKI 2012 became 359 deaths per 100,000 live births. While infant mortality rate was less than 6 days decreased according to survey results of 2002, 2007, and 2012 are 23, 20, and 19 from 1,000 births.

Based on these data, pregnant mother should conduct a series of periodic health checks to determine the condition of pregnancy and fetal health. Early screening tools/early detection of pregnant women's risk are Poedji Rochjati Score Card (PRSC). The scorecard format is structured in a combination format between checklist and score system. Score is the approximate weight of the pregnant risk [3]. In this PRSC, there are 26 parameters that must be filled by health worker based on the pregnant women

ISBN : 978-602-99806-3-9

condition. Maybe there are consist of primer parameter or non-primer parameter, so we can find the primer parameter first before we modelled the data into a machine learning.

In order to find primer parameter of data, we can use a feature selection method. Feature selection is one of the most frequent and important techniques in data preprocessing, and has become an indispensable component of the machine learning process [4]. It is the process of detecting relevant features and removing irrelevant, redundant, or noisy data. This process speeds up data mining algorithms, improves predictive accuracy, and increases comprehensibility. Irrelevant features are those that provide no useful information, and redundant features provide no more information than the currently selected features [5].

Based on the above description, in this research will be modeled an application of early detection of pregnancy risk based on Poedji Rochjati Score Card to find out the most influential pregnancy factor in pregnancy health. In addition, this application can help pregnant women and health workers to know the risks of early pregnancy.

2. METHODS

In this research will be applied 2 methods, namely ReliefF feature selection and Neural Network classification. Methodology stages in this study can be seen in figure 1.

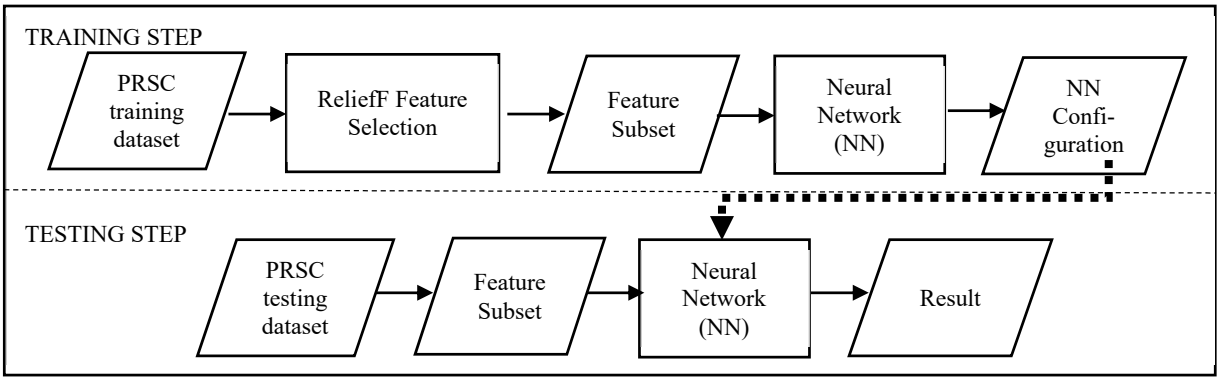


Fig. 1 Proposed Method.

Neural network is a supervised learning machine, which requires the training stage to get the configuration according to the problem. As shown in the flowchart training Figure 1, the result of the training process is a neural network configuration consisting of the number of hidden nodes and the weights between neurons.

After the training process, the neural network can be used for the testing process. The direct dataset testing feature uses the best feature subset number obtained from the training stage. And then put into neural network result of training process.

2.1 Poedji Rochjati Score Card

According to Poedji Rochjati [3], risk is a statistical measure of the probability or possibility of occurrence of an undesirable emergency situation in the future, namely the possibility of obstetric complications at the time of delivery which may cause death, sickness, disability, discomfort or dissatisfaction in the mother and/or baby. Poedji Rochjati Score Card is a method for introducing/early detection of pregnancy risk factors. This tool was made in 1989 for the mother of PKK (at that time there was no midwife in the village), in Sidoarjo district. With the concept of “dasa-wisma”, PKK agent can soon find her neighbor's pregnant woman [3].

In modern obstetrics there is a potential risk awareness, in which a pregnancy and childbirth always have a risk with the possible danger/risk of complications in the process of giving birth. This requires proactive anticipatory prevention efforts since the beginning of pregnancy, during pregnancy until the time of delivery performed by health workers, midwives in the village with pregnant women, husbands,

ISBN : 978-602-99806-3-9

families, and communities. The objective of the Risk Approach is to improve the quality of care for all pregnant women, fetuses and newborns as a whole, and special and more intensive attention is given to those who have greater likelihood of rescue [3]. In supporting the success of the objectives of the Risk Approach, there should be an extension about the condition of pregnant women in the form of Information and Education Communication to pregnant women, husbands, families and communities.

The level of risk can be formed of numbers called scores. Score is the approximate weight of the pregnant risk. The number of scores will provide an understanding of the level of risk faced by pregnant women. The type of pregnancy risk of pregnant women is obtained from the sum of scores of problems or risk factors experienced by pregnant women. Based on the number of scores, the risk of pregnancy is divided into three groups, namely:

1. Low Risk Pregnancy (KRR): Total Score 2
2. High Risk Pregnancy (KRT): Number of Scores 6-10
3. Very High Risk Pregnancy (KRST): Total Score ≥12

2.2 Feature Selection

Feature selection is divided into two approaches, namely the wrapper approaches and filter approaches [6]. Filter approach of feature selection is done separately with classification engine, or in other words, the selection of features is used as a data preprocessing before it is input into the classification engine. Some methods of filter approach of feature selection are gain ratio [6, 7], particle swarm intelligence (PSO) [8, 9], differential evolution [10], biclass adaptive discriminant ratio [11], reliefF [12, 13, 14].

Wrapper approach use classification engine to be trained and tested with feature set, if the addition feature make the accuracy decrease, then it will be remove from feature set. At the other hand, , if the addition feature make the accuracy increase, then it will be stay in feature set. The engine will process feature set and not use the other feature that will weaken the accuracy of the system. For example some methods in this approach are Ant Colony Optimization (ACO) [15], Sequential Forward Floating Selection (SFFS) [16], etc.

Based on this description, it appears that the filter approach is much simpler than the filter wrapper approach. In addition, the time required to filter approach is faster than the wrapper approach. But by using a wrapper approach, the classification engine will be optimized based on the features.

2.2.1Relieff Feature Selection

ReliefF [12] is a classical feature selection algorithm. It utilizes the correlation between the characteristics to make similar samples close and keep heterogeneous samples apart in order to achieve the purpose of the feature selection. ReliefF algorithm is the development of Relief algorithm that is not able to overcome inclomplete data and only limited to 2 class problem only. ReliefF algorithm is made to solve the problems that can not be overcome by Relief algorithm.

ReliefF algorithm is used to solve single label problem [13]. Assume that there are n instances and L labels. Let $P \in R^f$ be the full set of features, $p \in P$ be a feature, $X=[x_1, x_2, \ldots, x_n] \in R^{n \times f}$ denote instances and let $Y=[y_1, y_2, \ldots, y_n] \in R^{n \times L}$ denote the instances with labels. One instance represented by $x_i \in R^f$ can be expressed as $x_i=[p_i^1, p_i^2, \ldots, p_i^f]$. It is associated with a set of labels by a binary vector $y_i=\{0,1\}^l$, and $y_i(\mathrm{l})=1$ if x_i belongs to the l th class and $y_i(\mathrm{l})=0$ otherwise. Since an instance owns multiple labels, $\sum y_i(\mathrm{l}) \geq 1$.

For the classical ReliefF[12], the algorithm samples m instances randomly from the dataset. For each sample point x_t ($1 \leq t \leq n$), it finds K nearest neighbors that belongs to the same class$C$ as x_t named as Hit and for other ($L-1$) classes (other than C), it also finds K nearest neighbors denoted as Miss (C); So the formula for updating every feature is computed as,

$$W_P = W_P - \sum_{j=1}^{K} \frac{d(p, x_t, H_j)}{m \cdot K} + \sum_{C \neq C(x_t)} \sum_{j=1}^{K} \frac{P(C)}{1-P(C(x_t))} \cdot \frac{d(p, x_t, M_j)}{m \cdot K} \quad (1)$$

ISBN : 978-602-99806-3-9

Where W_P denotes the value of feature p, $P(C)$ is the priori probability of the label class C, and $d(p, x_t, x_j)$ is the distance between x_t and x_j on feature p (usually the Euclidian distance).

2.3 Neural Network

Artificial Neural Networks are one of the artificial representations of the human brain that simulate the learning process in the human brain. The term artificial is used because this neural network is implemented by using a computer program capable of completing a number of calculation processes during the learning process [17]. The human brain contains millions of nerve cells in charge of processing information. Every nerve cell (neurons) will have a single cell nucleus, the nucleus of this cell that will be in charge of processing information. For example when our skin is exposed to heat, then the information received by the nerve cells in the skin will be forwarded to the brain for processing, after it is channeled back to the nerve cells to produce motion reflex motion. Similarly, the artificial neural network algorithm, consisting of many interconnected neurons to process input data into output data. Adopting nerve cells (neurons) in humans, where each neuron has a cell nucleus, functions as information processing, and synapses, which act as interconnects between neurons and also as input receivers and produce output. Adoption of artificial neural network cells to human nerve cells can be seen in figure 2.

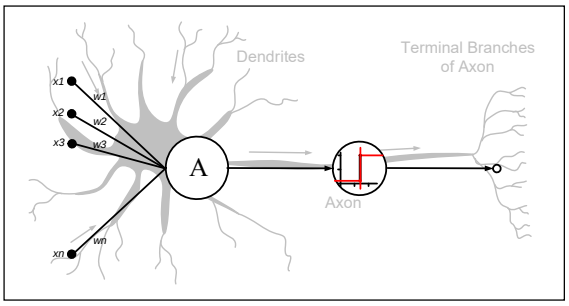


Fig. 2 Human nerve cell adopted to artificial neural network nerve cell.

Components of artificial neural networks as follows:

1. Neurons, nerve cells that will transform information received through its outgoing connection to other neurons. Within each neuron there is an activation function to replace the electrochemical process.
2. Weight, in artificial neural networks, the relationship between neurons known as the weights that replace the function of synapses.

In neural networks, neurons will be collected in layers called neuron layers (neuron layers). Information provided on the neural network will be propagated layer to layer, from input to output layer through another layer, known as a hidden layer. Depending on the learning algorithm, the information may be retroactively retrieved on the network. The artificial neural network method employed is backpropagation which is a controlled learning algorithm with multiple layers to change the weights associated with neurons present in the hidden layer (see figure 3). The learning method of the neural network is called supervised if the expected output has been known before.

ISBN : 978-602-99806-3-9

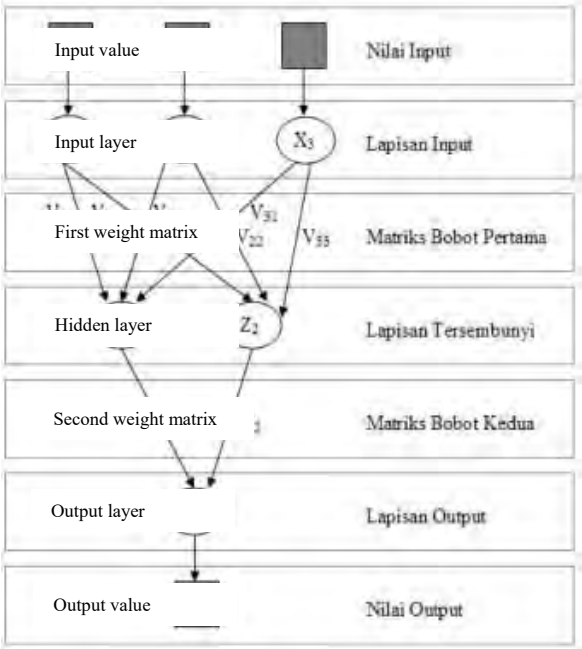


Fig. 3 Multilayer perceptron architecture

3. RESULT AND DISCUSSION

First, the dataset was applied by feature selection algorithm, ReliefF. The number of neighborhood parameter of ReliefF algorithm is variant start from 2 to 10. Table 1 show ReliefF feature selection result, bold number in atribut ranking column indicate feature number that have positif ranking value. And the number with underline is the feature number that occur in all experiment variant number of neighborhood, there are feature number 2, 3, 12, 13, 14, 23, and 27.

After feature selection, we classify the subset feature (bold feature number) using neural network. Table 2 show neural network classification performance using RMSE value. The last row is the result using the underlined features. And the bold number indicate the best configuration of neural network. First column, feature subset has the same meaning with first column on Table 1, number of neighborhood. Experiment result on Table 2, show that the best configuration using 4 neighborhood parameter of ReliefF algorithm and 5 hidden neuron parameter of Neural Network.

Table 1 Relieff fitur selection with varians neighborhood value (K).

Number of Neighborhood	Atribut Ranking
2	27,23,3,7,14,4,2,18,13,16,12,9,21,10,11,28,15,25,26,17,24,1,22,19,5,6,8,20
3	27,23,3,2,9,13,1,14,7,21,4,12,16,20,18,26,24,25,10,19,22,17,15,28,11,6,8,5
4	27,23,9,13,2,3,1,4,18,14,12,7,21,16,20,25,19,26,24,22,28,17,15,11,10,5,6,8
5	27,13,23,3,7,9,1,2,18,16,12,21,14,20,4,25,15,17,26,24,28,22,11,19,10,5,6,8
6	27,13,1,9,3,23,2,12,14,16,20,18,21,7,19,25,26,24,10,11,15,17,28,22,4,5,6,8
7	27,13,3,23,12,9,2,1,7,16,18,14,20,21,25,17,15,26,24,28,22,19,10,11,6,4,5,8
8	27,13,3,9,7,23,12,2,1,16,18,14,20,25,24,17,22,26,15,28,10,19,11,21,6,4,8,5
9	27,13,3,9,23,7,12,16,2,1,18,14,20,25,24,17,22,26,15,28,10,19,11,21,6,8,4,5
10	27,13,3,7,9,12,23,2,16,18,1,14,20,25,24,17,22,26,15,28,10,19,11,6,21,8,5,4

ISBN : 978-602-99806-3-9

Table 2 RMSE value of neural network classification using feature subset.

Feature Subset	Number of hidden neuron							
	5	10	15	20	25	30	35	40
2	0,23	0,770	0,226	~	0,228	0,2281	0,228	0,229
3	0,222	~	0,201	~	~	0,204	0,206	0,207
4	0	~	0,003	~	~	0,005	0,454	0,358
5	0,225	~	0,191	~	0,199	0,196	0,203	~
6	0,289	~	0,401	0,255	0,260	0,261	12,375	9284,6
7	0,267	~	0,276	0,956	0,255	0,259	0,264	0,264
8	0,271	2,05	0,264	0,606	~	0,251	0,259	0,259
9	0,267	~	0,276	0,956	0,255	0,259	0,264	0,264
10	0,285	~	0,264	0,973	~	0,254	0,278	0,262
a*	0,3261	0,402	0,3071	0,3059	1,5769	~	0,288	0,2912

* is subset feature that consist of number feature that occur in all variant neighborhood.
~ is infinity value

4. CONCLUSION

Experiment show that the best configuration was using 4 neighborhood parameter of ReliefF algorithm and 5 hidden neuron parameter of Neural Network. And most significant feature are And the significant feature are bleeding during pregnancy, baby dies in uterus, never failed pregnancy, had caesarean section, too late pregnant, first pregnancy when age 35th, age$\leq 16^{th}$, too soon pregnant again, diabetes, blood deficiency, had given birth and was given infusion / transfusion, age$\geq 35^{th}$, pregnant twins 2 or more.

Modeled application of early detection of pregnancy risk based on Poedji Rochjati Score Card can be used for pregnant woman, doctor or midwife as an assistant for early detection of pregnancy risk. In this research focus on method test, and the result is very good with 0 value of RMSE. This model can be implemented on mobile application, so it can help more and easy for pregnant woman.

5. REFERENCES

[1] Astuti, M., Smart Pregnancy Book. Jakarta: EGC, 2010.
[2] Badan Pusat Statistik, Indonesia Demographic and Health Survey 2012. Indonesia, 2013.
[3] Rochjati P., Antenatal Screening In Pregnant Women Edition 2, Airlangga University Press, Surabaya, 2011.
[4] Kalousis, J. Prados and M. Hilario, Stability of Feature Selection Algorithms: A Study on High Dimensional Spaces, Knowledge and Information System, Vol. 12, No. 1, 2007, pp. 95-116.
[5] Kumar V. and Minz S., Feature Selection: A Literature Review, Smart Computing Review, Vol. 4, No. 3, June 2014.
[6] Karegowda A.G., Manjunath A.S. and Jayaram, M.A., Comparative Study of Attribute Selection using Gain Ratio and Correlation based Feature Selection, International Journal of Information Technology and Knowledge Management, Vol. 2, No.2, 2010, pp.271-277.
[7] Anggraeny F.T. and Widiasri M., Voting of Artificial Neural Network Particle Swarm Optimization Biclassifier using Gain Ratio Feature Selection, Kursor, Vol.7, No.2, 2013.
[8] Huang C.L. and Dun J.F., A Distributed PSO–SVM Hybrid System with Feature Selection and Parameter Optimization, Applied soft Computing, Vol.8, No.4, 2008, pp.1381-1391.
[9] Yang H.C., Zhang S.B., Deng K.Z. and DU P.J., Research Into a Feature Selection Method for Hyperspectral Imagery using PSO and SVM, Journal of China University of Mining and Technology, Vol.17, No.4, 2007, pp.473-478.

ISBN : 978-602-99806-3-9

[10] Khushaba R.N., Al-Ani A. and Al-Jumaily A., Feature Subset Selection using Differential Evolution and A Statistical Repair Mechanism, Expert Systems with Applications, Vol.38, No.9, 2011, pp.11515-11526.

[11] Anggraeny F.T. and Indriati H.R.H., Voting of Biclass and Multiclass Artificial Neural Network, Proceedings of Bali International Seminar on Science and Technology 2011.

[12] Kononenko I., Estimating Attributes: Analysis and Extensions of RELIEF, In European Conference on Machine Learning, Springer Berlin Heidelberg, April 1994, pp. 171-182.

[13] Cai Y., Yang M. and Yin H., Relieff-Based Multi-Label Feature Selection, International Journal of Database Theory and Application, Vol.8, No.4, 2015, pp.307-318.

[14] Durgabai R., Feature Selection using ReliefF Algorithm, International Journal of Advanced Research in Computer and Communication Engineering, Vol. 3, Issue 10, 2014.

[15] Liao T.W., Feature Extraction and Selection from Acoustic Emission Signals with An Application in Grinding Wheel Condition Monitoring, Engineering Applications of Artificial Intelligence, Vol.23, No.1, 2010, pp.74-84.

[16] Bouckaert R. R., Frank E., Hall M., Kirby R., Reutemann P., Seewald A., and Scuse, D., WEKA Manual for Version 3-6-9, 2013.

[17] Hermawan A., Artificial Neural Network Theory and Applications, ANDI Yogyakarta, 2006.

ISBN : 978-602-99806-3-9

Frequency Estimation Using Top-Hat Transforms

IGNA Dwijaya Saputra, IGNB Catur Bawa
Jurusan Teknik Elektro, Politeknik Negeri Bali
Jalan Kampus Bukit Jimbaran, Badung Bali, E-mail: dwijaya_s@pnb.ac.id

Abstract: In signal processing, frequency estimation is an important step to detect and analyse power quality disturbances. In general, conventional strategies based on Fourier transforms have been applied for this purpose. In this paper, a new strategy in estimating the frequency of the signal in time domain is presented. This proposed strategy is based on top-hat transforms. The signal is processed using both transforms, then the results are compared to find the frequency estimation of the signal. By simulating this strategy using Matlab, the results show good estimation for noise-free signal and signal with SNR at higher than 30dB. The accuracy of the results decreases when analysing the signal with SNR less than 30dB.

Keywords: *transforms, Mathematical Morphology, power quality, Top-hat transforms.*

I. Introduction

Several methods for frequency estimation have been applied on the signal such as Zero Crossing method [1,2]. This method has good performance for well filtered or perfect waves. It also has a high sensitivity to noise. Prony algorithm [3–6] also has a good performance in estimating the frequency in a signal. This proposed which gives reliable estimates in presence of noise but has a problem in the existent of the outliers due to the process on minimising the error between the estimated signal and original signal.

Another method for estimating frequency is Kalman filter [7]. This method is suitable for noise rejection, but it has a drawback where the process is slower compared with other methods. This method is dependent on the model parameters adjustment (variance and covariance noise matrices).

Demodulation is also can be used to estimate the frequency [2]. The main idea for this method is to multiply the scalar input with a sine and cosine signal with a known frequency. This has a sensitivity to large negative sequence component especially for fault conditions.

Phasor measurement angle changing [8] is also able to estimate the frequency signal. This method uses a positive sequence phasor estimation. This method presents satisfactory results under large frequency variations and is used in commercial PMUs.

In this chapter, the new strategy in estimating the frequency of a sinusoidal signal is presented. Even though for frequency estimation, the phasor angle changing method and demodulation strategy generated satisfactory results, but this strategy gives an alternative for the future application. This is because this method is based on mathematical morphology, the method that just needs some simple calculation.

ISBN : 978-602-99806-3-9

II. Method

Top-hat Transforms

The strategy in estimating of the frequency of the signal is based on top-hat transforms. The input signal f(x) is initially processed using top-hat SEs with value of structuring element (g) = 3 that can be denoted as follows:

$$T_{HAT} = f - (f \circ g) \qquad (1)$$

The effect of top-hat transforms on the signal can be seen in Figure 1. A small magnitude represent the peak of the signal in positive value is generated when the signal is processed using the top-hat transform while a negative value is generated by using the transform.

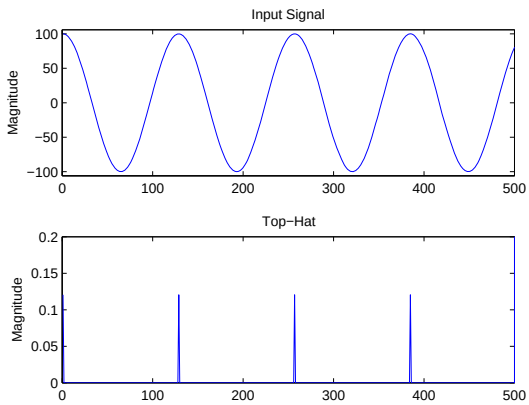


Figure 1. Effect of top-hat transforms on the signal

Frequency Calculation

Results of top-hat transforms in a signal is used to estimate the frequency of the signal by calculating the location time between the peaks of the signal. The result of the top-hat transform as a vector or matrix ($1 \times m$) are then used to find the frequency estimation of the signal. From this matrix, the row number of the elements that contain zero value are deleted, and non-zero values is recorded as a new matrix $T_{n1}(n)$ as follows:

$$T_{n1(n)} = \begin{cases} n & ; T_{n1(n)} > 0 \\ [-] & ; T_{n1(n)} = 0 \end{cases} \qquad (2)$$

where n =1, 2, 3, ... , m and m is the length of the processed samples. Then every element of the matrix T_{n1} is subtracted to become a new matrix T_{n2} using this formula:

$$T_{n2}(n-1) = T_{n1}(n) - T_{n1}(n-1) \qquad (3)$$

From these results, the frequency estimation (f_{es}) can be calculated using the following formula:

$$f_{es} = f_s / \max(T_{n2}) \qquad (4)$$

where f_s is the sampling frequency. By choosing the maximum value of T_{n2}, the values from the top-hat transforms process that represent the noise in the signal can be eliminated.

III. Simulation and Results

There were some simulations undertaken using Matlab. This proposed strategy was used to calculate the frequency of the signal in different conditions; noise free signals and signals

ISBN : 978-602-99806-3-9

containing noise. All signals were analysed in different frequencies and different values of SNR. The sampling frequency for all simulations was 6.4 kHz with a structuring element (g) = 3.

3.1. Noise-free Signal

For the noise-free signal, the estimation process using the top-hat transform can be seen in Figure 2 to 4.

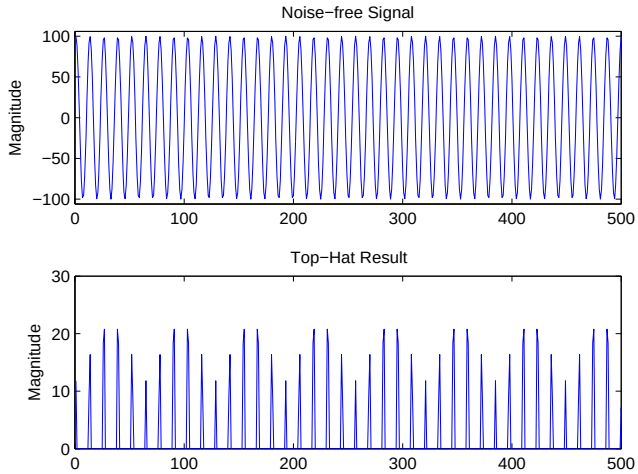


Figure 2: Results of top-hat transform for a noise-free signal

Figure 3 is the comparison of actual frequency and frequency estimation using the top-hat transform for noise-free signal. The errors in this method increase gradually following the increase of the frequency. This error can be seen in Figure 4. For frequencies 30 to 60 Hz, the error is less than 1% while at 300 Hz it becomes 5% and at 500 Hz it is about 8%.

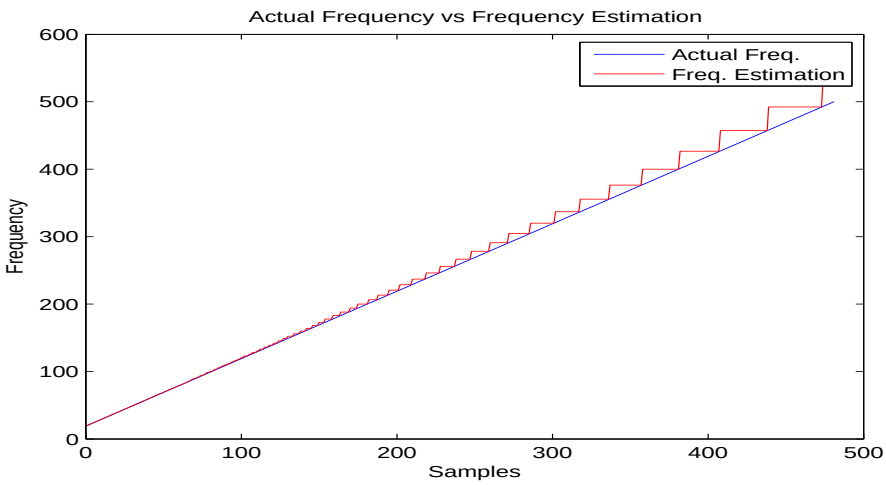


Figure 3: Actual frequency vs estimated frequency for noise-free signal

In Figure 3 the shape of the error is unique. It has a stair shape with some of the errors are zero or near zero with the largest error is just about 8% for a frequency of 495Hz. This means that some frequency is estimated correctly by this strategy especially for noise-free signals.

ISBN : 978-602-99806-3-9

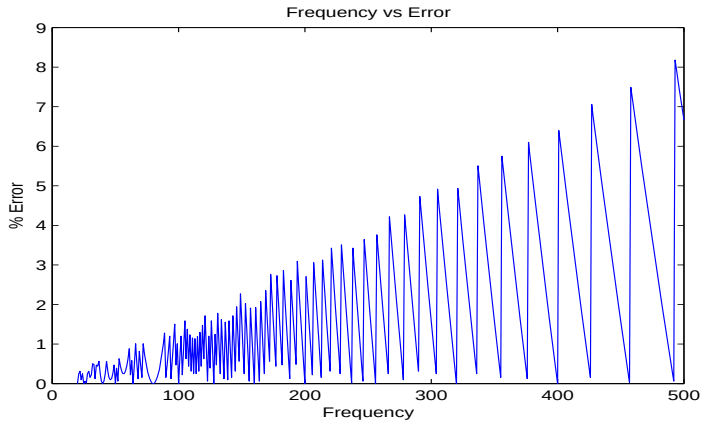


Figure 4: frequency vs error for noise-free signal

3.2. Signal with Noise

The simulation has also been undertaken using different values of signal to noise ratio (SNR) to show the effect of noise on the signal.

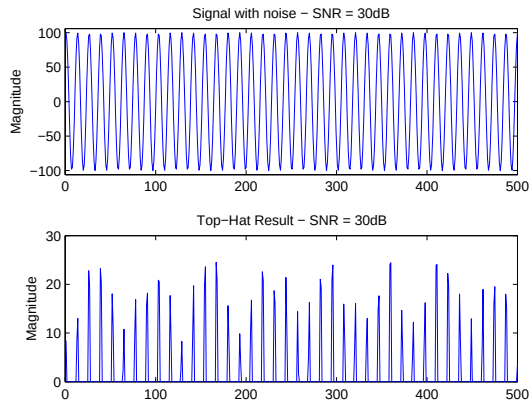


Figure 5: Results of top-hat transform for signal with SNR=30dB

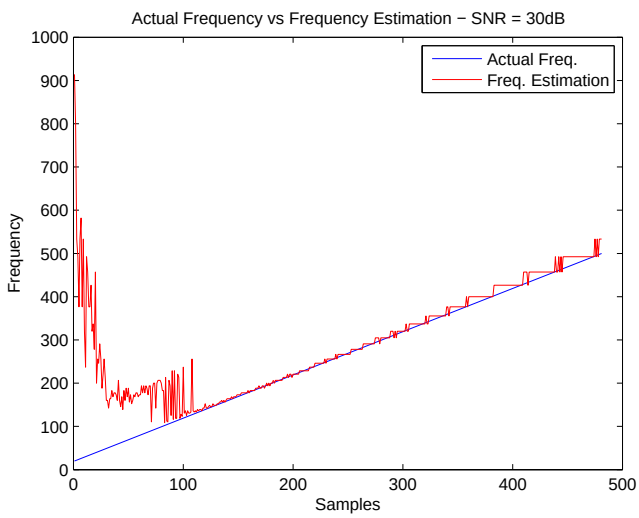


Figure 6: Actual frequency vs estimated frequency for 30dB signal

ISBN : 978-602-99806-3-9

Figures 5 to 7 show the estimation process using top-hat transform or signal with SNR=30 and the frequency varying from 20Hz to 500Hz. It is clearly seen in Figure 6 that this method has a difficulty in detecting frequency lower than 110Hz. In this frequency range, the errors are high while in the frequency over 110Hz this method generates a better result. The error in this condition can be seen in Figure 7 for the different frequency.

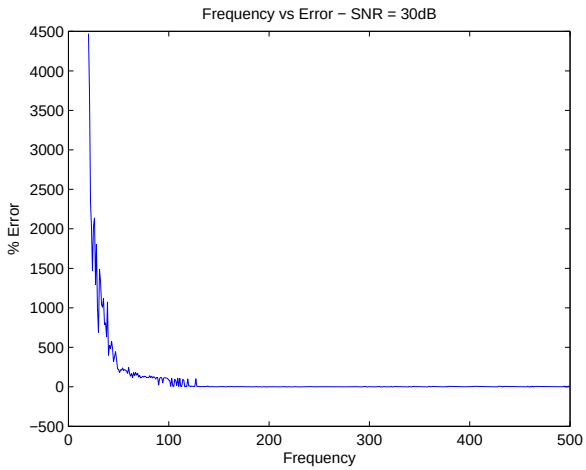


Figure 7: frequency vs error for signal with SNR=30dB

The error for the frequency of lower than 100Hz happens due to the availability of noise in this signal. This noise is processed by the top-hat transforms making this strategy generate an imprecise estimation. The more noise exists in the signal, the higher the frequency estimation is produced. For example, the result for a signal with frequency of 40Hz is 400Hz or ten times higher than the expected frequency which is shown in Figure 7.

3.3. Signal at various frequencies

Figure 8 shows the results of the top-hat transform for a frequency of 100Hz. The actual frequency versus estimated frequency for varies SNR (from 0dB to 100dB) at frequency 100Hz can be seen in Figure 9. The error increased when the SNR was lower than 35 dB. This means that more noise makes more errors in this method as can be seen in Figure 10.

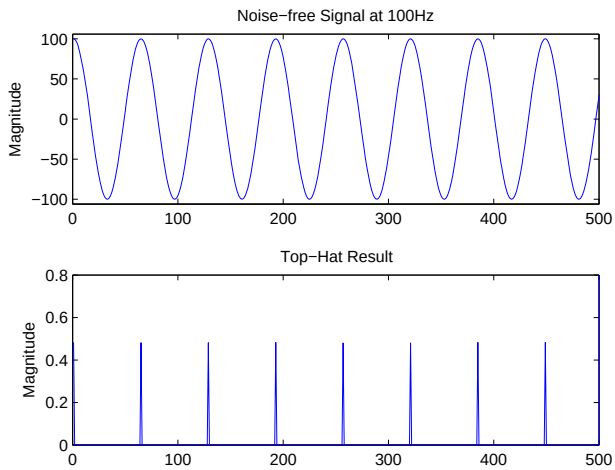


Figure 8: Results of top-hat transform for a noise-free signal at 100Hz

ISBN : 978-602-99806-3-9

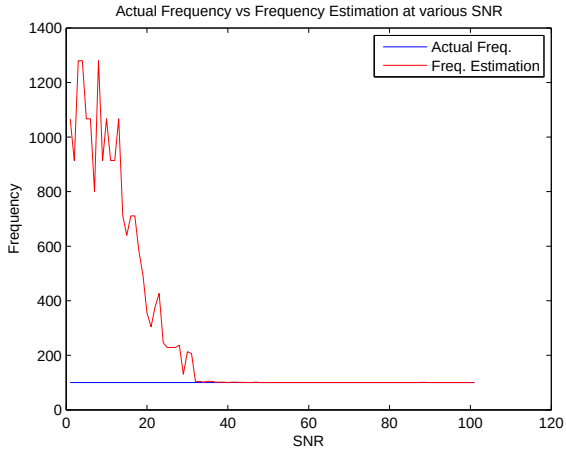


Figure 9: Actual frequency vs estimated frequency at 100Hz

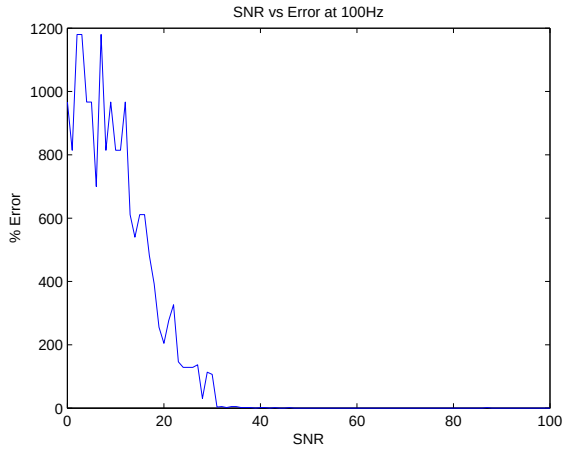


Figure 10: frequency vs error at 100Hz

For the signal with a frequency of 100Hz, the strategy has good results when the SNR value is larger than 35dB.
This strategy successfully estimates the frequency of the signal at 300Hz when the signal has SNR value greater than 18dB. It can be seen in Figures 11 to 13.

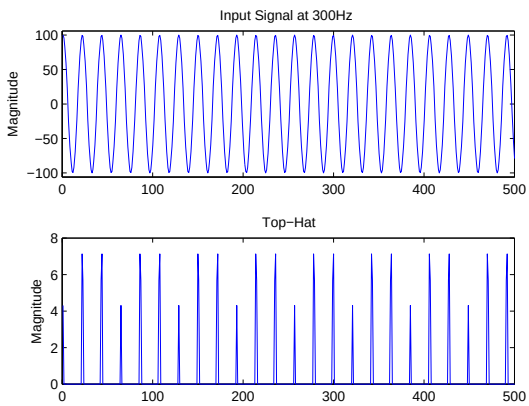


Figure 11: Results of top-hat transform for a noise-free signal at 300Hz

ISBN : 978-602-99806-3-9

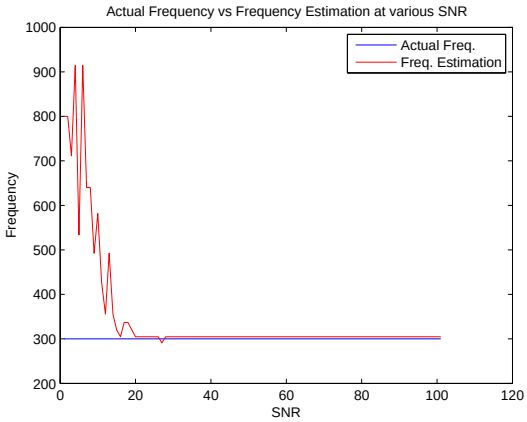


Figure 12: Actual frequency vs estimated frequency at 300Hz

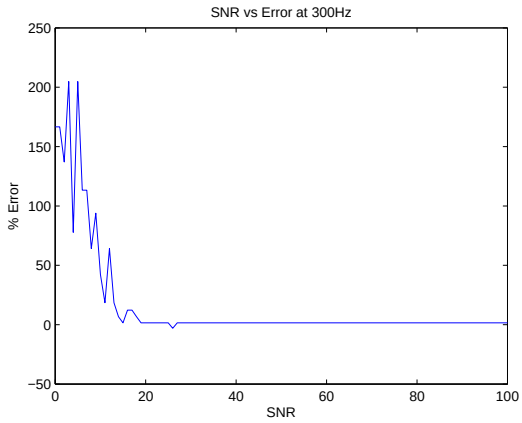


Figure 13: frequency vs error at 300Hz

At 500Hz, error for this strategy is less than 10% of the actual frequency when the SNR value of the signal is bigger than 8dB, and it can be seen in Figures 14 to 16.

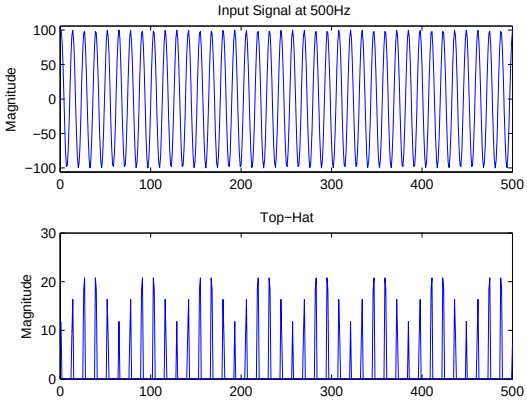


Figure 14: Results of top-hat transform for a noise-free signal at 500Hz

ISBN : 978-602-99806-3-9

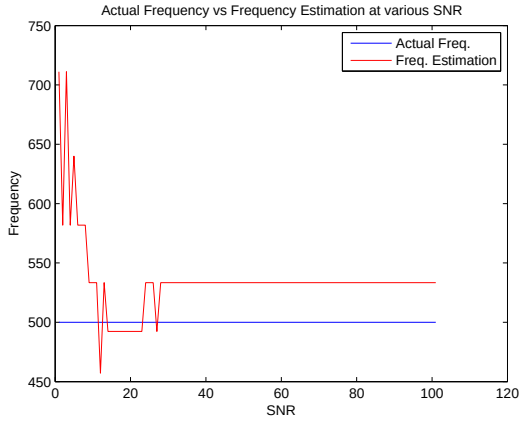


Figure 15: Actual frequency vs estimated frequency at 500Hz

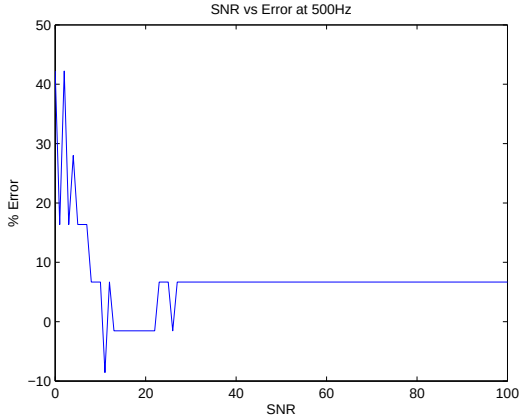


Figure 16: frequency vs error at 500Hz

Successful results have been made for this strategy when the signal has a frequency of 800Hz with SNR is higher than 1. The simulation results for this frequency can be seen in Figures 17 to 19.

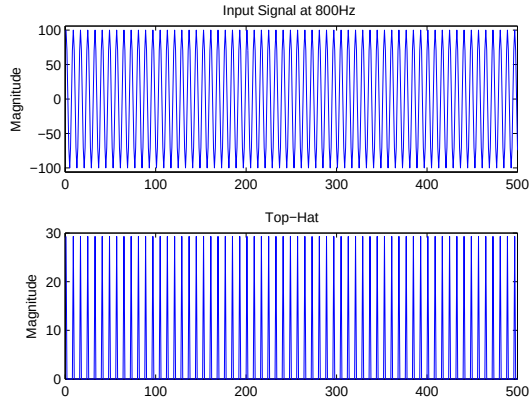


Figure 17: Results of top-hat transform for a noise-free signal at 800Hz

ISBN : 978-602-99806-3-9

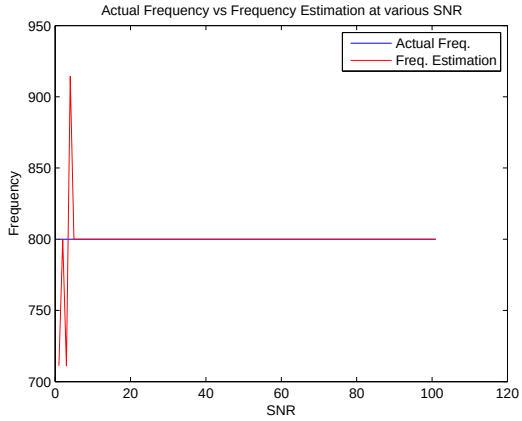


Figure 18: Actual frequency vs estimated frequency at 800Hz

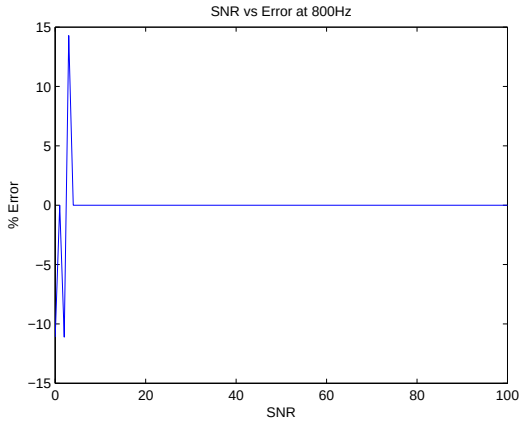


Figure 19: frequency vs error at 500Hz

The proposed method also has been tested for frequency of 1kHz. The results can be seen in Figures 20 to 22.

The error for the signal at 1kHz is 6.5% of the actual frequency for the SNR greater than 8dB, while the estimated frequency dropped to 8.5% below the actual frequency for SNR between 0 to 8dB.

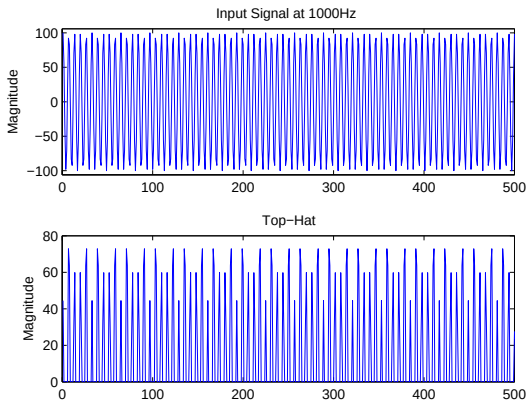


Figure 20: Results of top-hat transform for a noise-free signal at 1kHz

ISBN : 978-602-99806-3-9

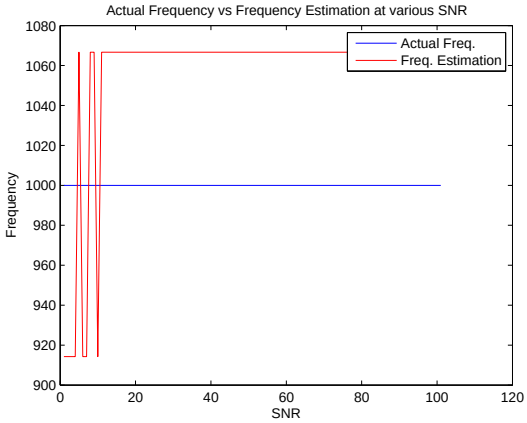


Figure 21: Actual frequency vs estimated frequency at 1kHz

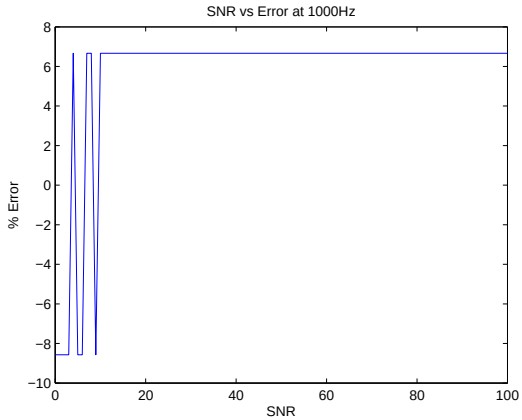


Figure 22: frequency vs error at 1kHz

IV. CONCLUSION

This proposed strategy is based on the top-hat transforms to estimate the frequency of the signal. The results show this method can handle low frequencies when the signal is a noise-free signal while this method cannot handle low frequency, especially lower than 40Hz, in the signal containing noise with SNR below 30 dB. For various values of SNR, the higher the frequency the better results have been obtain with the optimum result at frequency 800Hz. This method is an alternative method in estimating the frequency of a signal. By using MM, the burden in calculation when using traditional methods can be reduced.

V. REFERENCES

[1] C.T. Nguyen and K. Srinivasan, "A new technique for rapid tracking of frequency deviations based on level crossings," IEEE Transactions on Power Apparatus and Systems, vol. PAS-103, no. 8, pp. 2230–2236, Aug 1984.

[2] M. M. Begovic, P. M. Djuric, S. Dunlap, and A. G. Phadke, "Frequency tracking in power networks in the presence of harmonics," IEEE Transactions on Power Delivery, vol. 8, no. 2, pp. 480–486, Apr 1993.

ISBN : 978-602-99806-3-9

[3] S. Rai, D. Lalani, S. K. Nayak, T. Jacob, and P. Tripathy, "Estimation of low-frequency modes in power system using robust modified prony," IET Generation, Transmission Distribution, vol. 10, no. 6, pp. 1401–1409, 2016.

[4] S. R. Nam, S. H. Kang, L. M. Jing, S. H. Kang, and S. W. Min, "A novel method based on prony analysis for fundamental frequency estimation in power systems," in IEEE 2013 Tencon - Spring, April 2013, pp. 327–331.

[5] J. Li, S. Wang, and F. Wang, "Frequency estimation by correlation based two dimensional prony-type method, " in International Conference on Neural Networks and Signal Processing, 2003. Proceedings of the 2003, vol. 1, Dec 2003, pp. 681–685 Vol.1.

[6] T. Lobos and J. Rezmer, "Real-time determination of power system frequency," IEEE Transactions on Instrumentation and Measurement, vol. 46, no. 4, pp. 877–881, Aug 1997.

[7] M. S. Sachdev, H. C. Wood, and N. G. Johnson, "Kalman filtering applied to power system measurements for relaying," IEEE Power Engineering Review, vol. PER-5, no. 12, pp. 52–53, Dec 1985.

[8] A. G. Phadke, J. S. Thorp, and M. G. Adamiak, "A new measurement technique for tracking voltage phasors, local system frequency, and rate of change of frequency, "IEEE Transactions on Power Apparatus and Systems, vol. PAS-102, no. 5, pp. 1025–1038, May 1983.

ISBN : 978-602-99806-3-9

Community information systems for agriculture with analytical features

Mohamad Irwan Afandi, Eka Dyar Wahyuni, Achmad Nuruddin and Dwatra Apriandi
Information Systems Department, Faculty of Computer Science, Universitas Pembangunan Nasional "Veteran" Jawa Timur, Indonesia
e-mail: mohamadafandi.si@upnjatim.ac.id

ABSTRACT: Indonesian farmers and agriculture face various obstacles in every stage of production from finding good seeds, inefficient production, and well into post-production which are marketing and selling. Among the common obstacles that farmers have in the last stage is the lack of access to market information, the price in particular, and the lack of financial power to bring and sell their produce to the nearest market which ultimately leads many farmers unable to resist when the middlemen, with their financial strength, offering to buy most or all of their agricultural produce even with price lower than the market price. This paper proposes a community information system with analytical features which offers farmers a platform to promote and offer their produce to end consumers or wholesalers directly with reasonable and competitive price. Equipped with OLAP view, the system enables users to compare the price of commodities in the markets both from official data released by the government agency and those posted by farmers or wholesalers. The system also opens up the way for transport companies or any individuals who offer goods transport service to share their service and prices which will benefit both sellers/producers and consumers. With this system farmers and other stakeholders in agriculture get comprehensive information which help them make action for their best interests.

Keywords: Community Information Systems, OLAP, Farmers, Agriculture

1. INTRODUCTION

Indonesian farmers face various obstacles in every stage of production from finding good seeds, inefficient production, and well into post-production which are marketing and selling. Among the common obstacles that farmers have in the last stage is the lack of access to market information [1], the price in particular, and the lack of financial power to bring and sell their produce to the nearest market which ultimately leads many farmers unable to resist when the middlemen, with their financial strength, offering to buy most or all of their agricultural produce even with price lower than the market price.

In the meantime, nowadays, social media has become an integral part of life of everyone's life disregard of where they live, whether they are in urban area or in the rural areas, and what they do, whether they work as managers, farmers or those who become housewives [2].

There has been many attempts to use ICT to solve issues in the agriculture [3], [4] and social problem especially poverty [5] but none has tried to propose a special purpose system for agriculture which gives users capabilities to analyze data.

This paper proposes a community information system [6], [7], [8], [9] with analytical features [10] which offers farmers a social media platform to post and offer their produce to end consumers or wholesalers directly with reasonable and competitive price. Equipped with OLAP view, the system enables users to compare the price of commodities in the markets both from official data released by the government agency and those posted by farmers or wholesalers. The word cloud on the other

ISBN : 978-602-99806-3-9

hand gives the users the ability to interactively see what terms are frequently used by all users in their posting or comments. The system also opens up the way for companies or any individuals who provide goods transport service to share their services and respected prices which will benefit both sellers/producers and consumers.

This paper is organized as follows: in Section 1 (Introduction) we introduce the background of the research; in Section 2 (Method) we explain the methodology which we use in this research; in Section 3 (Result and Discussion) we present the result and discuss the advantages and the potential for future improvements; finally, in Section 4 we conclude our research.

2. METHOD

The system developed in this research has several features that use data mining [14] and OLAP technology,

2.1 Feature of Comment Analysis

2.1.1 Model development

The processes to be carried out in the development of the model is to collect data related to agriculture, preprocess the data followed by TF-IDF weighting, and then finally visualize the weighted results. Flowchart of the development process of this model can be seen in Figure 1.

Fig.1 Stages of Development of Comments Analysis Model

In this research the preprocessing stage is done in the RStudio tools with the package library text mining support (tm) installed in it. Some required preprocessing stages are available in the functions contained in this package library, while other preprocessing stages must be assembled by themselves. The processes contained in this preprocessing step are case folding, cleansing, stop-word removal, and whitespace striping.

If the level of accuracy obtained is considered good enough, then the model can be used well to classify new data records that have never been trained or tested before. In other words the built model is ready to be implemented into the system.

2.2 Visualize comment analysis results

The first process that will be passed is to collect data from official websites related to agriculture, then preprocess of all data that has been collected. The following step is calculating the weighting of TF-IDF (term frequency-inverse document frequency). Then the last process is to visualize the result of the weighting.

The result of the process of weighting the term frequency (TF) will be visualized into the form of word cloud, which will be packaged into a part of a web-based application with the aim that the results of the analysis can be visualized by attracting and facilitate users in understanding the output generated by the system has been built. Stages of visualization will be compiled with scripts PHP, HTML, CSS, and JavaScript.

2.3 Features of external data acquisition

Data acquisition system can be defined as a system that functions to retrieve, collect and prepare data, to process it to produce the desired data. Selected types and methods generally aim to simplify every step taken in the whole process. So before creating a system that can acquire a data required a process to build and find a good acquisition model.

The next process that will be done in the development model is the collection of data related to agriculture in this case the data will be retrieved from official government agency www.siskaperbapo.com. After preprocessing, the data is stored in the database and visualized on the

ISBN : 978-602-99806-3-9

web. Here's a web display design that already contains data acquisition features.

Fig.2 Interface Design of External Data Acquisition Features

2.4 OLAP View Features

This feature displays agriculture data collected in multidimensional view using features provided by OLAP engine by Mondrian.

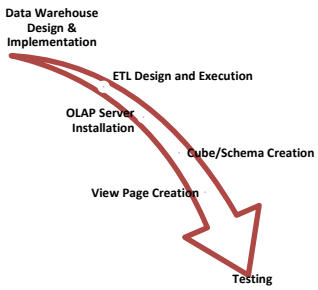


Fig.3 Interface Design of External Data Acquisition Features

The analysis module to be built should provide data analysis capabilities easily and flexibly, viewing data from multiple perspectives and can be easily operated by users who are primarily knowledge workers and decision makers. For the purposes of such a transactional or transactional system Point of Sales (POS) database is designed to serve transactions in the most effective manner known as Online Transaction Processing (OLTP). For the purpose of a system that can analyze data easily and flexibly then the database is designed with different concept that is Data Warehouse which implements Multidimensional Modeling concept to be able to serve query optimally known as Online Analytical Processing (OLAP).

2.4.1 Data Warehouse Design and Implementation

The first step is to design the data warehouse and implement it. The multidimensional model used in data warehouse design is Star Schema. While the data source used is data related to consumer prices and producer prices obtained from http://siskaperbapo.com. In the design of the star schema taken as measures in the fact table are consumer price today (price), consumer price yesterday (price_yesterday), and price difference (price_diff).

ISBN : 978-602-99806-3-9

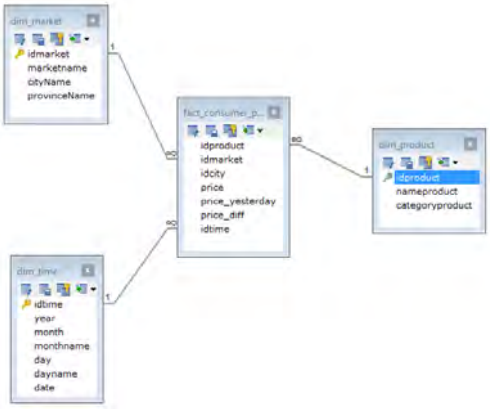


Fig 4. Star Schema – Consumer Price

While the 3 dimension tables used are market dimensions showing the name and location (city and province) of the market, the product dimension that describes the product name and category, as well as the time dimension that shows the time in the hierarchy form of the year, month, date and complete date. Month names and day names are also used to enrich the analysis that allows easier analysis of data by month names and day names.

2.4.2 ETL Design and Execution

Raw data collected from Siskaperbapo needs to be included in the designed data warehouse. This process is commonly known as ETL (Extract, Transform, and Load).

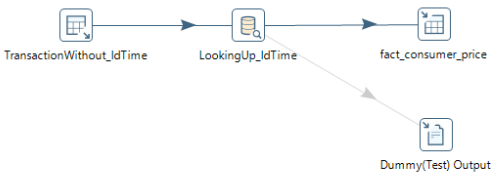


Fig 5. ETL Transformation in Pentaho Data Integration

3. RESULT AND DISCUSSION

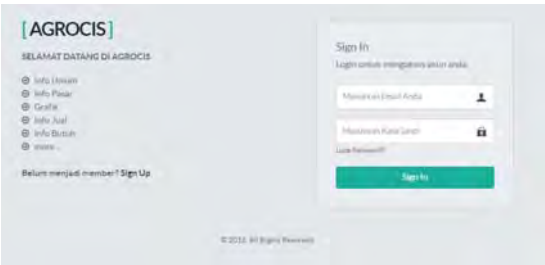


Fig 6. Sign In Page

After the first page (Fig. 6), the user will go to the main page that has a choice of various menus on the left column. Explanation of the main features of the application as follows:

3.1 Feature of Comment Analysis

This comment analysis feature uses text mining technique implemented using R language. All comments are analyzed, viewed every word and counted its appearance. The results of the analysis are visualized using word cloud. This feature is found in the general info menu as shown in figure 4.

ISBN : 978-602-99806-3-9

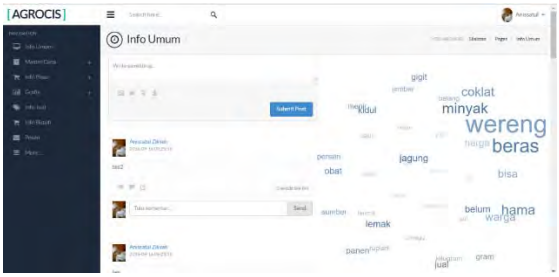


Fig 7. Public/General Page and Word Cloud

3.2 Features Of External Data Acquisition

The external data acquisition feature utilizes CURL techniques that are implemented by using PHP. The results of the acquisition will be displayed in graphical form as shown in figure 5.

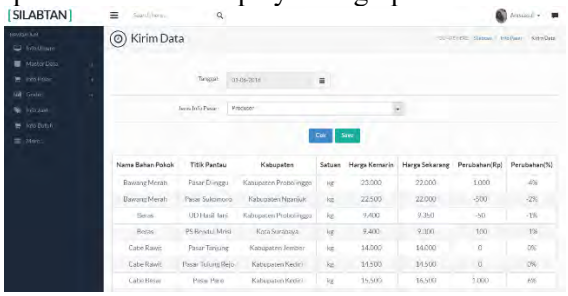


Fig.8. External Data Acquisition

3.3 OLAP View

In figure 9, an OLAP view of consumer commodity price is presented. Using this analysis page, users can easily view data from different perspective and gain knowledge necessary to make decision for their businesses.

Fig 9. Sign In Page

4. CONCLUSION

The system takes a different form of information systems in general because it adopts various aspects of social media technology that is currently growing. The system succeeded in implementing data acquisition and visualized using chart. The system successfully implements the analytic feature in the form of text mining processing and visualized to the word cloud and also presents data analysis using OLAP View.

5. ACKNOWLEDGEMENTS

Authors would like to thank LPPM (Research and Community Service Institute) Universitas Pembangunan Nasional "Veteran" Jawa Timur for funding this research.

6. REFERENCES

[1] Magesa, M. M., Michael, K., Ko, J. Agricultural Market Information Services in Developing Countries, ACSIJ Advances in Computer Science: an International Journal (ISSN : 2322-5157), Vol. 3, Issue 3, No.9 , May 2014, pp. 38-47

ISBN : 978-602-99806-3-9

[2] Ballantyne, P., Accessing, Sharing and Communicating Agricultural Information for Development: emerging trends and issues, Information Development (ISSN 0266-6669), SAGE Publications. Vol. 25, No. 4, 2009 , pp. 260-271, DOI: 10.1177/0266666909351634

[3] Nwagwu, W. E., Soremi, O., ICT Use in Livestock Innovation Chain in Ibadan City in Nigeria, Advances in Life Science and Technology, www.iiste.org, ISSN 2224-7181 (Paper) ISSN 2225-062X (Online) Vol 32, 2015

[4] Chikaire, J. U., Anaeto, F.C., Emerhirhi, E. and Orusha, J. O., Effects Of Use Of Information And Communication Technologies (ICTS) On Farmers' Agricultural Practices And Welfare In Orlu Agricultural Zone Of Imo State, Nigeria

[5] Chikaire, J.U., Ani, A.O., Nnadi, F.N. and Godson-Ibeji, C.C, Analysis of Information and Communication Technology Roles in Poverty Reduction Among Small and Medium Scale Farmers in Imo State, Nigeria,

[6] Baruah, T. D., Effectiveness of Social Media as a tool of communication and its potential for technology enabled connections: A micro-level study, International Journal of Scientific and Research Publications, Volume 2, Issue 5, May 2012 1 ISSN 2250-3153, p.p. 1-10

[7] Grigore, M., Grigore, L-R., The Management Of The Agricultural Information System "Shocks" The Conventional Agriculture, Lucrări Ştiinţifice – vol. 56 (2) 2013, seria Agronomie

[8] Kim, J.Y., Chun, G.L., Baek, S, H, Yong-Rheel, J., Open farm information system data-exchange platform for interaction with agricultural information systems, June, 2015, AgricEngInt: CIGR Journal Open access at http://www.cigrjournal.org, Vol. 17, No. 2, pp. 296-310

[9] Dagar, G., Study Of Agriculture Marketing Information Systems Models And Their Implications, AIMA Journal of Management & Research, May 2015, Volume 9 Issue 2/4, ISSN 0974 – 497 Copy right© 2015 AJMR-AIMA

[10] Lee, R., Chen, I-Y., A Novel Production Process Modeling For Analytics, International Journal of GEOMATE, Aug., 2016, Vol. 11, Issue 24, pp. 2370-2377 Geotec., Const. Mat. & Env., ISSN: 2186-2982(Print), 2186-2990(Online), Japan

[11] Afandi, M. I., Nugroho B., Hadiwiyanti R., "Community-based Collaborative Information Systems for Agriculture", Proceedings of BISSTECH 2015, 2016.

[12] Brady, M.,& Loonam, J., Exploring the use of entity-relationship diagramming as a technique to support grounded theory inquiry. Bradford: Emerald Group Publishing, 2010.

[13] Bridge C., Unstructured Data and the 80 Percent Rule.[Online]. Available at http://www.clarabridge.com/default.aspx?tabid=137&ModuleID=635&ArticleID=551 [accessed: 5 Feb 2016], 2011.

[14] Coussement K. & Poel V. D., Integrating the Voice of Customers through Call Center Emails into a Decision Support System for Churn Prediction [Online]. Tersedia di: http://www.textmining.ugent.be/ [accessed 5 Feb 2016], 2008.