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PROCEEDING

The 2nd International Conference on Applied Science and Technology (iCAST)
24th - 25th OCTOBER 2019

Social Science (iCAST-SS)
Engineering Science (iCAST-ES)

POLITEKNIK NEGERI BALI

RISTEKDIKTI

FORUM DIREKTUR POLITEKNIK NEGERI FDPNI SE - INDONESIA

Bali Nusa Dua Convention Center
Bali, Indonesia

PROCEEDING

The 2nd International Conference on Applied Science and Technology (iCAST)

APPLIED RESEARCH IN GREEN DEVELOPMENT THROUGH MILLENNIAL INDUSTRIALIZATION: CHALLENGES IN BALANCING ECONOMIC ADVANCEMENT

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Publisher

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PREFACE

The 2nd International Conference on Applied Science and Technology (iCAST) 2019, has been held in Bali Nusa Dua Convention Center, Bali, Indonesia from 24-25 October 2019 as a continuation of the previous iCAST conference that had been held in Manado, North Sulawesi. In this year, the conference theme is "Applied Research in Green Development Through Millennial Industrialization: Challenges in Balancing Economics Advancement". This theme is taken by considering that half of the workforce in various industries will be made up of millennials in 2020.

Polytechnics, as higher education institution that provide skilled and professional study, must be able to prepare millennials supporting green development that focused on responsiveness to the environment, efficiency in uses of earth's limited resources, and sensitivity to the community and culture. To answer this challenge, this conference has been held in two groups of science, i.e., social science and engineering science to present the results of applied research to find a balance between economic and environmental sustainability.This prestigious conference is aimed at bringing together researchers and experts in intelligent technology and social science from educational institutions, R & D, industry, government and the community to exchange and share ideas, knowledge through a discussion of a wide range of issues related to green development through millennial industrialization. This conference has been held in two groups of science, i.e., social science (iCAST-SS) and engineering science (iCAST-ES). Research findings and results on latest technology are presented in this conference. A side event on exhibition of technology products as the outcomes of joint research between students and lecturers will also be displayed around the conference areas

Finally, thanks to all those who participated in this 2nd International Conference on Applied Science and Technology (iCAST) 2019 in particular conference participants and all members of the organizing committee for their willing to organize the conference as good as possible.

Warm regards,

Dr. Dra. Ni Nyoman Aryaningsih, MM
General Chair

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Student attendance based on face detection and recognition with PCA Algorithm using LattePanda

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Abstract. Face is the representation of one's identity. The human face is a complicated multidimensional visual model. Hence, it is very difficult to develop a computational model for recognizing it. Face Recognition, as it is often referred to, analyses characteristics of a person's face image input through a camera. Verification or identification can be accomplished from the distance of two-feet-away or more, without requiring the user to wait for long periods of time. Face recognition is widely used in many applications, such as security system. Traditionally, students' attendance is taken manually by using attendance sheet, given by the faculty member in class. The paper describes how to take students' attendance using face recognition. The face recognition is implemented with the help of Principal Component Analysis (PCA) algorithm. It recognizes the face of students and saves the response in database automatically. The system also includes the feature of retrieving the list of students who are absent in a particular day. Lattepanda is used for image processing using OpenCV.

1. Introduction

Maintaining attendance is very important in education institution to check the students' performance. In most education institutions, students' attendance is manually taken by using attendance sheets issued by the department head as a part of regulation. The students sign in these sheets which are then filled or manually logged in to a computer for future analysis. This method is dull, time consuming and inaccurate as some students often sign for their absent colleagues. This method also makes it difficult to track the attendance of individual students in a large classroom environment [1]. In this project, the writers propose the design and use of a face detection and recognition system to automatically detect students attending a lecture in a classroom and mark their attendance by recognizing their faces.

While other biometric methods of identification (such as iris scans or fingerprints) can be more accurate, students usually have to queue for long at the time they enter the classroom [2]. Face recognition is chosen owing to its non-intrusive nature and familiarity as people primarily recognize other people based on their facial features [3]. This facial biometric system consists of an enrolment

process, in which the unique features of a persons' face are stored in a database, and then they continue to the processes of identification and verification. In these processes, the detected face in an image (obtained from the camera) is compared with the previously stored face captured at the time of enrolment.

The traditional manual methods of monitoring student attendance in lectures are dull as the signed attendance sheets must be manually logged in to a computer system for analysis. Using face detection and recognition system will replace the traditional methods that provides a fast and effective method of capturing student attendance accurately, while offering a secure, stable and strong storage of the system records, in which upon authorization; one can access them for purposes like administration, parents or even the students themselves [4].

2. Literature review

2.1. Digital Image Processing
Digital Image Processing is the processing of images which are digital in nature by a digital computer [5]. Digital image processing techniques are motivated by three major applications mainly:
- Improvement of pictorial information for human perception.
- Image processing for autonomous machine application.
- Efficient storage and transmission.
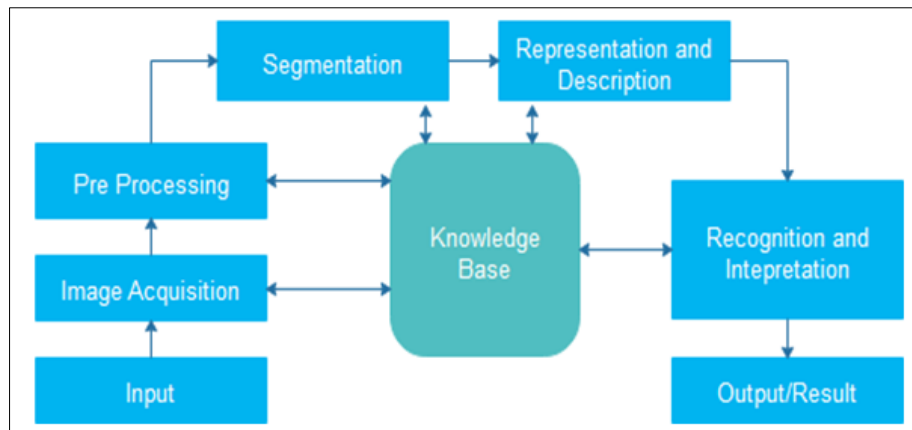
Figure 1. The steps in digital image processing.

An image is a 2-Dimensional light intensity function
$$\mathbf{f}\,(\mathbf{x},\,\mathbf{y}) = \mathbf{r}\,(\mathbf{x},\,\mathbf{y}) \times \mathbf{i}\,(\mathbf{x},\,\mathbf{y}) \qquad (1)$$

in which,
r (x, y) is the reflectivity of the surface of the corresponding image point.
i (x, y) represents the intensity of the incident light.

A digital image **f (x, y)** is discretized both in spatial coordinates by grids and in brightness by quantization [6]. Effectively, the image can be represented as a matrix whose row, column indices specify a point in the image and the element value identifies gray level value at that point. These elements are referred to as pixels or peels.

2.2. Viola-Jones Algorithm
Viola-Jones algorithm, which was introduced by Paul Viola, Michael Jones, is the most popular algorithm to localize the face segment from static images or video frame. It presents an approach for

object detection which minimizes computation time while achieving high detection accuracy. Paul Viola and Michael Jones [7] propose a fast and robust method for face detection which is 15 times quicker than any technique at the time of release with 95% accuracy at around 17 fps. The technique relies on the use of simple Haar-like features that are evaluated quickly through the use of a new image representation.

Based on the concept of an integral image, it generates a large set of features and uses the boosting algorithm AdaBoost to reduce the over complete set, and the introduction of a degenerative tree of the boosted classifiers provides for robust and fast interferences. The detector is applied in a scanning fashion and used on grey-scale images, the scanned window that is applied can also be scaled, as well as the features evaluated. Basically, the concept of Viola-Jones algorithm consists of four parts. The first part is known as Haar feature, second part is in which integral image is created, followed by implementation of Ad-boost on the third part, and lastly cascading process. In general, Viola and Jones method is appropriate for our proposed technique, and was chosen in this paper for its robustness, speed of detection [8], and low false positive detection rate. The four key points in Viola and Jones' technique is Haar features, adaptive boosting, cascading and computing integral images to reduce the computations and get higher accuracy [9-10].

3. Methodology and design

3.1. System design
In this design, several related components in terms of functionality have been grouped to form sub-systems which then combine to make up the whole system. Breaking the system down to components and sub-systems informs the logical design of the class attendance system. From figure 2, it can be observed that most of the components utilized are similar; the image acquisition component for browsing for input images, the face detector and the faces database for storing the face label pairs, only that they are employed at the different stages of the face recognition process.

3.2. Training set manager sub system
The logical design of the training set management sub-system is going to consist of an image acquisition component, a face detection component and a training set management component. These components interact with the faces database in order to manage the training set. These are going to be implemented in a windows application form.
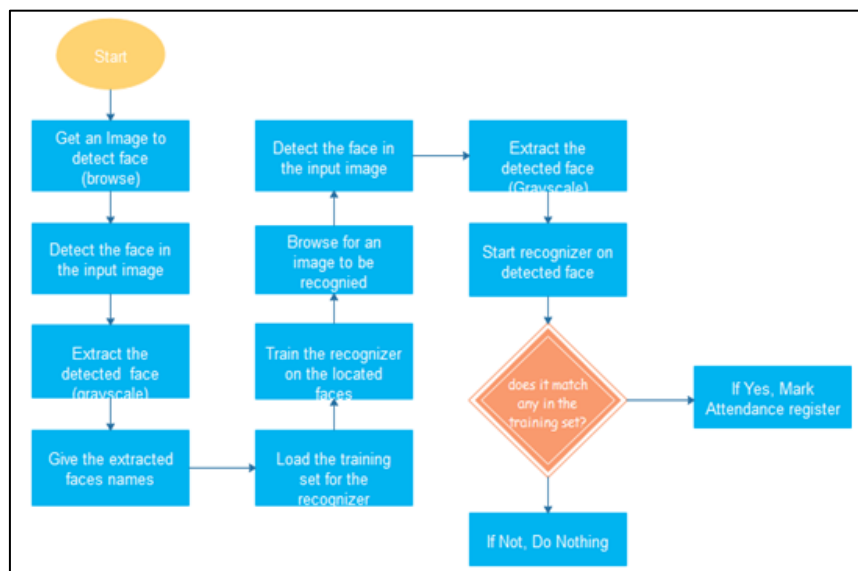
Figure 2. System overview.

3.3. Face recognizer sub system

The logical design of the Face Recognizer consists of the image acquisition component, face recognizer and face detection component, all working with the faces database. In this design, the image acquisition and face detection component are the same as those in the Training set manager sub system, as the functions of them are the same. The only difference is in the face recognizer component and its user interface controls. This loads the training set again so that it trains the recognizer on the faces added and shows the calculated Eigen faces and average face. It should then show the recognized face in a picture box.

3.4. Function of two sub-systems

The functions of the components are depicted in the block diagrams of figure 3. The face recognizer system consists of two major components i.e. the training set manager and the face recognizer. These two components share the Faces database, the image acquisition and the face detector components; as they are common in their functions.
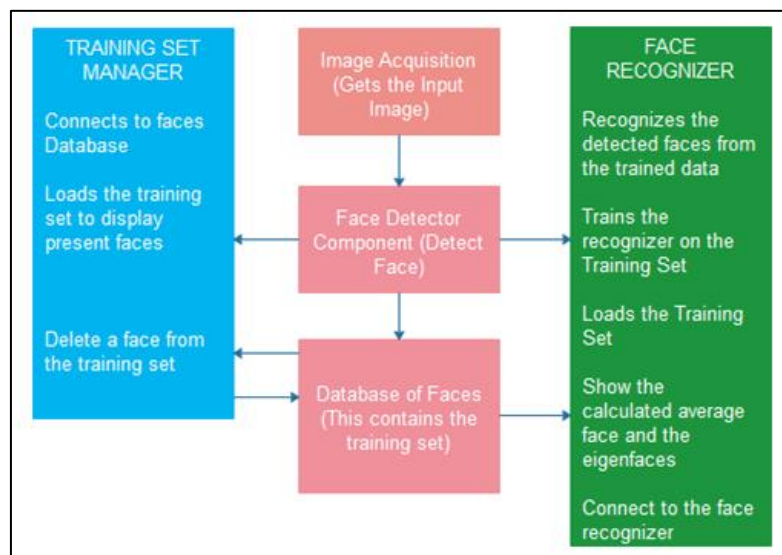
Figure 3. The function of the components.

This article is going to break the system down into two subsystems and have their detailed logical designs to be implemented.
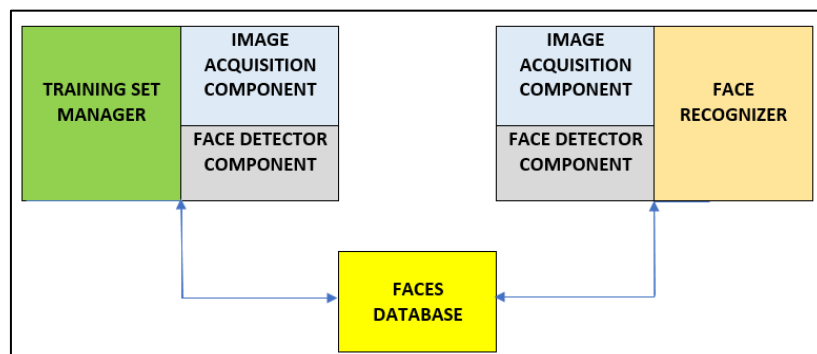
Figure 4. A logical design of the whole system.

3.5. Tools

The tools consist of two components; hardware and software that are going to be utilized in the actual development of system. They also connect to the class attendance register which is implemented as a database management system. In this paper, it uses LattePanda for the computer. LattePanda is the first development board that can run a full version of Windows 10. It is turbocharged with an Intel Quad Core processor and has excellent connectivity, with three USB ports and integrated Wi-Fi and Bluetooth 4.0. It also includes an Arduino co-processor that enables to master the physical world by controlling interactive devices using thousands of plugs and play peripherals. LattePanda is different from the Raspberry Pi and other development boards as it supports a complete Windows 10 system. With abundant software resources and a mature Windows ecosystem, LattePanda gives ideas more accessibility and power [11].
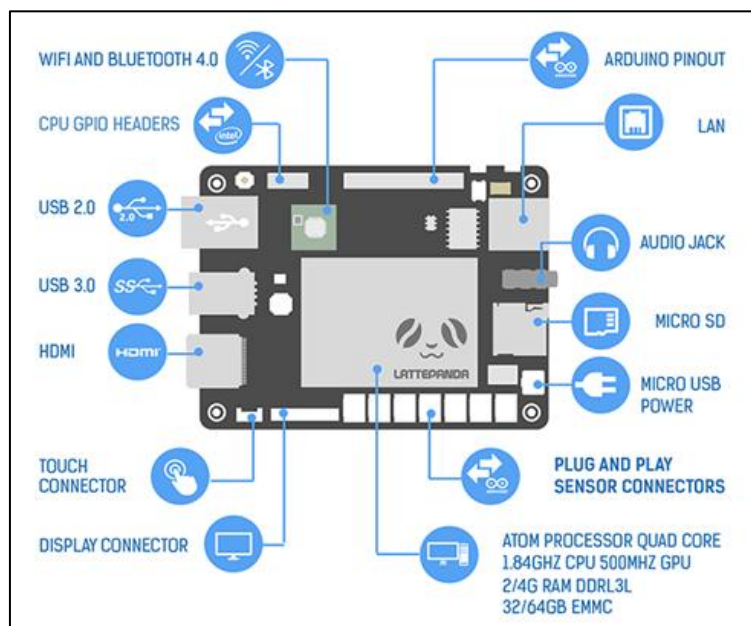
Figure 5. LattePanda Structure.

LattePanda is not only low-cost regular Windows computer, but it also includes an Arduino co-processor, which means it can be used to control and sense physical world when sensor and actuators are added. The image processing uses OpenCV software. OpenCV (Open Source Computer Vision Library) is an open source computer vision and machine learning software library. OpenCV was built to provide a common infrastructure for computer vision applications and to accelerate the use of machine perception in the commercial products [12]. Being a BSD-licensed product, OpenCV makes it easy for businesses to utilize and modify the code.

The library has more than 2500 optimized algorithms, which includes a comprehensive set of both classic and state-of-the-art computer vision and machine learning algorithms. These algorithms can be used to detect and recognize faces, identify objects, classify human actions in videos, track camera movements, track moving objects, extract 3D models of objects, produce 3D point clouds from stereo cameras, stitch images together to produce a high resolution image of an entire scene, find similar images from an image database, remove red eyes from images taken using flash, follow eye movements, recognize scenery and establish markers to overlay it with augmented reality, etc. OpenCV has more than 47 thousand people of user community and estimated number of downloads exceeding 14 million. The library is used extensively in companies, research groups and governmental bodies.

Visual Studio is a widely popular integrated development environment (IDE) used all over the development landscape for business and personal needs, and it includes a vast number of features and plugins to assist developers in their day-to-day work and collaboration [13]. According to a Microsoft developer blog, there are over 1.5 million developers (as of October 2016) writing C++ in Visual Studio alone. Current developers often experience build failures due to problems in their code from recent changes or issues with refactoring. The aim of this project is improving developers' efficiency and output by analysing these issues they are having and providing insight into their session-by-session timelines. Over time, Visual Studio has seen many new features added, both for efficiency and utility.

4. Results

4.1. User interface of the system
The faces database editor adds faces in the training set. It consists of 5 steps.
Step 1: The image is acquired from the highlighted box.
Step 2: Display the image acquired.
Step 3: Extracted grayscale face from the image.
Step 4: Modify the face label pairs.
Step 5: Prepare for the recognition stage.

The desktop module utilizes the OpenCV library in Visual Studio 2017 to implement the two sub-systems (Training set manager and Face recognizer) together with face detector in windows form. The MS Access database is designed in MS Office Suite 2016.
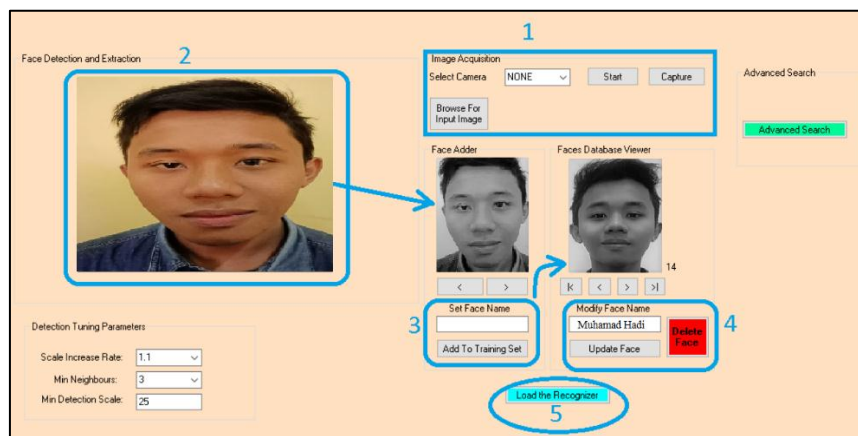
Figure 6. Training set editor.

4.2. The face recognizer
The face recognizer compares the input face in the image captured with the faces captured during enrolment. If it is a match it then retrieves the name associated with the input face.
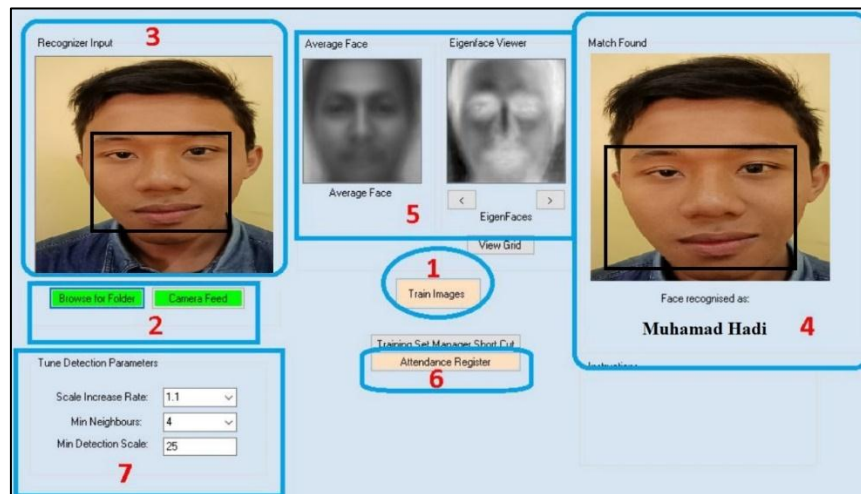
Figure 7. The face recognizer.

Step 1 is to train the recognizer to be able to identify a face as either known or unknown. Step 2 selects the source of the image with the face to be recognized. This could be from a live camera feed or a folder with captured images. The input image with the face will display in the recognizer picture box 3 as shown in Figure 7.

Figure 8. The attendance register.

The name of the input face in the image will display as shown in box 4. The returned name on the input face, date and time are utilized in populating the records in the attendance register database. Clicking the button in box 6 displays the register as shown in figure 8. The highlighted that show in box 5 displays the computer average and eigen faces.
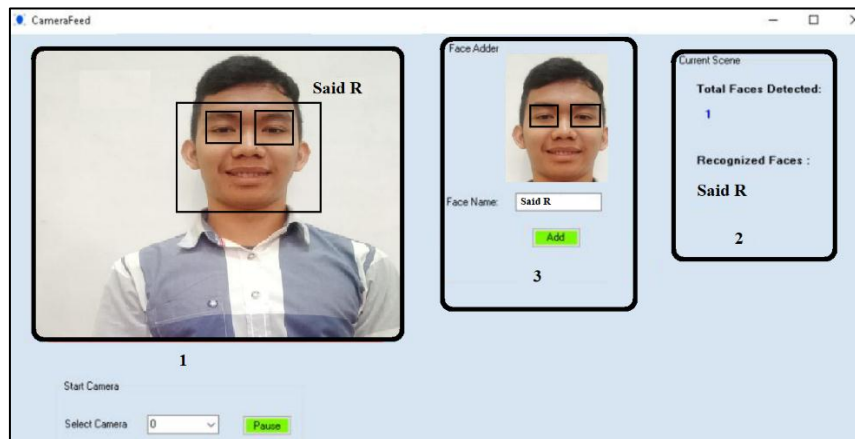
Figure 9. The camera feed.

From Figure 9, the highlighted box 1 shows the current camera view. The faces and eyes in the image are automatically detected as indicated by the rectangular boxes around them. The detected face is extracted and compared with those in the database. When the image is successful match, the name associated with the face will display on the upper edge of rectangular box. The number of faces in this scene as well as their corresponding names are also shown on the highlighted box number 2. The face adder box number 3 can also be used to add faces to the database.

4.3. Face detection
For group photos with Minimum Neighbours detection tuning parameter of 3 yield is the best overall performance as indicated in figure 9 where the physical count is 10.
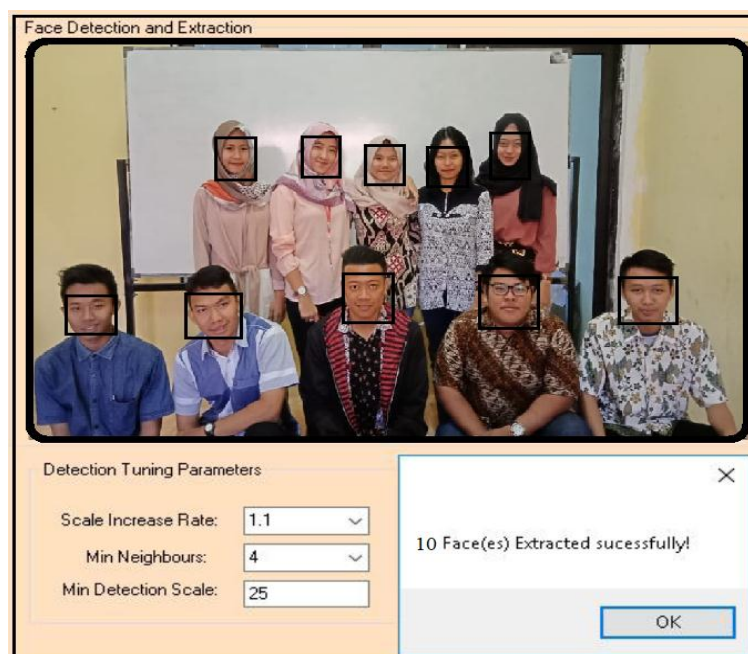
Figure 10. The face detection and extraction.

The faces marked by black hexagon is detected in the Max Neighbors' setting of 4. Here, the faces can be fully displayed. Fur is the highest setting which strictly returns frontal images. The face detector

only works with frontal images. When using a minimum neighbors setting of 1.0 and 2.0, tuning it to 1 returns the number of faces in the images as 8, different from the physical count of 5. This is because the detector returned the slightest resemblance to a face as an actual face and hence the face detection can't detect it correctly.

4.4. Latte panda processing

The Lattepanda is an incredible bit of gear. It's fully featured microcomputer that runs Windows 10 with impressive performance features for its size. It's got a built-in Arduino co-processor in the shape on an ATmega32u4 baked right into the board. In this application, Lattepanda is used because everyone is familiar with windows, and being able to use it exactly like a regular desktop. Image processing need higher speed to process the image. It has 1.8 GHz Quad Core Intel Atom Cherry Trail and 4 GB memory. Besides that, Lattepanda offer GPIO pins for both the Intel CPU which gives a huge amount of flexibility for integrated with discrete hardware and sensors. By using Lattepanda, we need less time to get the face recognition and detection result.

4.5. PCA algorithm

Principal Component Analysis or PCA is a dimensionality-reduction method that is often used the large data sets, by transforming a large set of variables into a smaller one that still contains most of the information in the large set. Reducing the number of variables of a data set naturally comes at the expense of accuracy, but the algorithm in dimensionality reduction is to trade a little accuracy for simplicity. Because smaller data sets are easier to explore and visualize and make analysing data much easier and faster for the algorithm without extraneous variables process.

5. Conclusion

It can be concluded that a reliable, secure, fast and an efficient class attendance management system has been developed replacing a manual and unreliable system. This face detection and recognition system will save time, reduce the amount of work by the administration and replace the stationery material currently in use with already existent electronic equipment. There is no need for specialized hardware for installing the system as it only uses a computer and camera. The camera plays a crucial role in the working of the system hence the image quality and performance of the camera in the real time must be improved. Future work could also include adding several well-structured attendance registers for each class and the capability to generate monthly attendance report and automatically email them to the appropriate staff for review.

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7. Acknowledgements

Webqual 4.0 and ISO/IEC 9126 Method for website quality evaluation of higher education

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Abstract. The paper is the development of a model from previous research on the quality of student website services or academic portals from user perceptions. The purpose of this study is to determine the quality of website services in Higher Education towards user satisfaction and website performance, conducting a service quality analysis of the 2 quality measurement approach models used. Development Method using the ISO/IEC 9126 model and Webqual 4.0 method to measure user satisfaction. Quality variables used are usability, information quality, service interaction quality, reliability quality, and efficiency quality. Additional testing of web performance is also carried out to support the results of quality evaluations of user perceptions and website performance.

1. Introduction

1.1. Research background

Higher Education, as one of the institutions that focus on the field of education service providers are required to be optimal in the quality of services to users, in this case are students. Various forms of method approach are used, and service models are provided to students. One of which is the utilization of information and communication technology in the management of student academic administration, as an effort towards Good University Governance (GUG) for Excellent Service [1]. Excellent service is a service that not only meets customer expectations but also exceeds the expectations of customers. Excellent service can be a capital to increase student confidence in Higher Education. This supports Nurcahyani's study [2], which explains that the practice of the principles of good corporate governance is consistent and sustainable, generating public trust.

Utilization of information and communication technology, one of which is an academic information and management system, this system consists of several service management sub-systems, such as student study plan services, student assessment information services, practical work services and real student work, student competency test services, student career services, tracer study services, and other student management administration services. Utilization of information systems and academic management is provided by higher education institutions, aimed for optimizing services effectively and efficiently, which provides quality and satisfaction to students.

1.2. Motivation

The importance of service quality and satisfaction to students greatly affects the image of the Higher Education, competition in fighting over the student market is quite heavy. Based on the database of Higher Education in [3], that the number of Higher Education in Indonesia reached 4,603. From the total number of Higher Education, 4,481 or 97.35% are private institutions, while state institutions only amount to 122 or 2.65%. In the midst of heavy competition, improving quality becomes inevitable in order to compete for public trust and continue to exist. Higher education is required to be able to provide the best service to the community and be oriented to the needs of the community. Academic services and supporting facilities are among the consideration of prospective students in choosing Higher education institutions to continue their education. So that, the quality of service is one indicator of the success of educational institutions as a public service organization.

1.3. Problems

This paper is the development of a model from previous research [4] about the Web Performance Optimization Techniques for Biodiversity Resource Portal, and the research [5], about QoE and QoS Evaluation for Academic Portal in Private Higher Education Institution. The purpose of this study is to measure the quality of website services in Higher Education towards user satisfaction and website performance, conducting a service quality analysis of the 2 quality measurement approach models used. Development Method using the ISO/IEC 9126 model and Webqual 4.0 method to measure user satisfaction. Quality variables used are usability, information quality, service interaction quality, reliability quality, and efficiency quality. Additional testing of web performance is also carried out to support the results of quality evaluations of user perceptions and website performance.

2. Methodology

2.1. Data sources and collection methods

Data sources are divided into primary data and secondary data. Primary data is data obtained directly by researchers through questionnaires and website services in Higher Education testing using simulation tools. Secondary data is data obtained by researchers from the international standard software quality documentation from ISO / IEC 9126.

2.2. Software quality: ISO / IEC 9126 model and Webqual 4.0 method.

The quality factor according to ISO/IEC 9126 [6], includes the following six quality characteristics:
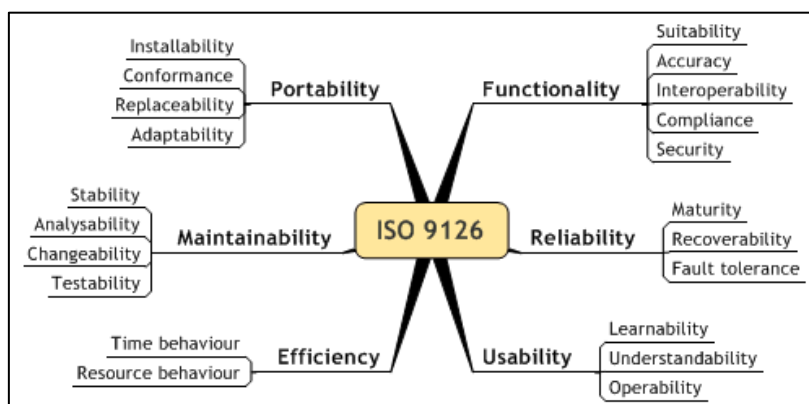
Figure 1. ISO/IEC 9126.

Measurement of the quality of service information systems and academic management of students using the ISO / IEC 9126 model based [6] on Figure 1, explains that there are 6 characteristics in measuring the quality of a website's services, i.e. Functionality, Reliability, Usability, Efficiency, Maintainability, and Portability.

Webqual 4.0 is one of the methods of measuring the quality of services for customer satisfaction, such as management information systems service of students on higher education. And this paper characteristics of the ISO / IEC 9126 service quality model used are Reliability, and Efficiency refers to [5], [7], [8], [9].
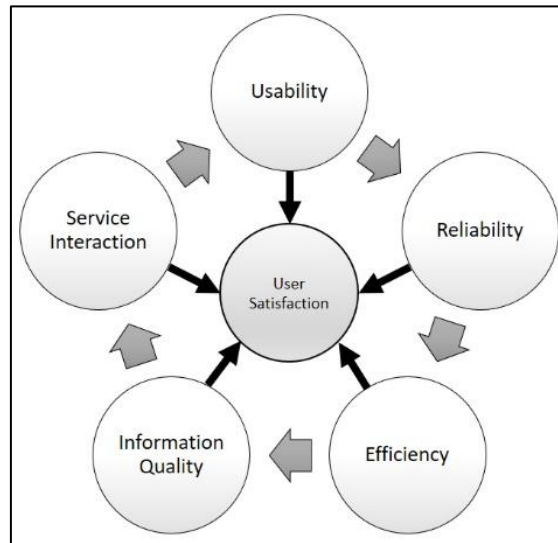
Figure 2. Webqual 4.0 and ISO/IEC 9126.

The variable used (see: **Figure 2)** is an independent variable. These variables are explained based on the characteristics of the ISO 9126 model with the usability 10 Heuristic approach refers to [5], while the Webqual 4.0 quality variable (service interaction, information quality and functionality) refers to research [10]. the variable quality reliability and efficiency refers to [4], [11].

3. Results and Discussion
While the population in this study were all students who used Higher Education academic services throughout 2018. The population was 8261 users. The study sample using the Slovin formula [12], with an error tolerance level of 10%. Based on the results of sample calculations using the Slovin formula, a minimum sample of 98 samples was obtained from distributing the questionnaire to 104 respondents.

3.1. Result: instrument test
Testing the questionnaire instrument using validity and reliability tests. Data validity testing uses a Pearson product-moment correlation coefficient [13]. The results of the validity test of 10 items on the questionnaire declared valid at a significance level of 0.05 with a sample size of 100 respondents. as well as the reliability test results of each variable with an Alpha Cronbach value for Usability of 0.768, information quality of 0.781, and service interaction quality of 0.773. This shows that the reliability test value is declared reliable because it is greater than the Cronbach Alpha value > 0.6.

3.2. Result: webqual 4.0 method
The independent variable (X) of the research is Usability (X1), Information Quality (X2), Service Interaction Quality (X3), and the dependent variable is User Satisfaction (Y). Using the core quality indicators Webqual 4.0 which refers to Barnes and Vidgen research [14]. Reliability test results using Cronbach Alpha theory. If the Cronbach Alpha value is greater than 0.60 then the question items on

the questionnaire are declared to be reliable for use as research instruments. Furthermore, Based on the results of the Kolmogorov-Smirnov One-Sample test (using SPSS), the Asiymp.Sig (2-tailed) significance value of 0.583 is greater than 0.05. Then according to the basis of decision making in the Kolmogorov-Smirnov normality test, it was stated that the data were normally distributed. Thus, the assumptions or normality requirements in the regression model have been accepted.

From the results of the reliability test based on Table 1, it shows that the value of sig. (Deviation from Linearity value) each variable is more than 0.60 and it can be concluded that the research variable is declared reliable, and is worthy of being used as a research instrument.

Table 1. ANOVA table reliability test.

		Sum of Squares	df	Mean Square	F	Sig.
User_Satisfation * Usability		91.500	13	7.038	.820	.638
User_Satisfation * Information_Quality	Deviation from Linearity	105.507	14	7.536	.881	.682
User_Satisfation * Service_Interaction		82.691	15	5.513	.612	.856

Furthermore, the results of the Assumption test for multi-collinearity are seen in Table 2. To detect the presence or absence of multi-collinearity symptoms in the regression model, it can be done in several ways, i.e.: See the correlation value between independent variables, see the condition index and eigenvalue values, and see the value of tolerance and variance inflating factor (VIF). In this paper, we examine multi-collinearity by looking at tolerance values and VIF using the SPSS program.

Table 2. Assumption test for multi-collinearity.

Coefficients[a]							
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	1.799	1.302		1.435	.194		
Usability	.433	.094	.485	3.832	.000	.416	2.576
Information_Quality	.354	.095	.334	2.968	.005	.534	1.874
Service_Interaction	.257	.095	.397	3.225	.003	.423	3.632

a. Dependent Variable: User_Satisfaction

Based on Table 2 "Coefficients" in the "Collinearity Statistics" section, the Tolerance value for the Usability (X1) variable is 0.416, Information Quality (X2) is 0.534 and Service Interaction (X3) is 0.423. These 3 variables are greater than 0.10. And the VIF value for the Usability (X1) variable is 2.576, information quality (X2) is 1,874 and service interaction (X3) is 3.632 <10.00. Then referring to the basis of decision making in the multi-collinearity test it can be concluded that there were no symptoms of multicollinearity in the regression model.

Table 3. ANOVA[a] - Linear regression test.

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	516.434	3	172.145	57.468	.000[b]
Residual	287.566	96	2.995		
Total	804.000	99			

a. Depcndent Variable: User_Satisfaction

b. Predictors: (Constant), Service_Interaction, Information_Quality, Usability

Linear regression test is used to measure how much influence the independent variable X has on the dependent variable Y. Multiple linear regression is based on functional or causal relationships (cause and effect). The results of the analysis are in Table 3. Table 3 ANOVA - Linear regression test, provides information about the simultaneous (together) use of usability, information quality and service interaction on user satisfaction based on the significance value (Sig.) of Anova, the Sig value is 0,000. Because of the value of Sig. $0.000 < 0.05$, so according to the basis of decision making in the F test it can be concluded that the hypothesis is accepted or the usability (X1), information quality (X2) and service interaction (X3) simultaneously affect user satisfaction (Y).

To measure how much (%) the effect of the quality of usability (X1), information quality (X2) and service interaction (X3) simultaneously (together) on user satisfaction (Y), referring to the value of R square contained in Table 4.

Table 4. Model summary[b] – linear regression test.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.801[a]	.642	.631	1.73074

a. Predictors: (Constant), Service_Interaction, Information_Quality, Usability
b. Dependent Variable: User_Satisfaction

Based on Table 4, it is known that the coefficient of determination or R Square is 0.642. R Square value of 0.631 is derived from the square of the correlation coefficient (R), which is 0.801 x 0.801 = 0.642. The magnitude of the coefficient of determination (R Square) is 0.642 or equal to 64.2%. This value implies that the quality of Usability (X1), Information Quality (X2) and Service Interaction (X3) simultaneously (together) to user satisfaction (Y), amounted to 64.2%. While the rest (100% - 64.2% = 35.8%) is influenced by other variables.

Based on the results of research in measuring the quality of management information systems services of students on higher education based on the User Satisfaction using the Webqual 4.0 method, the results of testing on 3 variables showed a significance value of 0,000. This shows that the quality of usability, quality of information, quality of service interaction has a positive and significant impact on user satisfaction.

3.3. Result: ISO/IEC 9126 formula
The characteristics of ISO / IEC 9126 as measured in the paper are the quality of reliability and efficiency, especially in the performance of internal resources in the student academic management system of Higher Education. Measuring the quality of service (reliability) resource system using the GTMetrix performance measurement tool of the website [15]. The results of performance measurements of reliability quality are shown in Figure 3. The Executive Summary report on the results of measuring the quality of reliability performance is shown in [16], Figure 3.
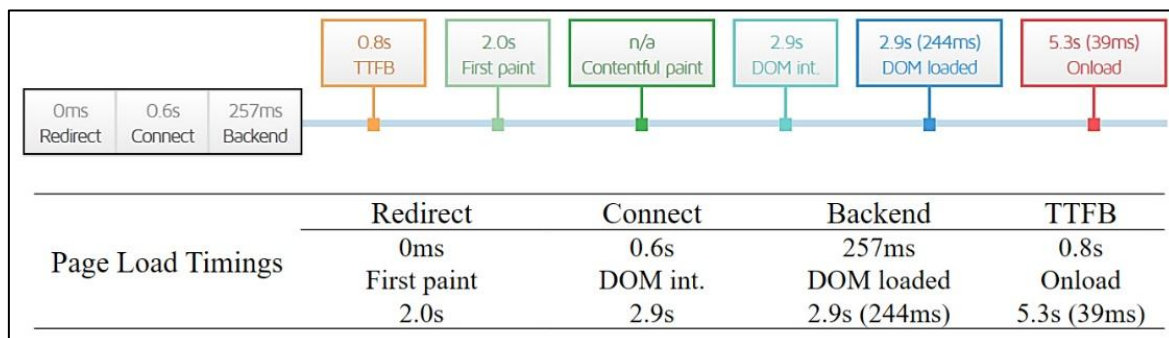
Figure 3. The executive summary report of the website performance.

Figure 3 at performance report [16], explains that the time spent redirecting the URL before the last HTML page loads is 0 ms. This time is the total of all this time spent diverting, the value of which is 0ms (no redirects occurred). The time spent connecting to the server to make requests to the page is 0.6s. Once the connection is complete and the request is made, the server needs to generate a response for the page. The time it takes to generate the response is known as the Backend duration of 257 ms, with the total amount of time spent to receive the first byte of the response once it has been requested or Time to First Byte (TTFB) of 0.9 s. The time spent browser sort and rendering on the page (First paint time) is 2.0s, the Document Object Model (DOM) interactive time is 2.9s and DOM loaded is 244ms. Onload time needed for page processing is complete and all resources on the page are 5.3 s (39 ms).
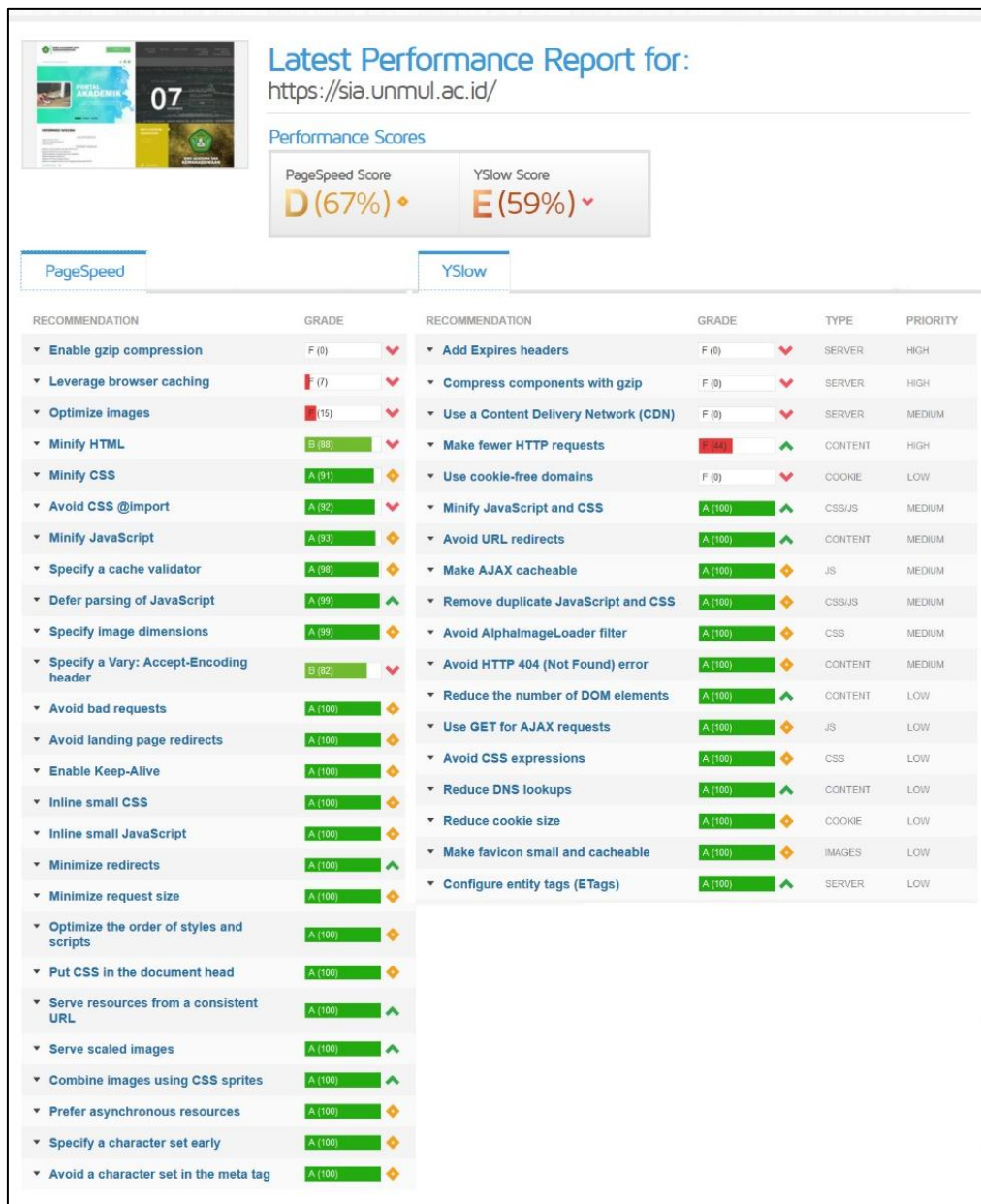
Figure 4. The performance recommendation from Google's PageSpeed and Yahoo's YSlow.

The results of meassuring for quality of efficiency of service system resources using a combination of the performance recommendation parameters from Google's PageSpeed and Yahoo's YSlow [16-18]

shown in Figure 4. Based on the results of the measurement of the quality of the efficiency presented in Figure 4 shows that the performance of the website resources Academic management system students get a PageSpeed score (67 %) category D and YSlow Score (59 %) in the E category. This explains that the low score quality website resource efficiency caused by some parameters PageSpeed recommendations get grade F (0) such as Enable gzip compression, Leverage browser caching, and Optimize images, and YSlow recommendations, such as Add Expires headers, Compress components with gzip, Use a Content Delivery Network (CDN), Make fewer HTTP requests and Use cookie-free domains.

4. Conclusion

Research measuring the quality of student academic services at tertiary institutions based on the perception of users (User Satisfaction), using the WebQual 4.0 method involves usability quality, information quality, and interaction service quality, it is concluded that shows significance and has a positive influence on user satisfaction. If the quality of usability, quality of information, and quality of service interaction increase, user satisfaction will also increase. Whereas the measurement of the quality of reliability and efficiency using the formula approach ISO / IEC 9126 shows that the quality of reliability based on the evaluation of the GTmetrix web performance measuring tool obtained a Fully Loaded Time value of 5.3 s (onload) with 1.24MB total page size of 33 Requests. This is due to the resource parameter in Optimize images recommendation in grade F, this parameter greatly influences the high page load time.

These recommendations for improving the quality of reliability can be through file size reduction by loading images of the right size based on where the images will be displayed, saving files in the appropriate format depending on usage, and save time and bandwidth by compressing resources. So that the results of this reliability quality measure significantly affect the quality of efficiency, which shows the performance of the Academic Management System website for students obtaining a PageSpeed D score (67 %) and YSlow Score E (59 %).

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6. Acknowledgments

Analysis of student difficulties in calculus and intervention strategies for problematic students

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Abstract. In engineering-based colleges, calculus is one of the compulsory subjects that is generally given to first-year students. Although this course is important to be mastered by students, some students do not like this lesson and become the cause of their failure to learn the material next. The purpose of this study was to analyze the difficulties students as well as describing the results of the intervention were given to students who have difficulty in learning calculus. This study uses a mixed-method. To see the difficulty of students used instruments in the form of tests given at the end of lectures. The test material is in the form of multiple-choice with 40 items consisting of 12 limit items, 14 Derivative items, and 12 Integral items. The results of tests on 56 students showed that the average tenure of the calculus of 57.3 percent which includes mastery of the Limit on average by 61.5 %, mastery Derivative average 54 percent and mastery Integral average of 56.5 percent. Furthermore, students who do not reach graduation standards are given a remedial intervention program. Through the remedial program provided, students can achieve the specified graduation standards.

1. Introduction

Calculus is a branch of mathematics that has relations with other material which is quite broad in various disciplines such as engineering, social and others. Ideally students studying in the first year must be able to: (1) Make calculations with agility, accuracy, intelligence and flexibility; (2) Explain the basic concepts of calculus clearly and reason mathematically with them; (3) Solve extended problems with good judgment in the choice of tools and in checking answers; (4) Make a connection between different incarnations of the same idea; (5) Use calculus to model realistic situations from engineering and the physical, life and social sciences [1].

Fact, these calculus lessons are often the main sources of failure for students to complete their studies. Calculus is considered as one of the difficult subject matter for students [2-3]. As stated [4] that the difficulty of students in calculus is caused by its nature in the form of abstract ideas and very complex

calculations. Besides calculus is seen as a boring and only procedural subject [5], educators in the practice of learning calculus material in the classroom are done traditionally [6-7]. More than that students do not know how to apply concepts in real-life situations [8-9]. As a result, many students fail to get good grades in these subjects, including students of the Manufacturing Polytechnic, Bangka Belitung.

This will certainly be a problem for students who will take part in lectures and challenges for lecturers who will teach. Such a condition if left unchecked will harm the quality of learning in calculus courses, especially in the electronics engineering department of the Manufacturing Polytechnic, Bangka Belitung. Therefore, efforts are needed to overcome these problems. To improve the quality of teaching students, need innovation by using approaches, strategies, and methods of learning new [10]. A few ways that can help to improve student understanding of calculus, among others: (1) active learning; (2) build up intuitions suitable for later formalizations ; (3) computer graphics; (4) computer programming; and (5) symbol manipulators [11]. With technological advances, various ways have been made to help facilitate learning calculus, such as developing graphics using software [12]. This software aims to facilitate student understanding of learning graph functions. Durán, [13] developed a computer algebra system to make it easier for students to explore the concept of calculus. Through the use of technology, students better understand the things that are abstract and complex on lessons calculus [14-16] , help the understanding of students in the conceptual [16-17] and procedural skills [18-19]. D ith the technology students showed a positive attitude toward the subject of the lectures are studied [20-21]. Besides, the technology also can help students when visualizing concepts through graphical representations with a better [22].

Although various technologies have been developed and have been applied by educators to students, some students still have difficulties in studying calculus topics, as experienced by students in the Department of Electronics Engineering Manufacturing Polytechnic, Bangka Belitung. Existing technology does not seem to be suitable for every student. Therefore, in addition to technology, other things also need to be considered to be able to overcome the difficulties of students so that they can overcome the difficulties they face when studying calculus. Therefore it is necessary to investigate any topic from the calculus material that is difficult for students, what factors cause it, and what strategies can help them so that later students can complete their studies on time. This study aims to analyze the difficulties of students in learning calculus which includes limit, derivative and integral material. Furthermore, students who have difficulty attending this lecture are given an intervention strategy with a remedial program. From the formulation of the problem, it can be broken down into some problem formulations as follows:

- What topics from calculus material are difficult for students?
- How is the implementation of the intervention strategy given to students?

2. Methodology

The method used in this research is mixed methods research, which is a study that combines or connects qualitative and quantitative research methods [23]. The data obtained are presented in the form of numbers and the results are explained descriptively Analytically. Descriptive aims to describe something that is ongoing at the time of the study and examines the causes of a particular symptom. It also aims to solve problems that arise at that time. The reason for choosing the analytical descriptive method is because this study intends to describe and analyze a student's difficulty that occurs when studying calculus material. Thus this study seeks to describe or describe data obtained from test results obtained by students. From this data obtained topics that are students' difficulties in learning calculus. Furthermore, for the support of this research interviews were conducted on several students who faced problems. This is intended to divert deeper why they have difficulty in studying the material provided and what interventions they think are appropriate to be carried out.

2.1. Research location and time
This research was conducted at the Bangka Belitung State Manufacturing Polytechnic in the second-semester electronics engineering students in the 2018/2019 academic year as many as 56 students. This research was carried out through several stages, starting from the preparation stage, data collection, data analysis, and finally reporting results.

2.2. Data collection techniques
Data collection techniques used in this study used several methods including (1) Tests; (2) Questionnaire; and (3) interviews. This method is carried out to find out detailed information and understanding per student's problem under study. The interviews used by researchers are interviews that have been arranged systematically and completely to collect data in the form of an outline of the problem to be asked.

3. Discussion

3.1. Analysis of student hardness
To see the students difficulty against calculus, at the end of the course students are given a test by the number of about 40 grains (about the limit of 12 items, the issue of derivatives 1 5 grains and about integral 1 3 grains), as shown in Table 1 below:

Table 1. Calculus test questions.

No	Topics	Number of Questions
The limit		
1	algebraic functions limits	6
2	trigonometric function limits	2
3	infinite function limit	4
Derivative		
4	derived algebraic functions	2
5	derived trigonometric functions	3
6	derived the multiplication of two functions	3
7	derivative Implicit function	1
8	derived logarithm functions	2
9	derived exponent functions	2
10	the second derivative of algebraic and trigonometric functions	1
11	derived on a moving object vertical	1
Integral		
12	integral algebraic functions	3
13	integral trigonometric functions	1
14	integral by substitution	3
15	partial integral	2
16	certain integral of an algebraic function	1
17	certain integral of a trigonometric function	1
18	calculate area with integral	1
Total		40

The test results of the questions given can be seen as in Figure 1.
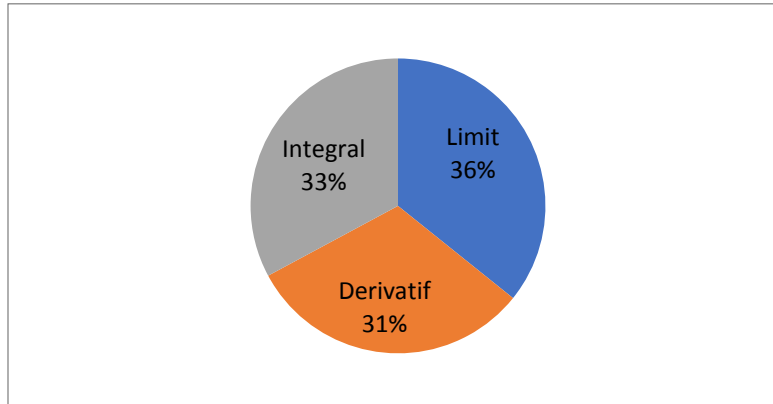
Figure 1 . Student calculus test results.

Figure 1 above shows that the average results of tests on 56 people are 57.3% which consists of a Limit with an average of 61.5 %, Derivatives with an average of 5 4 %, and Integral with an average of 56.5 %. From the questions given, the lowest value is about determining the area of an area by using integrals.

3.2. Intervention strategy

Giving a strategy of intervention in the form of remedial given to students whose value does not reach the standard set that is minimal with a score of 60. Before the remedial program is given, first, conducted interviews to obtain information from students about what factors cause them not to stigmatize results test well. For remedial activities, students are given questioner to obtain information about what strategies are elected to support their learning progress. Based on interviews given to the two students who scored the lowest, information was obtained that the main factor that caused them to fail was not because of their lack of academic ability, but because of the lack of study time they had. This is due to the economic factors of students. To meet the needs of students and their families, they are forced to work. They work after the lecture program is finished until the evening. They barely had time to study well. With these conditions, as an educator pay special attention, namely by motivating them. Besides, they are also equipped with knowledge of how to manage study time, even though they have to work. Furthermore, based on the results of student assessments, the form of the remedial program they choose is with the help of technology. Then agreed that the students use the software examview used as practice doing problems calculus. Besides they also learn by using peer teaching methods. After the remedial program ends, students are allowed to retake to achieve the minimum standards given. The results of the remedial program provided can help students to reach the minimum standards that have been set.

4. Conclusions

Student test results show that the mastery of students on average of the results of tests on 56 people is equal to 57.3% consisting of a Limit with an average of 61.5 %, Derivatives with an average of 5 4 %, and Integral with an average of 56.5 %. Of the 40 items given, the most difficult for students to experience is the problem in determining the area of an area using integrals. For this condition, a re-explanation is given to those who have difficulty with this material at the time the remedial program was conducted. Next to that giving intervention in the form of remedial help in enhancing the learning outcomes of students, so that they can achieve the minimum standards set.

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Influence of some variables in online marketing strategy on interests of student entrepreneurs

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Abstract. This study aims to find out some of the variables of Online Marketing that influence the interest in entrepreneurship of students of the Faculty of Computer Science and Information Technology Mulawarman University batch 2018. The variables are Email Marketing Marketing (X1), Social Media Marketing (X2) and Marketing with advertising networks (X3). This study used a sample of 83 students using the Slovvin formula. The respondents were students who had taken Technopreneurship courses. The results of the research show that Email Marketing Marketing (X1), Marketing through Social Media (X2) and Marketing with advertising networks (X3) have a significant effect on the dependent variable (Y), namely student interest in entrepreneurship, this can be seen based on the F test on testing hypothesis where the value of F count is 5.392 > F Table 2.711, with significance 0.001 smaller than 0.05. Based on the t test, the value of t count for each variable obtained by the dominant variable is X2 (Marketing through social media) with the largest value of t count is 3.054 and the smallest significant level is 0.005. This shows that with the increasing number of social media can be a means for students to do small-scale business, foster their entrepreneurial spirit without difficulty finding a place of entrepreneurship and also without ignoring the lectures they are currently undergoing.

1. Introduction

At present the ways or strategies to market products are increasingly developing and a lot of variety. This happens along with the development of science and information technology. Marketing practitioners or more accurately called entrepreneurs not only market their products using conventional methods, but have increasingly developed using modern methods or strategies that make it easier for consumers to get the product they want. Some marketing strategies as below have been recognized for their reliability by utilizing technology in selling products more modern [1-2]. This strategy is nothing but a way to attract the interest of potential customers in determining purchasing decisions for a product that can have a positive impact on these consumers. Online marketing is a marketing strategy that a lot of people choose as a way to sell their products. This is because of the many conveniences experienced by business people in selling their products, among others is the increasingly active community in social media activities through Facebook, Instagram, line, twitter,

whatsapp and others so that it is easy to see the products offered by business people through social media [3-4].

Interesting online marketing strategies for many people who intend to become entrepreneurs are not spared also students in the Faculty of Computer Science and Information Technology (CSIT) Mulawarman University especially the class of 2018. Even though they are still pursuing education at undergraduate level 1 (S1), the entrepreneurial spirit and enthusiasm are growing strong in these students, because according to them it is not difficult at this time to do business since the development of information technology. Businesses do not currently have to have business premises in the form of land and buildings, complicated licensing documents, do not need a large capital, enough to be sold or marketed online can already be seen by consumers until a purchasing decision by a consumer is all done online.Tthe development of information technology today that it causes students to choose to do business through online marketing to earn income so that they can be more independent while in college [4-5]. Online marketing strategies can be done in many ways and in this study there are three variables chosen namely through Business Marketing with Email Marketing (X1), Marketing Through Social Media (X2) and Marketing Through Advertising Networks (X3) [6-10].

2. Research method

The study was conducted at FKTI Mulawarman University in early 2019. The population in this study were students of FKTI mulawarman university 2018, where in this semester they take Entrepreneurship courses so it needs to be explored to what extent the entrepreneurial spirit that grows in their hearts by utilizing the field of IT that they field knowledge at this time. type of research is quantitative descriptive research that is to determine the effect of several variables of online marketing strategies on the entrepreneurial interest of CSIT Mulawarman University 2018 students. The population of this research is the students of CSIT Mulawarman University 2018 who are enrolled in the faculty of approximately 500. The number of samples of this study used the Slovin formula method. By taking into account data on the number of students as many as 500 people and the level of error (e) in determining respondents is 10%. Respondents needed to fill out questionnaires were 83 people [11].

The sampling method used in this study is the random sampling method. Random sampling is a sampling method that is done by selecting samples randomly by researchers. Based on the problems that have been formulated and the proposed hypothesis, the variables in this study consist of the independent variables Business Marketing with Email Marketing (X1), Marketing through Social Media (X2) and Marketing through Advertising Networks (X3) and 1 dependent variable, namely entrepreneurial interest in CSIT Mulawarman University class of 2018 (Y). The tools used in this study are questionnaires in the form of question questions and choice questions that are distributed to students, cameras, computers, calculators, SPSS software version 21.0 that is used for data processing the results of questionnaire answers given to respondents.

2.1. Validity test

Validity test is a test used to show the extent to which the measuring instrument used in measuring what is measured [10],[12],[13]. Validity test is used to measure valid, or whether a questionnaire is valid or not. A questionnaire is said to be valid if the questions on the questionnaire are able to reveal something that will be measured by the questionnaire. Validity indicator of entrepreneurial interest in CSIT Mulawaraman University Students.

Table 1. Validity indicators of entrepreneurial interest (Y).

Indicator	Factor Loading	Communalities	Information
Y1.1	0.887	0.590	Valid
Y1.2	0.651	0.652	Valid

Based on Table 1, all items of questions for student entrepreneurial interest (Y) show the number of communalities and factor loading which is> 0.5, so it can be maintained for further analysis in this study.

Table 2. Validity of business marketing with email marketing (X1).

Indicator	Factor Loading	Communalities	Information
X1.1	0.877	0.781	Valid
X1.2	0.621	0.581	Valid

Based on Table 2, all question items for business marketing with email marketing show communalities and factor loading rates> 0.5, so it can be maintained for further analysis in this study.

Table 3. Validity of marketing through social media (X2).

Indicator	Factor Loading	Communalities	Information
X3.1	0.826	0.724	Valid
X3.2	0.692	0.597	Valid

Based on Table 3, all question items for the social media marketing variable show the numbers of communalities and factor loading which are> 0.5, so it can be maintained for further analysis in this study.

Table 4. Validity of marketing through advertising networks (X3).

Indicator	Factor Loading	Communalities	Information
X2.1	0.836	0.649	Valid
X2.2	0.661	0.564	Valid

Based on Table 4, all the question items for the marketing through advertising network variable show the number of communalities and factor loading which is> 0.5, so it can be maintained for further analysis in this study.

From the results of the validity test with the product moment correlation (Pearson Correlation) it appears that all items have a value of the product moment correlation / Pearson correlation (r) between each question to the total score> r Table (where the r Table used is 0.182 and as many samples 83 people) so it can be said that all of these questions are valid. As for the value of the product moment correlation of each variable are as follows:

Business marketing with email marketing (X1). Three questions used to measure the variable Business marketing with email marketing (X1) shows the value of the product moment correlation / Pearson correlation (r) between each question to the total score as in Table 5.

Table 5. Correlation value X1.

Indicator	Correlation	Information
X1.1	0.784	Valid
X1.2	0.545	Valid

Based on Table 5, all question items for variable X1 are valid, because it shows the correlation value> r Table.

Marketing through social media (X2). Three questions used to measure the variable *m*arketing *t*hrough social media (X2) shows the value of the product moment correlation / Pearson correlation (r) between each question to the total score as in Table 6.

Table 6. Correlation value X6.

Indicator	Indicator	Information
X3.1	0.817	Valid
X3.2	0.799	Valid

Based on Table 6, all question items for variable X2 are valid, because they show the correlation value> r Table.

Marketing through advertising networks (X3). Three questions used to measure the variable Marketing through advertising networks (X3) shows the value of the product moment correlation / Pearson correlation (r) between each question to the total score as in Table 7.

Table 7. Correlation value X3.

Indicator	Indicator	Information
X2.1	0.876	Valid
X2.2	0.634	Valid

Based on Table 7, all question items for variable X2 are valid, because they show the correlation value> r Table.

2.2. Reliability Test

Reliability tests are carried out to show the extent to which a measuring device is reliable or reliable. State of the attributes of each variable, among others [14-15], can be identified through internal testing of the consistency of reliability on the questionnaire made using Cronbach's Alpha analysis techniques through computer assistance with SPSS program version 21.0. For the reliability test, Cronbach Alpha coefficient values are obtained for the questions given to respondents, each variable can be seen in Table 8.

Table 8. Reliability test results.

Variable	R-Alpha	Decision
Business Marketing With Email Marketing	0.545	Reliabel
Marketing Through Social Media	0.682	Reliabel
Marketing With Advertising Networks	0.625	Reliabel

As for the Cronbach's Alpha value for the instrument as a whole, it was 0.408 where the value was positive and greater than r Table. So it can be said to be reliable and this shows the existence of consistency.

2.3. Multiple regression model

After conducting various tests with the help of the SPSS program the regression equations are obtained in Table 9.

Table 9. Coefficients[a].

Model		Unstandardized Coefficients		Standardized Coefficients				Collinearity Statistic	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	-2.722	2.329		1.169	.252		
	X1	.200	.114	.312	2.758	.020	.157	1.256
	X2	.447	.314	.419	3.054	.005	.465	1.493
	X3	.379	.145	.399	2.792	.010	.448	1.327

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Based on the regression equations obtained can be explained about the coefficient. The value of the constant shows the amount of interest in entrepreneurship at the Faculty of Medicine Unmul 2018 (Y) if X1, X2, X3 are zero (0) then the amount of student entrepreneurial interest will be worth -2.722. This means that if the interests of student entrepreneurship are not supported by these 3 independent variables, students will find it difficult to do business or business because of the limited place and means of entrepreneurship. Regression coefficient (X1) of 0.200 means that if there is a change in the positive direction or an increase in marketing with email marketing, then the Y variable will change positively as well and so on other variables.

3. Results and discussion

From the regression equation model that has been formed obtained overall correlation coefficient (Multiple R) of 0.694 or 69.4%, which means the relationship between X1, X2, X3 as the independent variable with the dependent variable Y is positive and strong enough. While the value of the coefficient of determination (R2) is 0.482. This means that 48.2% of the proportion of diversity in student entrepreneurial interest (Y) can be explained by variables X1, X2 and X3, while the other 48.2% is explained by other variables outside the three independent variables not examined in this study. So, based on the coefficient of determination it can be seen that the three independent variables have a real influence on Y.

Table 10. Model summary.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.694a	.482	.392	1.09164	1.572

a. Predictors: (Constant), X5, X4, X2, X3, X1
b. Dependent Variable: Y

Based on the feasibility test (model validity) using the calculated F value of 5.392> F Table 2.711 with a significance of 0.001 smaller than 0.05, it can be said that the equation model is feasible to use and overall the independent variables have a significant effect on the variables Y.

Table 11. Anova.

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	32.127	5	6.425	5.392	.001b
	Residual	34.559	29	1.192		
	Total	66.686	34			

a. Dependent Variable: Y
b. Predictors: (Constant), X5, X4, X2, X3, X1

3.1. Testing of the regression coefficient hypothesis (Uji F)

Based on the results of calculations using SPSS program assistance, the value of the F ratio obtained was 5.392 with a significance of 0.000 so it can be concluded that H1 was accepted at a significance level of 0.05. So the hypothesis which states that Marketing with email marketing (X1), Marketing through social media (X2), and Marketing through advertising networks (X3) simultaneously (together) has a significant (significant) effect on students' interest in entrepreneurship so that (Y) can be accepted.

3.2. Partial regression coefficient hypothesis testing (Uji T)

Test the truth of the hypothesis carried out in this study to determine the effect of each independent variable on the dependent variable Y using the t test. Hypothesis testing partially obtained t count for Marketing with email marketing (X1) of 2.758 with a significance level of 0.02 smaller than 0.05 so

that Ha for X1 can be accepted. Therefore, the hypothesis stating that marketing with email marketing (X1) influences student entrepreneurial interest (Y) can be accepted.

While t arithmetic for marketing through social media is 3.054 with a significance level of 0.010 less than 0.05 so Ha for marketing through social media can be accepted. Therefore, the hypothesis which states that marketing through social media (X2) influences the interest in student entrepreneurship (Y) can be accepted. The results of t count for Marketing with advertising networks (X3) of 2.792 with a significance level of 0.010 less than 0.05 so Ha for Marketing with advertising networks (X3) can be accepted. Therefore, the hypothesis stating that marketing with advertising networks (X3) influences the interests of student entrepreneurship (Y) can be accepted.

Based on partial testing, it can be seen that the variable that has a dominant influence on student entrepreneurial interest (Y) is Marketing through social media (X2). This can be seen based on the regression coefficient, where the regression coefficient for variable X3 has the highest coefficient value compared to the coefficient values of other variables, the smallest significance value compared to other variables. Therefore, the alternative hypothesis (Ha) which states that Marketing through social media (X2) is the dominant variable on student entrepreneurial interest (Y) can be accepted, because based on partial hypothesis testing, the dominant variable is X2, with t arithmetic 3.054 and the level of significance of 0.005 smaller than 0.05 (Data can be seen in Table 9).

4. Conclusions

- Independent variables Email marketing marketing (X1), marketing through social media (X2), marketing with advertising networks (X3), have a significant (significant) effect on student entrepreneurial interest (Y) is evidenced by the F test (F ratio) obtained is 5.392 with a significance of 0.001.
- While the influence of independent variables on the dependent variable, partially it can be seen from each of the t value, namely Marketing with email marketing (X1) of 2.758 with a significance level of 0.020 less than 0.05, Marketing through social media (X2) of 3.054 with a significance level of 0.005 less than 0.05, Marketing with an advertising network (X3) of 2.792 with a significance level of 0.010 less than 0.05. Among the variables X1-X3 above, the variable Marketing through social media (X2) predominantly affects student entrepreneurial interest (Y) with a t value of 3.054 and a significant 0.005.

5. Suggestions

- Online marketing is currently becoming a trend for the community as well as for students, they can do business by not setting aside the education that they are taking specifically in CSIT Mulawarman University, so it needs motivation and direction from both lecturers and processors of CSIT Mulawarman University to build and instill souls and the spirit of entrepreneurship in these students.
- Advances in Information Technology makes students become independent people, because of the various facilities to do business that they offer, especially doing business through social media, so it needs teaching and training also for students.
- Further research needs to be done on this study by using other variables.

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The effect of ratio of pineapple skin water and coconut water in cellulose membrane production and its application

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Abstract. Pineapple skin contains high carbohydrates and sugar, hence pineapple skin can be used as raw material for making chemicals, one of which is making cellulose membrane to further be utilized as peat water filtration. This study varied pineapple and coconut skin as the main ingredients of membrane production and varied starter volume or Acetobacter Xylinum. The formed membrane was further analyzed by using flux method, membrane tensile strength test, FTIR test and SEM test to see membrane morphology. From the results of the research, the best water flux data was 6.58 L / hr m2, the best tensile strength test of membrane was 22.1 Mpa and confirmation that cellulose was the composer of the membrane. The membrane was also applied for peat water filtration where peat water with its turbidity value of 10.3 NTU and its TDS 161 decreased the turbidity level to 0.34 NTU and TDS to 138.

1. Introduction

Pineapple is one of the most famous fruit and it is easily be found in many part of the world. Besides being consumed as fresh fruit, pineapple also can be processed as raw material in food processing industries. The products of pineapple processing that are mostly found in our daily live such as pineapple juice, pineapple jam, pineapple sweetmeat and also as the complementary in cooking process.

The pineapple production in Indonesia has developed rapidly year by year, so that it can be imagined the waste resulted from this pineapple process. Susanto et al found that the waste of the pineapple especially from the skin piled up and it caused many problems especially to the environment [1]. As far as we know, Indonesian people utilize only the meat of pineapple, while the skin are being unused. it because the physical structure of the skin which is hard and rough. Based on this reason, there is a chance to utilize the waste of pineapple skin and make it to a product that can be processed further. The result of previous study showed that pineapple skin contains 81,72 % water; 20,87 % rough fiber; 4,41 % protein; 17,53 % carbohydrate and 13,65 % reduction sugar. Considering the high content of sugar in the pineapple skin, it is quite possible to utilize the skin as raw material in making chemical material such as Nata [2]. Nata is a bacterial cellulose produced by Acetobacter xylinum in the process of fermentation [3-4]. Agus Susanto have studied that pineapple liquid waste can produce

nata de pina which it is the good quality and feasible product ecologically and economically [5]. Liquid waste from pineapple can obtain the cellulose film with assist of Acetobacter xylinum. Celluose film created to be membrane cellulose.

Membrane is a thin layer from a pored material that can be used to several separation process. Using membrane is one of the economical ways in separation process, it is also effective and will not change the compound both physically and chemically. Generally, membrane is made from natural polymer and its modification such cellulose and synthetic polymer such polysulfide and polyamide Cellulose is one of polysaccharide containing in plant and can be used as the material for membrane making. The main source of cellulose is wood porridge or cotton, but due to the raising amount of population and the development of technology causes the ring of life necessities. Therefore, the source of cellulose apart from wood is urgently needed. For this reason, the development of making cellulose from fruit juice, one of them is *nata de pina* which come from pineapple juice and in this research; the juice is resulted from the skin of pineapple. In 2005, Muhammad Adriansyah did a study about producing cellulose membrane from pineapple skin juice and got a very satisfied result [6]. Iskandar and friends in 2010 also did a research about producing cellulose film from *Nata De Pina* [7]. While Senny Widyaningsih in 2013 studied about utilizing nata de coco membrane as filtration media to recover used cooking oil [8].

This research will vary the juice of pineapple skin and coconut water as the coconut water also contains good cellulose for making membrane and a number of studies have been done about producing cellulose membrane using coconut water. Water is the most vital need in human life, lack of water will give great impact to both human health and social. Yet the fulfillment of clean water still becomes a general problem especially in Indonesia. Areas with no access to clean water usually use entrenchment well, river water which sometime the quality of the water do not fulfill the standard of clean water. Lately, complains are frequently heard from the people regarding to the quality of water from well which is quite far from the standard of clean water. Most often the water from the entrenchment well does not produce water with good quality, for example the color of the water is yellow and smelling.

This research will process peat water become clean water that is qualified for use by using the filtration of cellulose membrane. Peat water is one of water sources which mostly found in Kalimantan and Sumatera. Aceh, located in Sumatera, is one of the areas with lot of peat water. The color of peat water is brown till swarthy and usually contains high organic compound. Peat water requires special processing before being used as daily for domestic necessities. The aim of this research is to observe the ratio of pineapple skin whe filtration for peat water.

2. Research methodology

2.1. Tools and materials
The research used pineapple skin and coconut water as raw material gained from local traditional market. Sugar, acetic acid, aquades, starter *Acetobacter Xylinum*, and NaOH were also used for this study. The tools used were glasses, Ph paper, plastic trays, oven and mixer.

2.2. Work procedure
The pineapple skin was first blended and mixed with coconut water. Then sugar and ZA were added for each 50 gr and 4 gr and heated. After that, the coumpond was cooled and the PH was set untill 4, and next step was adding starter *Acetobacter Xylinum* and incubated for seven days. Nata de coco that had been formed was then washed with water soaked with 2 % NaOh for 24 hours and then rewashed untill its PH was neutral. The Nata was pressed by using *filter press* till the membrane of *nata de coco* was got. The membrane was dried in oven with 50°C temperature to get dry membrane.

2.2.1. FTIR test. The pressed sample was cut in same size with the media and put in it. After the preparation process was done, the sample was then analysed and the formed spectrum was noted.

Tensile Test. The sample that was cut according to ASTM D-638 standard was set to the sample binder. Then the computer was turned on, and then the icon of TW elite was clicked as well as the interlock to set up the binder sample up and down. The sample that would be tested was set and ASTM D-638 Plastic Tension Test was chosen, then the thickness of sample and rate time was inserted. Next, click load and right click for zero signal, crosshead was chosen as well as zero signals. Before naming the sample, Run The Test icon was clicked. After that, the sample would be observed until it was cut and then the graph was saved, the result was saved in excel form. Scanning Electron Microscopy (SEM) Test. This test was conducted by cutting the sample into small pieces, and then they were adhered to the media. The sample then was placed in a tube to be coated with gold for twenty minutes. Next, the coated sample was put in SEM and the best enlargement was settled to find out the surface form. The picture met the requirement then was saved in the disk.

2.2.2. Turbidity test. The test was conducted by inserting 15 ml filtrate to a special turbidity glass bottle. The bottle was wiped by using dry paper to omit impurities during the filling to the input cell, the bottle then was reclosed. Next step was turning on the test equipment, and after several minutes the number showed up on the screen and the result was noted. This procedure was done in several times in order to get the accurate turbidity concentration. Total Dissolved Solid (TDS) Test. The test was done by filling the beaker glass with water and the equipment tool then was inserted the glass, then the result showed up on the tool and then noted.

3. Results and discussion

The study has been done in making cellulose membrane from pineapple skin waste and coconut water. During this time, ppineapple skin waste has rarely been used and also coconut water which is one of the products from coconut plants which is also not yet widely used. Cellulose membrane was ready obtained using pineapple skin and coconut water by adding Acetobacter xylinum to convert sugar in that materials to be nata and the next process becomes cellulose membrane.

This study made cellulose membrane from the mixture pineapple skin and coconut water to obtain the good quality of cellulose membrane. A graph at figure1 shows the relationship between variations in the ratio of pineapple skin water and coconut water with tensile strength values in Mpa units. Tensile strength test is carried out to determine a maximum load that can be borne by a specimen or material test. In this tensile strength test analysis using the UTM EXCEED tool. It can be seen that the membrane at a ratio of 1:0 is the best variation to obtain the tensile strength value where the tensile strength value is 22.1 Mpa and the elongation or elongation% is 15.83%.
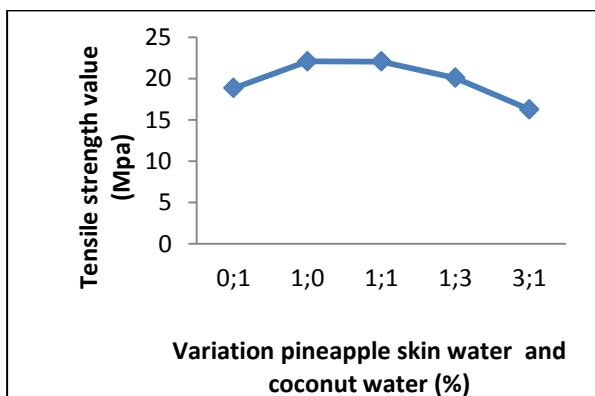
Figure 1. Tensile strength value of cellulose membranes in pineapple skin and coconut water water variations.
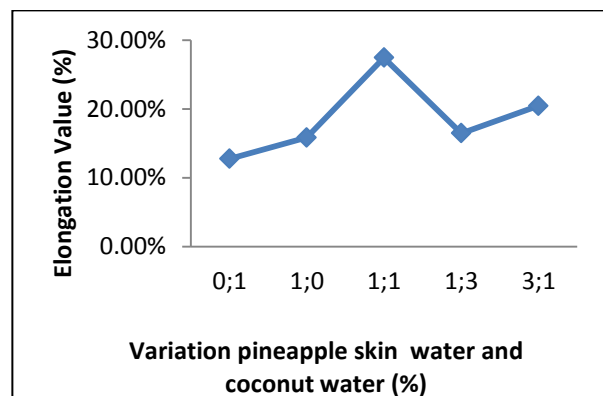
Figure 2. Precent elongation value of cellulose membranes in pineapple skin and coconut water water variations.
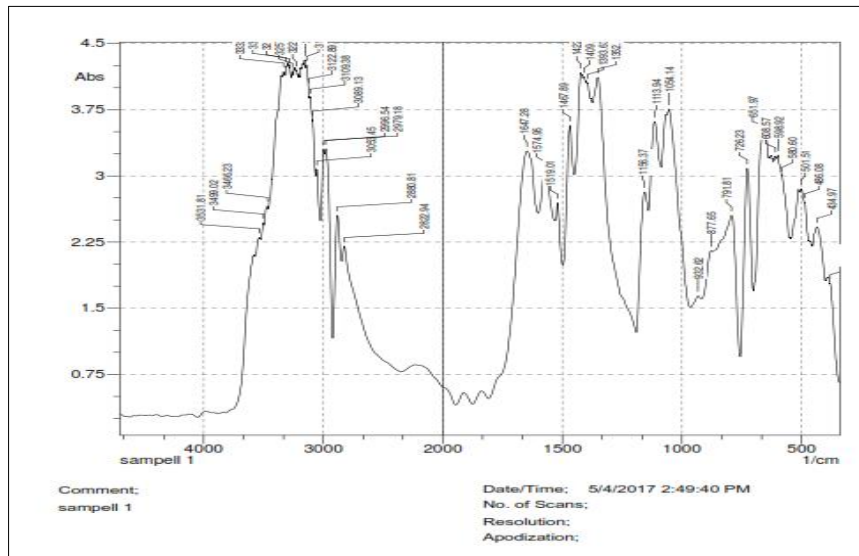
Figure 3. FTIR test of cellulose membrane.

The result of FTIR test on the cellulose membrane sample was aimed to observr the structure information of an organic compound. Rachmilda Pinnata and Alia Damayanti found out in their research ,which used water hyacinth as the cellulose membrane, that from FTIR test it identified C= O group, OH group in wave number 3364 cm^{-1} and also C-O group in wave number cm^{-1}. From picture 2. it can be seen the adsorption of OH group in wave number 3309,03 cm^{-1}. The adsorption also exist in C-O group in wave number 1054,14 cm^{-1} as well as in C= O in wave numebr 1647,28 cm^{-1}.
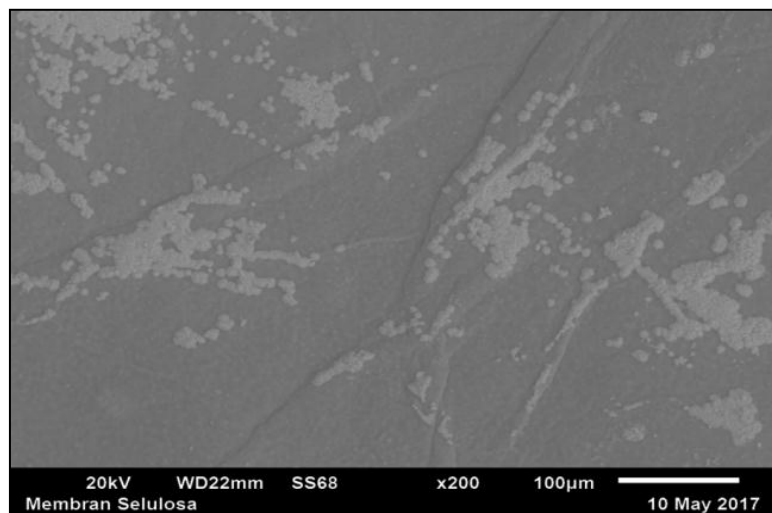
Figure 4. SEM test result.

SEM analysis is an appropriate method to observe the surface morphology of a membrane. This analysis is implemented to see the membranes pores. From picture 3 above, it can be seen the result of SEM analysis with 200 times enlargement that the structure of cellulose membrane is sufficiently tight. The tightly pore structure stating thatthe morphology of the membrane surface is not homogeneous and a tight layer formed after interfacial polymerization process. The more tightly structure cellulose membrane made solvent molecule diffusion so hard to produce a smaller pore size [9].
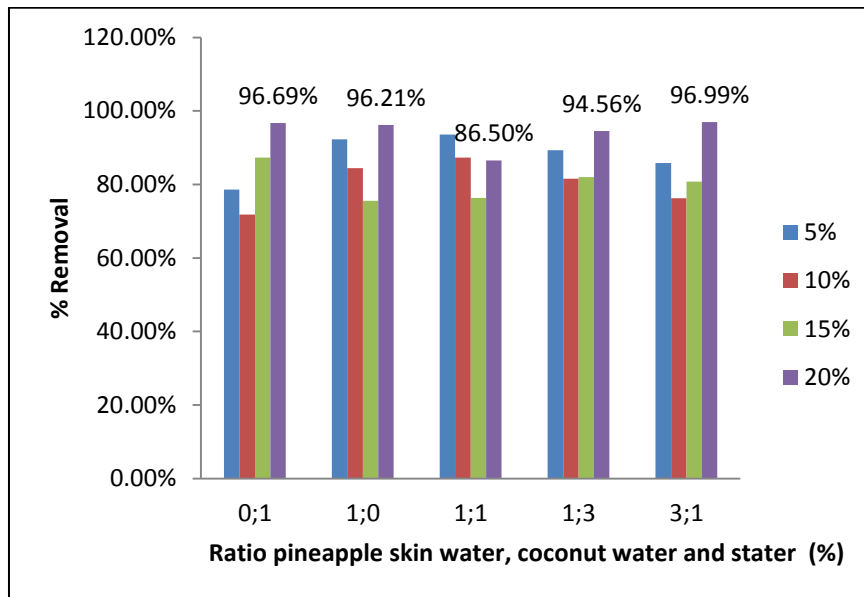
Figure 5. Efficiency decreases turbinity peat water after filtration with using cellulose membrane from pineapple skin water and coconut water.
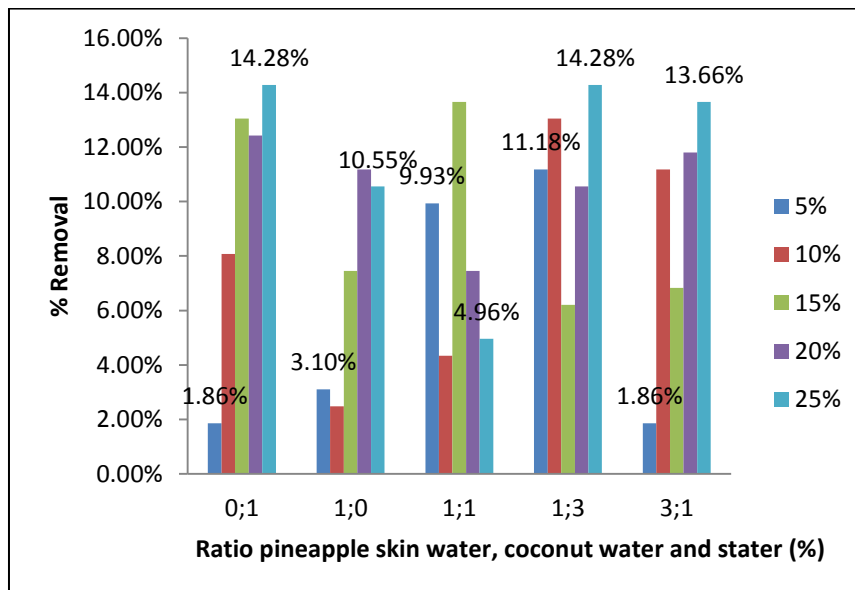
Figure 6. Efficiency decreases TDS peat water after filtration with using cellulose membrane from pineapple skin water and coconut water.

Table 1. The first result of peat water.

No	Sample	Turbinity (NTU)	TDS
1	Peat water	10,3	161

Tabel 2. The result of turbinity and TDS from peat water after filtered using cellulose membrane from pineapple skin water and coconut water.

No	Ratio pineapple skin water and coconut water	Ratio volume of stater	Turbidity (NTU)	TDS
1	0:01	5%	2.2	158
		10%	2.9	148
		15%	1.31	140
		20%	0.34	141
		25%	0.44	138
2	1:00	5%	0.80	156
		10%	1.60	158
		15%	2.52	149
		20%	0.39	143
		25%	1.52	144
3	1:01	5%	0.66	145
		10%	1.31	154
		15%	2.44	139
		20%	1.39	149
		25%	0.94	153
4	1:03	5%	1.1	143
		10%	1.9	140
		15%	1.85	151
		20%	0.56	144
		25%	0.90	138
5	3:01	5%	1.46	158
		10%	2.45	143
		15%	1.98	150
		20%	0.31	142
		25%	0.75	139

After that cellulose membrane applied as filter. The first study used to cellulose membrane as microfiltration process for fermented coconut oil and ultrafiltration for reducing Fe in water [10-11]. Therefore this research applied cellulose membrane from pineapple skin and coconut water to filter water peat. As a filter, cellulose membrane can reduce turbinity and tds from water peat. This result got at the figure 5 and 6. The Figure 5 shows the graph of the peat water turbidity water efficiency analysis after passing through the cellulose membrane. Turbidity analysis aims to see the level of turbidity of water because turbidity is usually caused by a number of things including microscopic particles such as microorganisms in the liquid, soluble solids and others. And the results after the water passes through the membrane, the turbidity value in the peat water decreases where the turbidity value of the water before passing through the membrane as seen in table 1. is 10.3 NTU and after passing through the membrane the turbidity value decreases (table 2.). And based on Figure 5 above,

the most efficient value is membrane at a ratio of 3: 1 with a starter volume of 20 % with a level of efficiency of 96.99 %.

Whereas Figure 6 above is a graph of the efficiency of peat water TDS analysis after passing through the membrane. TDS analysis aims to see the size of dissolved substances both organic and inorganic substances contained in a solution. Analysis of total dissolved solids (TDS) is used for indicator tests to determine the general quality of drinking water. Based on the graph above TDS value from peat water reduce after pass the cellulose membrane (table. 2). It showed that the cellulose membrane at a ratio of 0: 1 with a starter volume of 25% and 1: 3 starter volume of 25% is the most efficient in reducing TDS in peat water.

4. Conclusions

The ratio of pineapple skin water and cocnut water can be used as the material to produce cellulose membrane. The result of tensile strength test ,the ratio of 1: 0 is the best variation to gain the value of tensile strength where the value is 22,1 Mpa and the elongation is 15,83%. The result of FTIR analysis detected the interaction among C-O, OH and C=O group and cellulose membrane as filtre can decreases turbinity and TDS.

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6. Acknowledgments

Test the e-commerce model in coconut product smes in North Sulawesi

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Abstract. This study aims to test the SME e-commerce model of coconut-derived products in North Sulawesi. This test model is needed to measure the extent to which all functions are functioning well. By conducting tests on businesses SMEs of coconut-derived products by laboratory testing, the results of the e-commerce model can be applied to SMEs to help business actors in business continuity efforts. This model has been tested through the use based evaluation approach by explaining all the functions or features that are available, then the respondents' responses are outlined in the form of a questionnaire about the resulting e-commerce software model. The test results show that the e-commerce model can be applied to SMEs as a tool in running their business.

1. Introduction

Indonesia is a country that has a lot of natural resources and other potential can make Indonesia an economically advanced country so that it is possible creating a fair and equitable economy. North Sulawesi is an area with a very large coconut farming land has the potential to produce raw materials for the production of coconut-derived products. Cooking oil, VCO, coconut flour, copra, palm sugar, coconut shell, coconut wood furniture and nata de coco are some coconut derivative products that have great potential for into processed products of the small and medium business industry. Opportunities for profit from very large coconut products.

Many problems are being experienced by small and medium businesses in North Sulawesi (SULUT) in the effort to sustain their businesses. Among them are the availability of minimal capital, business management, and technology utilization.

The process of business transition from conventional to digital is a strategic step from a business process to sustainability. One way is to utilize technology in the field of marketing that changes the way work is done from the conventional way towards digital technology by utilizing e-commerce [1]. Therefore, it is necessary to have a touch of technology in the effort of sustainability of the business that will continue to be developed in order to improve the economy, because it is believed that SMEs

have a role in driving economic development, because it can not be denied that smes have contributed greatly to regional income and the income of the indonesian state.

2. Literature review

In the era of digital empowerment technology for business transaction processes must involve information systems. E-commerce technology is very powerful to drive business growth. E-commerce bringing fundamental changes to commerce [2].

The global definition of e-Commerce is all forms of electronic goods or service trading transactions. A formal definition of e-Commerce is given by Baum, namely: a dynamic set of technology, applications and business processes that connect companies, consumers, and communities through electronic transactions and trade in goods, services and information conducted electronically [3].

Small Business is defined as an economic activity carried out by an individual or household or an agency aiming to produce goods or services for commercial trade and have a sales turnover of 1 (one) billion rupiah or less [4].

User guides are made referring to the results of trial messages or user interaction with the computer. The fundamental purpose of a user guide is to promote an efficient and good system to use [5].

3. Method

Propose a model, which posits that the nature of firms' participation in electronic markets depends on organizational motivation and ability. This participation takes place in the form of exploration state, expert state, or passive state. Firms in the exploration state allocate various resources to learn the requirements of doing business in the online environment. On the other hand, firms in the expert state have successfully reengineered their processes to do business online. Firms in the passive state are not eager to commit their resources to actively participate in electronic markets but may experiment with these markets with the notion that they may utilize them in the future to supplement their traditional operations [6].

Testing the e-commerce model is done by exploring questions with measurable answers, confirming the assumptions of the developer in choosing alternative designs. The test plan will explain the document test stages.

Usability Testing is one way to find out whether prospective users can use the application easily and whether the application to be used can provide positive value in helping users achieve their goals. The types of usability evaluation methods are observation, analytic and investigation. In this study using the observation method by testing the usability and user-oriented appearance.

To get good test results, the test is carried out in 10 small and medium business actors by conducting application trials. The test was carried out in 5 districts / cities namely Manado, Bitung, Tondano, Southeast Minahasa and North Minahasa.

Tests are carried out at a laboratory scale and then tested at SME locations. The initial step is to provide an explanation of e-commerce and its benefits in business continuity in the digital age. After that an explanation of the application and its features. After getting a good understanding of the test carried out by demonstrating the application that has been made and after that an experiment is carried out by prospective users.

4. Results and discussion

Interface design must pay attention to an attractive visual appearance so that it can provide added value in achieving the expected goals [7]. Figure 1 below presents the application interface model.
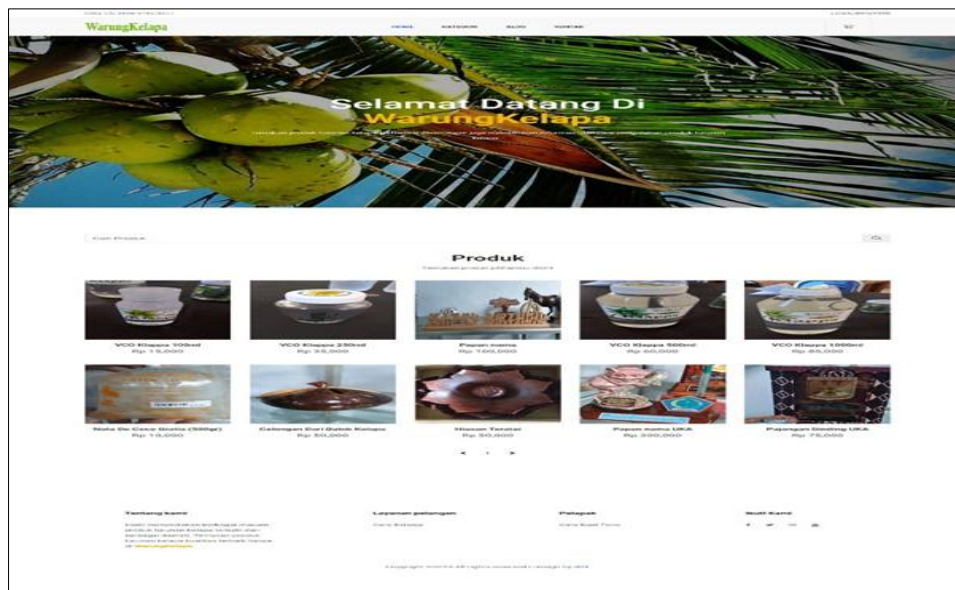
Figure 1. Interface model.
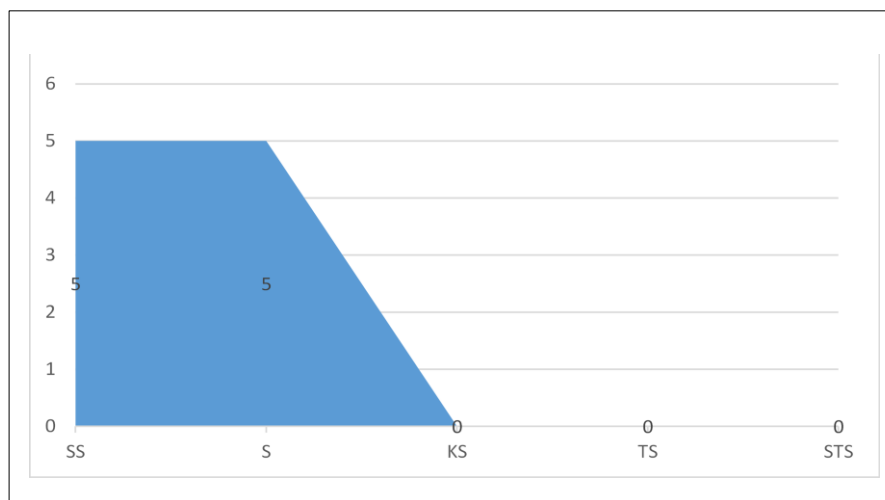
Figure 2. Results of respondent test.

The test is carried out using the use based evaluation approach presented in the questionnaire by involving potential users (SME owners). The questionnaire was designed using language that was easy to understand. The results obtained are measured using a Likert scale of 1 to 5.

Of the 10 UKM that were observed, 9 UKM did not yet have an application to market the products produced. The products produced in the form of cooking coconut oil, VCO, shredded oil pulp, souvenirs, copra, shell charcoal and klapetart. 1 UKM already has web marketing but cannot be accessed.

At present many e-commerce websites can be accessed, but specifically e-commerce websites of coconut-derived products have never been found when searching the internet. Therefore this e-commerce design is very much needed in terms of implementing it as a web marketing for SMEs of

coconut-derived products. The need for this tool is needed because of the lack of knowledge of SMEs in understanding technology in an effort to change the way of marketing from conventional to digital.

5. Conclusion
Based on observations , test result and used based evaluation approaches, it can be concluded that SMEs want an e-commerce design that is clear, easy to understand and has an attractive appearance and can be accessed easily so that the products sold can have a wider market reach

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7. Acknowledgments

Implementation of communication system between Siemens PLC S7-1200 with Omron PLC CP1L-EL20DT1-D for induction motor speed controller

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Abstract. Nowdays, it has entered the era of the Industrial Revolution 4.0 where information and communication technology plays an important role almost in all fields such as transportation, industry, education and other fields. The Industrial Revolution 4.0 requires that all equipments or systems are connected to one another. At present, many equipments in the field of industrial automation have not integrated yet. The main device that must be connected in a control system is a PLC, because it is a data storage and control center. Some problems will arise if the PLCs are not connected to each other, such as asynchronous data which managed by each PLC, offline data recording and monitoring the performance of each PLC takes a relatively long time. This research discusses the multi PLC communication system for induction motor speed regulation. Induction motor is one type of motor that is widely used in industry because it is cheap and reliable. The communication media is used for communication between PLCs is modbus. The results showed that communication between PLCs could worked well with the master model (PLC Siemens) - slave (PLC Omron). The system had a steady state error of 17.07% with a maximum speed of 1267.6 rpm.

1. Introduction

Industrial revolution 4.0 requires that the field of industrial automation undergo a change from what was originally standalone, it must integrate between one system with another system. One of the most important parts in the field of industrial automation is the Programmable Logic Controller (PLC). PLC is one of device that is widely used in the manufacturing, pharmaceutical, garment and several other industrial fields. The PLC's function has evolved from being replaced only as a relay control, now PLC has additional functions as motion control, process control, distributive control system and complex networking [1]. Research on industrial automation has been carried out [2],[3],[4],[6] especially in the field of communication between PLC, such as research conducted by [1] about SMS communication between PLC masters and slaves using a GSM modem, in this research controlled plants are water treatment processes that are made in a simulation. Hence, the time delay in the process of transferring data from the slave to the plant is ignored, because the plant is in the form of simulation. Media for communication between PLCs uses GSM Modem. If the number of PLCs has increased, an additional GSM modem is needed. The system is not effective if it is used on many

PLCs. The next research carried out by [3] is about multi PLC communication with integrated SCADA-DCS system platforms.

The PLC system is made with a master slave system and it is displayed on an HMI with an Ethernet connection. The PLC is used as the master is Siemens S7-1200, while the slave PLC uses the Twido Schneider PLC and the Omron CP1H PLC. HMI is used for displaying data using Vijeo Architecture software. There is only a serial communication facility in the CP1H PLC to be able to communicate over long distances and it is necessary to add conversion equipment from serial data to Ethernet TCP / IP using WIZ110SR devices. The development of PLC technology has developed now both in terms of software and hardware, nowdays there has been a PLC that has facilitated communication via Ethernet TCP / IP for PLC e series.

In this research, a communication system design was made between two PLCs with the modbus communication protocol. PLCs that will be used in the system that will be built are Siemens S7-1200 and Omron CP1L-EL20DT1-D which have communication facilities with Profibus. Then, for testing the system,it will be applied to the induction motor speed regulation. The set point speed comes from the potentiometer and the motor speed value that is displayed on the LCD. The prototype of this tool will serve as a learning medium for the practice of PLCs in State Polytechnic of Cilacap in industrial automation laboratory. This paper will be divided into several sections. The first part is the ackground of the problem, the second part is the design of the system or method of research , the third part is the results and discussion, and the last part is the conclusion.

2. System design

The system design that used in this research consists of two parts ,i.e., the master and slave parts refer to [2]. The master part serves to provide control signals which originate from the motor speed set point. The slave part functions as the receiver of the control signal from the master, then it is processed to adjust the speed of the induction motor as we expected by the master section. System block diagram that has been made can be seen in Figure 1.
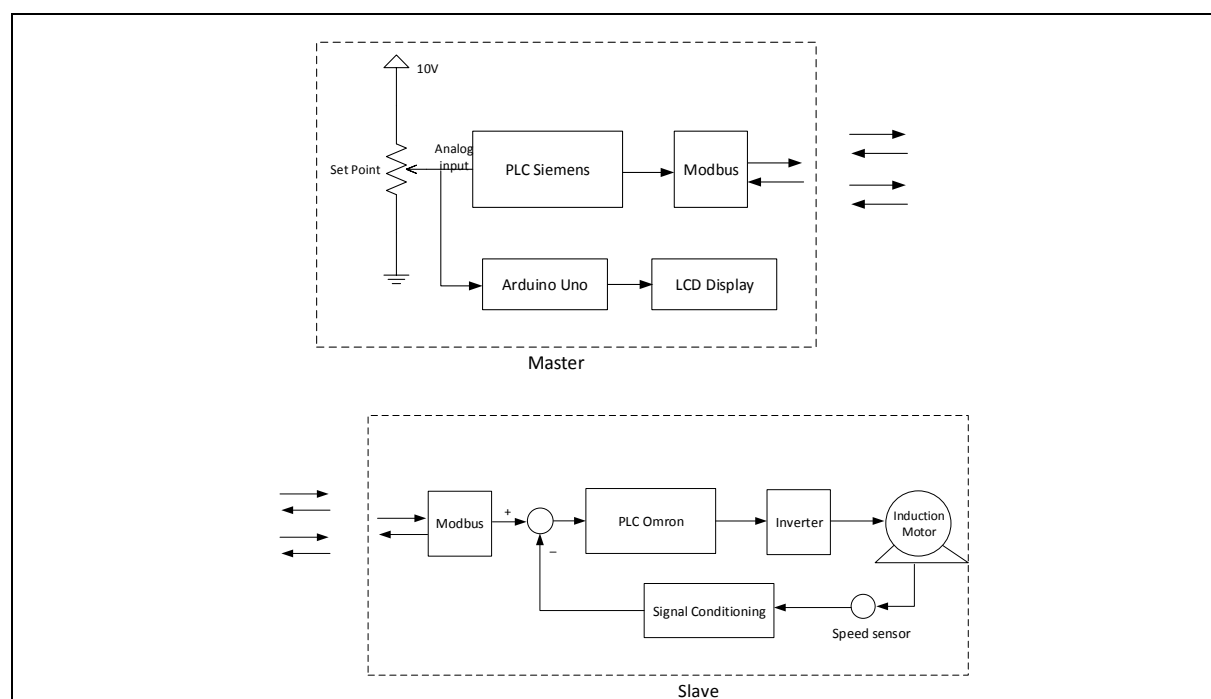
Figure 1. System block diagram.

Based on the block diagram that the PLC has made on the slave section has a vital role in this system because it serves to regulate the motor speed as well as sending actual motor speed data to the master section. So the motor speed can be adjusted linearly, an inverter with a variable voltage input that obtained from the PLC is used. The work principle of each part of the block diagram above are explained as follows.

2.1. PLC

PLC which used in this system is Siemens S7-1200 which has been supported by professional communication using standard TCP / IP connections and it can be used for communication with HMI or other devices which can be seen in Figure 2. The communication interface uses RJ45 connectors with autocross over functions that equipped with Ethernet network with data transmission up to 10/100 Mbps. Profinet protocol is possible to communicate with several third party devices using the open ethernet protocol and ISO on TCP. In addition, the software and library section also includes modbus over TCP instructions that have been used via the ethernet port.

Figure 2. PLC Siemens S7-1200.

The PLC that used as a slave in this system is the Omron PLC type CP1E,i.e., a series of CP1L-EL20DT1-D which shown in Figure 3. The omron PLC type is chosen because there is already a communication facility via an ethernet terminal. This PLC can be used for LCD Display and supporting expansion slots for analog input / output. Besides, the CP1L-EL20DT1-D series is equipped with a high speed counter for reading from speed sensors, such as a rotary encoder.

Figure 3. PLC Omron CP1L-EL20DT1-D.

2.2. Modbus Communication Protocol

The communication protocol that used in this research is Modbus. This protocol becomes the communication standard in industry. Some of the advantages of the Modbus communication protocol are as follows:

- Relatively easy to combine with industrial networks
- Are open protocol and royalty free
- Can transfer data "raw bits" or "word" without limiting the type of vendor

As an intermediary media of the modbus communication protocol can be via serial ports (RS 232, RS 485, FO), Ethernet (LAN) and networks that support internet protocols. The entire Modbus TCP / IP is packaged into standard TCP frame data and sent over TCP port 502, which is specific to the modbus application. The function code that used in Modbus can be seen in Table 1.

Table 1 Modbus function code.

Code	Function	Reference
01 (01H)	Read Coil (output) status	0xxx
03 (03H)	Read Holding Register	4xxx
04 (04H)	Read Input Registers	3xxx
05 (05H)	Force Single Coil (Output)	0xxx
06 (06H)	Preset Single Coils (Output)	4xxx
15 (0FH)	Force Multiple Coils (Output)	0xxx
16 (10H)	Preset Multiple Registers	4xxx
17 (11H)	Report Slave ID	Hidden

2.3. Induction motor

The load that is controlled in this system is the speed of the induction motor [5-6]. This single phase induction motor is a type of motor that is easy to regulate. The series of single phase induction motors for left and right turn can be seen in Figure 4. The part of a single phase induction motor consists of a stator containing the main winding, auxiliary winding and the coil on the rotor. The speed regulation of the motor is conducted by the inverter by regulating the frequency at the output voltage of the inverter. If the frequency is high, the motor rotation speed will be higher,vise versa if the output frequency is low, the motor rotation will also be lower. The direction of rotation of a single phase induction motor can be adjusted by changing the voltage polarity of the main coil as shown in Figure 4.
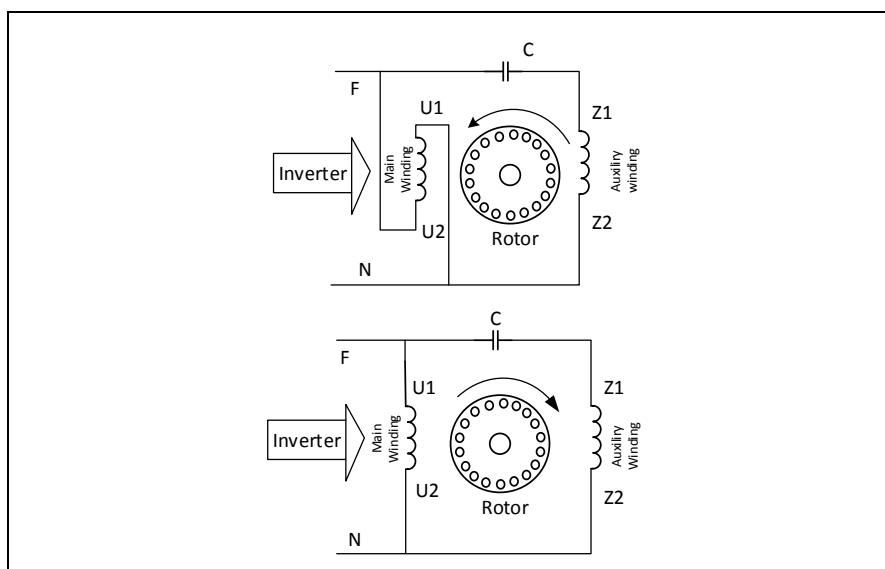
Figure 4. The series of single phase induction motor for left and right turn.

The symbol F is the phase for the supply voltage of the induction motor. This voltage is obtained from the inverter that has been controlled by the PLC. The amount of voltage applied is 220 V with a frequency that can change to adjust the speed.

2.4. Inverter

The inverter is used as an induction motor driver that functions as a soft starter and running. Inverter that used in the Sv008ic5-1f type system is from LS Industri System. This inverter operates with a 220V single phase input voltage with a maximum output power of 0.75kW [7]. The output of this inverter is three phase (U V W), because the induction motor that used is one phase, only the "U" phase is used. This inverter can be operated either internal mode or external mode which gets input from outside of the inveter. In this research, the inverter is operated in an external mode where the trigger from the inverter is obtained from the PLC output. There are two terminal parts in this inverter,i.e., the control terminal and power terminal, the structure of each terminal can be seen in Figure 5.
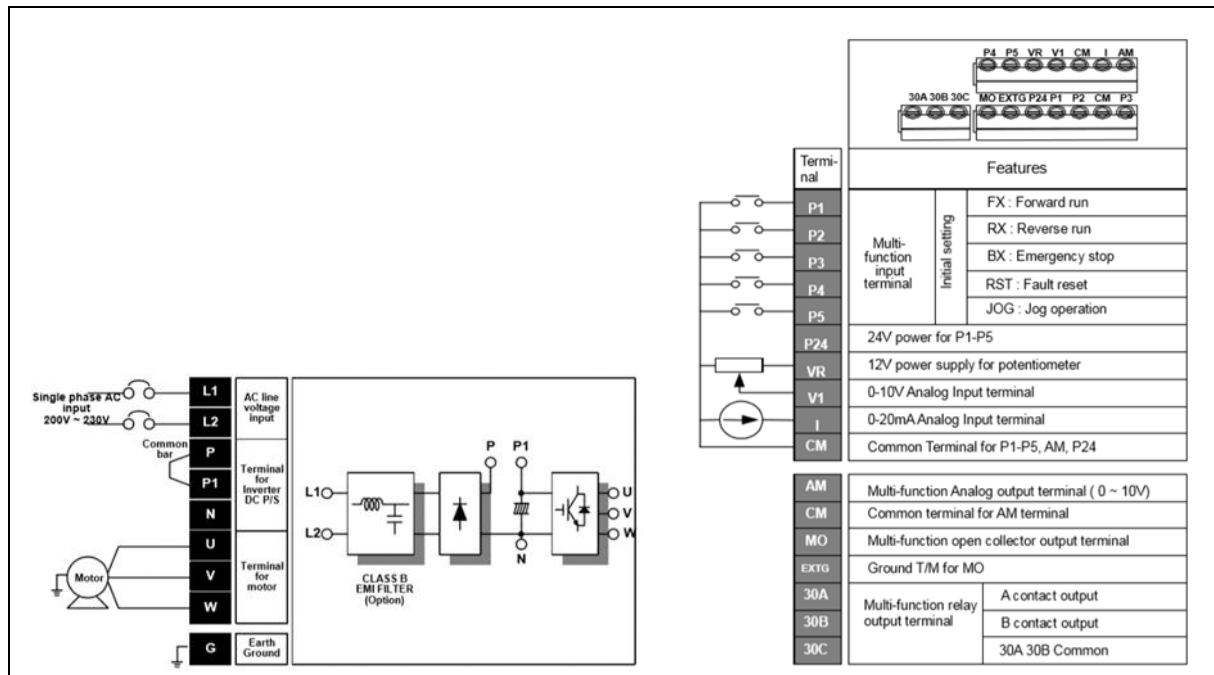
Figure 5. Control terminal and power inverter.

Operation with an external mode is conducted by giving a voltage of 0 to 10 V on terminal V1. In the operation of single-phase induction motors is only one phase that used from the three available phases, i.e., the "U" and Ground phases. This inverter has 4 menus that can be set, each menu has several parameters that can be set. The inverter menu can be seen in Figure 6 as follows.
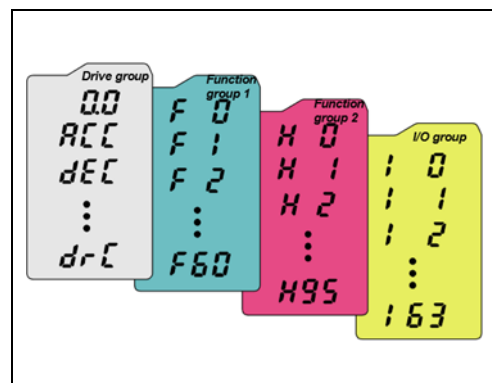
Figure 6. inverter setting menu.

Explanation of the setting of each menu group above can be seen in Table 2.

Table 2. inverter menu group.

Menu	Statement
Drive Group	Basic setting menu in order to run
Function Group 1	Basic parameter setting, such as voltage and output frequency
Function Group 2	Advanced setting for setting PID parameter
I/O Group	sequensial mode setting uses many inputs/outputs

In this research, the settings with external mode were selected. The settings menu is as follows:
- Drive group menu, select the parameter "00"
- Function Group 1 select F0 then set the parameter
  - The first parameter is filld in "00"
  - The second parameter is filled in "frq"
  - The third parameter is filled in "1"
  - The fourth parameter is filled in "3"

After all parameters are set, return to the initial menu then the inverter is ready to use. After an external voltage is applied to terminal V1, then give the trigger "0" to P1 in the control terminal section.

3. Results and discussion

The results of implementing the induction motor speed regulation system can be seen in Figure 7. The induction motor is placed above the control panel box, while the display in the form of an LCD display is placed beside the panel box. To adjust the speed using a potentiometer that is placed next to the LCD display. On the front panel there are the START, Rotate Right, Rotate Left and STOP buttons.

Figure 7. Designed system.

The direction of rotation of the motor is carried out by a combination of relay and contactor circuits, while the speed regulation of the induction motor is conducted by an inverter. Based on the test results that the communication system between Siemens PLC and PLC Omron can be conducted

by giving a High signal to the TCON.Req block. It aims to connect TCP / IP connections between Siemens PLC and PLC Omron. Then, it was conducted the IP Address equalization with each port. Connection results can be seen in the TCON value. Error Low, TCON. Busy Low, and TCON.Done by giving high pulses. If the connection is not connected, then TCON Error will be high.

Modbus testing between Siemens PLC as master and PLC Omron as slave can be conducted by looking at the "Connected" tag on each Client or Server data block. When the Siemens PLC is ON and each MD_Client and MD_server block is enabled, the connection will be automatically connected.

Test data that obtained from the system that has been made in the Laboratory of Industrial Automation of State Polytechnic of Cilacap can be seen in Table 3.

Table 3. Result of setting test of induction motor speed.

Vin (Volt)	Vout (Volt)	F(LCD) (Hz)	F(Invetr) (Hz)	Measure (rpm)	Calculation (rpm)
0.89	0.85	5	4.1	124.2	150
1.86	1.78	10	8.5	265	300
2.73	2.56	15	12.3	372.4	450
3.64	3.41	20	16.4	473	600
4.76	4.54	25	21.8	628	750
6.04	5.61	30	26.9	732.6	900
6.57	6.12	35	29.4	865.4	1050
7.45	6.75	40	32.4	975	1200
8.15	7.76	45	37.2	1124	1350
9.86	8.94	50	42.9	1267.6	1500

The data in table 3 is obtained when the motor speed has reached steady state. Where the voltage Vin is the voltage obtained from the speed sensor feedback. Then Vout is the voltage which released by the PLC analog output terminal. The output from the analog PLC output is used as an input inverter. Based on the data in table 3, it shows that the minimum frequency that can move an induction motor is 5 Hz and the maximum frequency is 50 Hz. There are 2 types of frequency data that shown in table 3: frequency data generated by the LCD Display that is connected indirectly to the potentiometer as a speed setpoint. Then the frequency data is displayed on the inverter display. There is a difference between the frequency data that was displayed by the LCD on the input panel and on the inverter, this is because the data that was displayed on the LCD input was controlled by Arduino Uno. Analog data that was obtained from the potentiometer were then it entered into the ADC and displayed to the LCD Display. It was conducted because of the incompatibility of the communication protocol between the LCD Display and the PLC that was used.

3.1. Comparison between V in and V out
In table 3, it appears that the magnitude of Vout and Vin is proportional. If Vin increases, then Vout also increases can be seen in Figure 8. Adding the value of Vin also affects the frequency generated by the inverter. If the frequency of the inverter increases, the motor speed also increases.

There is a difference in data between Vin and Vout, this is because Vout is obtained from the conversion of motor speed in units of rpm to voltage in units of volts. Voutis measured by the speed sensor has been burdened by an induction motor, so the value is relatively down from the input given. The average difference between Vin and Vout is 6.34%.
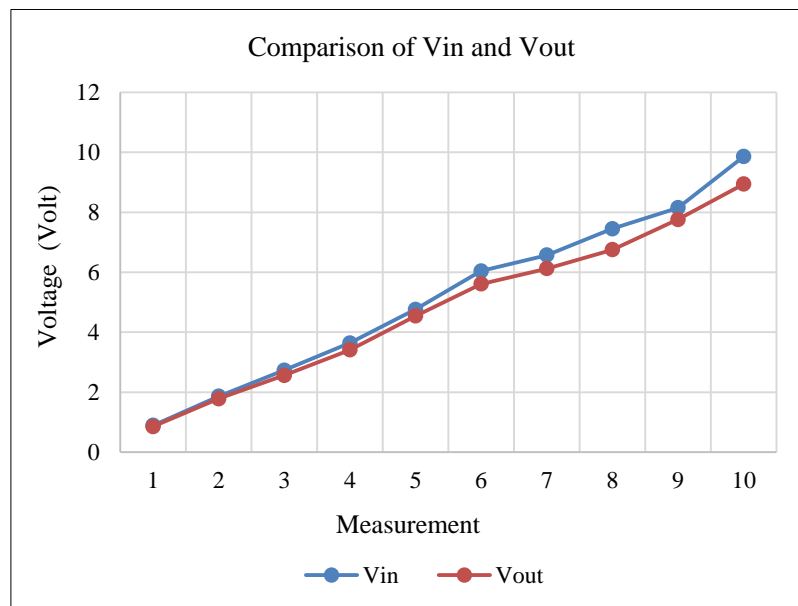
Figure 8. Comparison of Vin and Vout.

3.2. Comparison between turn and frequency

Based on measurement data that have been obtained, there are differences in the measurement data with the calculation. This is because the calculation results take data from the display frequency on the LCD on the input panel of the master, while the measurement results use the voltage data that goes into the inverter to be processed into frequency. The relationship between frequency and motor speed can be seen in Figure 9.
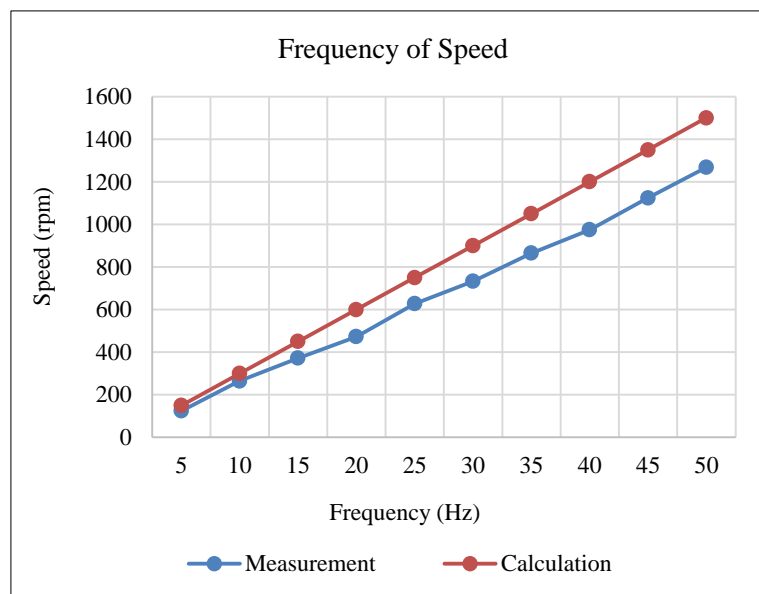
Figure 9. Frequency graph towards the turn speed of motor induction.

Based on Figure 9, it can be seen that the change of frequency is proportional to the change of motor rotation speed the higher the frequency, the greater the motor rotation speed will be. Based on table 3. The average difference between the measurement results and the calculation can be made at 17.07%.

This also corresponds to the Vout voltage that obtained from the speed sensor output which is lower than Vin. The controller that used in this system is only a proportional controller, so to determine the output equal to the set point has not been optimal. For further research, the controller can be improved by adding integral or derivative controls.

4. Conclusions

In the research that has been done, some conclusions can be described as follows:

- The communication system between Siemens PLC and PLC Omron can be conducted by providing a High signal to the TCON.Req block which functions to connect the TCP / IP connection between the Siemens PLC and the Omron PLC.
- Modbus testing between Siemens PLC as master and PLC Omron as slave can be conducted by looking at the "Connected" tag on each Client or Server data block.
- The average difference between Vin and Vout is 6.34%, because the Vout was measured by the speed sensor has been burdened by an induction motor
- The difference of motor rotation speed between the measurement results of the calculation or steady state error is 17.07% because the controller that used in this system is only a proportional controller.

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6. Acknowledgments

The measurement of end-user computing satisfaction of the banjar accounting information system

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Abstract. User satisfaction is a tool to measure the success of a system. Banjar Accounting Information System is an application that was built to facilitate in managing the administrative activities of the banjar adat sibang fund management in Sangeh Village. With this information system, some activities that are usually carried out manually can be handled more quickly and efficiently. This accounting information system is expected to shorten the fund management time. This system includes managing incoming and outgoing funds, managing loans and payments, and reporting. The system can automatically provide recapitulation of the results needed. In its implementation, this system was built so that it can be easily to use. From these problems, an analysis was carried out to measure the user satisfaction. The measurement of user satisfaction in this study uses the EUCS (End User Computing Satisfaction) method. The dimensions of content, accuracy, and timelines have a satisfaction level that is satisfied, while the other two dimensions namely format and ease of use have a satisfaction level that is either satisfied nor dissatisfied. The format dimensions and ease of use require improvements in system design so that the output of the system is pretended in a useful format and is more user friendly.

1. Introduction

At present information technology has become a basic requirement in carrying out all aspects of organizational activities and has an important role to gain competitive advantage. Business processes are much influenced by the rapid advancement of technology. Accounting information system is a system of people, data records, and activities to process data and information in an organization, either manually or automatically, which aims to support organizational activities [1]. Computer-based accounting information systems have the advantage of making it easier for organizations to produce information that is effective and efficient. The purpose of accounting information systems is to collect, store and process financial and accounting data and produce information reports that can be used by managers and other parties to make business decisions and make it easier to exercise proper control over organizational assets [2]. Therefore managers must be able to obtain quality information to improve management capabilities in decision making [3]. Decision making consists of several activities in problem solving to avoid the negative impact of the opportunities that exist. Difficulties of companies without accounting information systems are longer data retrieval times and inaccurate

information. In designing and implementing information systems, it is necessary to emphasize the management of information systems in building accounting information systems [4][5][6][1] by considering user needs and expected goals.

The banjar accounting information system is an application to facilitate the banjar management to manage the banjar sibang fund administrative activities in Sangeh village. With this accounting information system, the activities that are usually done manually can be handled more quickly and efficiently. This accounting information system is expected to shorten the fund management time. This system includes managing incoming and outgoing funds, managing loans and payments, and reporting. The application can provide a recapitulation of the results required. In its implementation, this application was made so that it can be easily used. This is a major consideration because users who will operate this application have limited ability to use computers.

Quality of service is expected to create satisfaction for users. The quality of the information system is very influential on the level of user satisfaction. The higher the quality of the system that is built and the quality of information in accordance with user needs, will foster a level of satisfaction for users. User involvement in the use of information system technology will determine the success of a quality system and information that is built. According to Doll and Torkzadeh [7] the definition of End User Computing Satisfaction of an information system is an overall evaluation of the users of the information system based on their experience in using the system. Evaluations using the EUCS model emphasize end-user satisfaction with technological aspects, by assessing the content, accuracy, format, time, and ease of use of the system.

An analysis of information system performance in the user's perspective was carried out by Roses, who examined to determine the level of user satisfaction with the Enterprise Resource Planning system in the context of the Transnational Bank [8] and Iliasa, A. conducted a case study in Malaysia of the Computerized Accounting System (CAS) [9]. Factors that are used as a reference are content, accuracy, format, ease of use, topicality for time, satisfaction with system speed and system reliability to measure the satisfaction of the end user of the computer. The results of the study show that ease of use, content, and accuracy have a significant effect on system user satisfaction. In other words, CAS is needed to provide accurate output or content. Research conducted by Ilias, A determines the relationship between End-User Computing Satisfaction (EUCS) factors, namely (content, accuracy, format, ease of use, timeliness, satisfaction with system speed, system reliability) and satisfaction. The empirical results of this study can provide support for the Doll and Torkzadeh model, which are related to factors that contribute to the satisfaction of end users of the accounting system. In addition, this study also evaluates the strong relationship between EUCS factors and satisfaction with the use of a computerized accounting system (CAS).

2. Methodology

An organization's information system can be said to be reliable if it has good quality and is able to provide satisfaction to users. With the satisfaction of these users, acceptance in the organization of information systems will arise. User satisfaction is one indicator of the successful development of information systems. The research variables are in accordance with existing instruments in the EUCS method, namely content, accuracy, format, ease of use, and timeliness as shown in Figure 1.
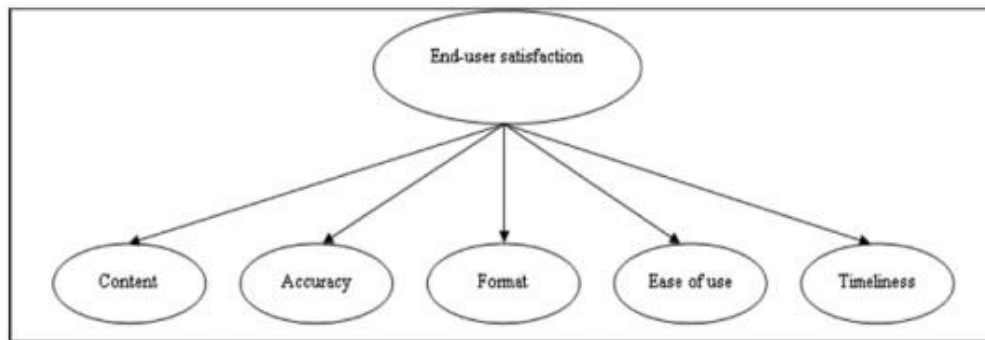
Figure 1. Instrument EUCS [10].

Doll et al have compiled the question items in the EUCS study, these questions were adopted and used as guidelines for making questionnaires for respondents. The list of question items to be asked in this study is shown in Table 1. The EUCS instrument consists of 12 items. This instrument was considered comprehensive because it collected items from questionnaire items from previous research studies and added items about ease of use that were previously ignored.

Data collection is done by literature study, questionnaires, observations. The validity of the measuring instrument is done by finding the correlation price between the parts of the measuring instrument as a whole using the Pearson product moment formula and reliability testing using the Cronbach alpha coefficient formula. The data analysis technique used in this research is descriptive analysis using mean testing.

For measuring the data obtained from filling out the questionnaire used Likert Scale namely Strongly Agree (4), Agree (3), Disagree (2) and Strongly disagree (1). Then the results of the questionnaire were tested using validity and reliability tests.

Table 1. The five dimension of end user computing satisfaction.

Dimension	ID Question	Question
Content	C1	The system provide the precise information you need
	C2	The system information content meet your needs
	C3	The system provide help that seemed to be just about exactly what you need
	C4	The system provides sufficient information
Accuracy	A1	The system is accurate
	A2	You are satisfied with accuracy of the system
Format	F1	The output of the system is pretended in a useful format
	F2	The system information is clear
Ease of Use	E1	The system is user friendly
	E2	The system is easy to use
Timeliness	T1	You get the information you need from the system at a suitable time
	T2	The system provides up-to-date information

3. Result

The level of user satisfaction in utilizing applications has been carried out using an end-user computing satisfaction analysis model covering 5 dimensions, further described in 12 item questionnaire statements. The number of respondents 25 people at 5% confidence level intervals. Testing the validity of each item used item analysis, which correlates the score of each item with a total score which is the sum of each item score. The minimum requirement to be considered eligible is if r = 0.391. The validation test results showed 12 items were valid so that they met the requirements for research analysis. The validity test results are shown in Table 2. Furthermore, the reliability test is performed to determine the instrument used precisely. Reliability test is the suitability of the measuring instrument with the measured so that the measuring instrument can be trusted or reliable. The reliability test can be done together with all questions. Reliability test can be seen in the Alpha value, if the Cronbach Alpha value> 0.60 then it is reliable. The reliability test results showed the Cronbach Alpha value for all variables is greater than 0.60 and declared reliable.

To determine the level of end-user satisfaction with the information system that was built, researchers convert the statement of satisfaction and dissatisfaction on the user questionnaire into five indicators as shown in Table 3.

Table 2. Validity analysis.

Dimension	ID Question	Question
Content	C1	0.548
	C2	0.415
	C3	0.461
	C4	0.417
Accuracy	A1	0.418
	A2	0.452
Format	F1	0.501
	F2	0.465
Ease of Use	E1	0.429
	E2	0.411
Timeliness	T1	0.533
	T2	0.420

Table 3. User satisfied level.

Level	Score	Satisfied Level
1	0.0 – 1.5	Very Dissatisfied
2	1.6 – 2.5	Dissatisfied
3	2.6 – 3.0	Neutral / Neither satisfied nor dissatisfied
4	3.1 – 3.5	Satisfied
5	3.6 – 4.0	Very Satisfied

The results of data processing on the questionnaire obtained conclusions from each dimension of satisfaction in the End User Computing Satisfaction model that is as shown in Table 4.

Table 4. Satisfaction level measurement results.

Dimension	Minimum	Maximum	Mean
Content	3.31	3.73	3.42
Accuracy	3.02	3.39	3.12
Format	2.98	3.35	3.05
Ease of Use	2.74	3.28	2.91
Timeliness	3.15	3.47	3.28

3.1. Content
The results for the content dimensions are a minimum value of 3.31, a maximum value of 3.73, and an average of 3.42. These results indicate the level of satisfaction at level 4, this shows that user satisfaction for the content dimension is satisfied.

3.2. Accuracy
The results for the accuracy dimensions are a minimum value of 3.02, a maximum value of 3.39, and an average of 3.12. These results indicate the level of satisfaction at level 4, this shows that user satisfaction for the accuracy dimension is satisfied.

3.3. Format
The results for the format dimensions are a minimum value of 2.98, a maximum value of 3.35, and an average of 3.05. These results indicate the level of satisfaction at level 3, this shows that user satisfaction for the format dimension is neutral (either satisfied nor dissatisfied).

3.4. Ease of use
The results for the ease of use dimensions are a minimum value of 2.74, a maximum value of 3.28, and an average of 2.91. These results indicate the level of satisfaction at level 3, this shows that user satisfaction for the ease of use dimension is neutral (either satisfied nor dissatisfied).

3.5. Timelines
The results for the timelines dimensions are a minimum value of 3.15, a maximum value of 3.47, and an average of 3.28. These results indicate the level of satisfaction at level 4, this shows that user satisfaction for the timelines dimension is satisfied.

4. Conclusions
Based on the description that has been described in the previous section, it can be concluded as follows. The dimensions of content, accuracy, and timelines have a satisfaction level that is satisfied, while the other two dimensions namely format and ease of use have a satisfaction level that is either satisfied nor dissatisfied. The format dimensions and ease of use require improvements in system design so that the output of the system is pretended in a useful format and is more user friendly.

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6. Acknowledgement

Smart green house's hydroponic with arduino uno

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Abstract. Hydroponic system is one of the solutions for planting systems in an area that has a narrow land and uses water media as a planting medium. Plant maintenance innovations are carried out automatically using Arduino uno for working systems of HC-SR04 Ultrasonic sensors, DHT11 and pH sensors to measure water level, acidity and humidity.From this research, testing of the sensors used, and the results obtained are accurate responses with the output for controlling the motor as a water refill pump, plant sprinkler pump and nutrition pump. For HC-SR04 Ultrasonic sensors work with an accuracy rate of 99.41%, for PH sensors with an average accuracy of 92.7%. When the water level is 5 cm from the sensor, the sensor will instruct the pump to replenish the nutrient "off". And when the water level is 34.5cm the sensor will order the "refill" nutrient pump motor. In addition, the nutrient refill pump will also be "on" if the acidity of the water drops from PH 6. And if the humidity reaches 65% band watering will be done. This hydroponics uses 50 WP solar sell as an energy source that will fill 50 AH battery and at 388 watts of load.

1. Introduction

1.1. Research background

In the last few years Indonesia has been faced with the problem of decreasing decent and productive agricultural land. The decline in productive agricultural land in Indonesia is due to several things such as agricultural land replaced with large-scale oil palm plantations, infrastructure development such as toll roads, malls and others. This has led to the reduction of decent and productive agricultural land, so farmers can not create large-scale agricultural land which results in a decrease in national food production which can threaten the balance of the ecosystem and higher food prices. The innovation that is now widely used by farmers in the world, especially countries that lack agricultural land, is to use water as agricultural land or in general is known as a hydroponic system. However, this system requires extra care such as regulating water filling, watering, and providing nutrition to plants that must be controlled periodically. Based on the problem, the researchers wanted to make a smart green hydroponics with new innovations related to the irrigation mechanism in hydroponic plants with a more complex automatic system including the circulation system of watering plants, levels of nutrient solution intake, watering plants and replenishing water tanks.

The use of electricity from PLN is a fundamental obstacle to the application of this hydroponic system. This is because if the power source is turned off, the hydroponic system will not be able to

operate as expected. To deal with these problems, the authors make a design of hydroponic irrigation systems automatically with solar energy sources.

1.2. Motivation

So that the condition of the community can live healthy and prosperous in the future, and also to increase food self-sufficiency and the call for food security, especially for people who do not have enough land, hydroponics is the right choice. Hydroponics is a solution in agriculture by using simple technology to facilitate the community in farming. Hydroponics can produce crop production that can guarantee that the plants are free from disease pests originating from the soil. Increasing the fulfillment of family and community nutrition resources, if done on a large scale can increase exports of fresh and high-quality horticultural production, so as to increase the country's foreign exchange. However, the application of this system is not easy to apply because it needs extra attention in the care of plants from nurseries to harvest. Until in the end, there were various innovations related to the treatment of hydroponic plants automatically, both water control systems, nutritional control and others. However, such a system is still considered not complex because the control system only covers a few aspects and is still separate.

1.3. Problems

Based on the diagram it can be described that the component that works as an input includes the start button which functions to turn on the system, an ultrasonic sensor as a trigger for the water pump in the water refill tank when water in reservoir 1 decreases. Water will fill the gutter in accordance with the desired capacity. When the ultrasonic sensor detects the level of the reservoir by 50% of its volume, the sensor will instruct the pump motor to refill the water to the reservoir. hydroponics decreases at a certain level and decides the source of voltage to the water pump engine when the water in the tub is almost full. The pH sensor as a detector controls the pH level of hydroponic liquids to keep them stable while controlling the pumping work of nutrient solutions in the system. The humidity sensor functions as a detector for the humidity of the plant environment and triggers the sprinkler pump to work under certain conditions. While the stop button system for turning off all of the system.

Components which perform as output include water circulation pumps, nutrient solution pumps, watering pumps and water pumps. All these components are connected to Arduino uno as input and output which will work according to the instructions given previously. The power source of the device comes from the grid of PLN which is connected to the power supply / supply and functions as a DC 5V voltage for Arduino uno devices and AC 220V voltage for output devices which are devices of electrical machines. This automatic hydroponic system device is presented in Figure 1.
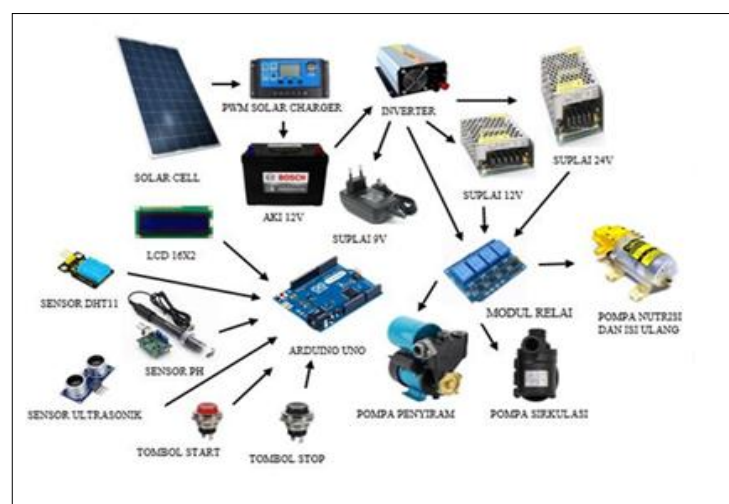

Figure 1. Block system diagram.

1.4. Research scopes

The scope of this research was carried out the making of an NFT system hindoponic installation as a mustard vegetable garden experiment and the implementation of the use of a control system on a hydroponic planting system using a microcontroller. And also solar panels as an energy source in running the automation control system on the hydroponic planting system. The mechanism of action of irrigation control, nutrition, air humidity and PH levels automatically uses Arduino Uno R3 in a hydroponic farming system. The energy source used uses solarcell.

2. Literature review

The use of hydroponic systems adds to innovation in agricultural systems in Indonesia in particular and in the world at large. Several studies have been carried out by several researchers conducted in Thailand by proposing a Hydroponic Agricultural Ecosystem (HFE) using an IoT device in a hydroponic planting system. This system will be applied to monitor humidity, nutrient solution temperature, air temperature, PH and Electrical Conductivity (EC).

The use of NFT-based hydroponic plant systems based on wireless NFT uses nutrient solutions to flow in the root area with application to slada plants. With monitoring results for PH and EC for 24 hours during the growth period of lettuce, using a wireless network, the slada's PH is between 6.0-6.5, and Conductivity (EC) is between 0.8-1.2. [5]. Performance Test System for Control of Giving Nutrient Solution Hydroponic Method Based on Microcontrollers ", which analyzes the performance of the Arduino R3 microcontroller in controlling the pump's working time based on rockwool water content detected by the 76LM393 water content sensor [2]. Hydroponic planting systems have also begun to develop with aquoponic cultivation techniques by adding goldfish ponds at the bottom. By using a temperature sensor DS18B20 is able to do it to monitor variations in water temperature in the aquarium [3]. Water level control system for hydroponic cultivation or called the floating system method. This control system consists of an arduino uno microcontroller, hcsr04 ultrasonic sensor, lcd, relay, water pump, and aerator. Microcontroller system functions as a control center, where the microcontroller will take data sent by ultrasonic sensors as a gauge of water level [1]. On the Design of Hydroponic Automation Systems in Chaisim Mustard, Mustard Meat and Lettuce Based on Arduino Uno 328P ", describes the use of automatic control mechanisms for the cultivation of hydroponic plants. By using Arduino Uno 328P which is integrated with various sensors, the automation system for hydroponics includes regulating pumps, LED grow lights, fertilizing and watering systems as well as providing information on a situation to hydroponic owners.[4]

And in this research, a hydroponic irrigation system for solar energy will be designed automatically. This title was appointed to create a new innovation related to the irrigation mechanism in hydroponic plants with the concept of an automatic system. Not only that, the system that was made also covered the system regulation including the mechanism of the irrigation circulation, the provision of the nutrient content, the detection of the humidity of the air, and the regulation of the pH level..

2.1. Software and hardware testing

Software testing is performed on arduino program . Hardware testing performaed on each section according to the block diagram. This test aims to test whether each system block has been in according with the whole system planned. Testing conducted includes testing

- Solar cell Assesment
- Assesment of Ultrasonic Sensor
- PH Sensor Assesment
- DHT sensors 11

Following are excerpts from the Arduino program which controls the operation of the hydroponic system.

```
#include <LiquidCrystal.h>        //Library lcd
#define MAX_DISTANCE 50
LiquidCrystal lcd(12,11,5,4,3,2);  // pin(RS,E,D4,D5,D6,D7)
int trigpin= 8;    //
int echopin= 9;      //
int motorPompa_isiUlang = 6;   //
long duration, distance;          //
const int phSensorPin  = A1;
int motorPompa_nutrisi = 13;
float Po              = 0;
void setup() {
  // put your setup code here, to run once:
pinMode (phSensorPin, INPUT);
pinMode(recycle motor pump_,OUTPUT);   //
pinMode(trigpin,OUTPUT);    //
pinMode(echopin,INPUT);        //
lcd.begin(16,2);                  //
lcd.clear();                  //
Serial.begin(9600);
void loop() {
  // put your main code here, to run repeatedly:
double TeganganPh = 5 /
//Po = 7.00 + ((teganganPh7 - TeganganPh) / PhStep);
Po = 7.00 + ((2.6 - TeganganPh) / 0.17);
lcd.setCursor(0, 1);
lcd.print("Nilai pH = ");
lcd.print(Po);
delay(2000);
digitalWrite(trigpin,LOW);              //membaca pin trigpin Low
delayMicroseconds(2);
digitalWrite(trigpin,HIGH);             //pin trigpin mengirim sinyal
delayMicroseconds(100);
digitalWrite(trigpin,LOW);              //pin trigpin LOW
int duration = pulseIn(echopin,HIGH);   //pin echo membaca atau menerima sinyal
int distance = duration/58;             //rumus dalam cm
lcd.setCursor(0,0);    //text dimulai dari baris 1 dan kolom 1
lcd.print("Jarak = "); //lcd menampilkan text Jarak =
lcd.print(distance);    //lcd menampilkan data nilai dari sensor
lcd.print(" Cm");        //lcd menampilkan text Cm
/* Kirim angka negatif ke komputer dan Turn LED ON
untuk menunjukkan "di luar jangkauan" */
if (Po >= 7)
lcd.setCursor(0,1);                 //text dimulai dari baris 0 dan kolom 0
lcd.print("POMPA PH ON      ");         //lcd menampilkan text POMPA ON
delay(1500);
digitalWrite(motorPompa_nutrisi, HIGH);  //saat level air berjarak lebih atau sama dengan 40 cm
else{
lcd.setCursor(0,1);                 //text dimulai dari baris 0 dan kolom 0
lcd.print("POMPA PH OFF      ");         //lcd menampilkan text POMPA ON
```

```
delay(1500);
digitalWrite(motorPompa_nutrisi, LOW);  //saat level air berjarak lebih atau sama dengan 40 cm
INSTRUKSI PADA SENSOR ULTRASONIK(PROGRAM LOGIKA YANG DIMINTA)
if (distance >= 40)
lcd.setCursor(0,0);                    //text dimulai dari baris 0 dan kolom 0
lcd.print("POMPA ON      ");           //lcd menampilkan text POMPA ON
delay(500);
digitalWrite(motorPompa_isiUlang, HIGH);  //saat level air berjarak lebih atau sama dengan 40 cm
if (distance <= 5)
lcd.setCursor(0,0);                    //text dimulai dari baris 0 dan kolom 0
lcd.print("POMPA OFF       ");         //lcd menampilkan text POMPA OFF
delay(500);
digitalWrite(motorPompa_isiUlang, LOW);   //saat level air berjarak kurang atau sama dengan 5 cm
//waktu tunda 50mS
delay(500);}.
```

2.2. Overall Testing
The following is a picture of the hydroponic installation and control system used.

Figure 2. Control system hydroponic instalation.

After all the equipment is installed it will be tested in its entirety for 3 days to see if all controls run as desired. As seen in Table 1.

Table 1. Overall testing.

1. Time	Temperature	Ultrasonik	PH	DHT 11
06.00-12.00	32^0	15 cm	6	65% RH
12.00-18.00	$34,3^0$	16cm	6	65% RH
06.00-12.00	33^0	17,5	6.3	65% RH
12.00-18.00	35^0	17.9	6.3	66%RH
06.00-12.00	33^0	18,2	6,4	67%RH
12.00-18.00	34^0	18.3	6	67%RH

System starts from filling the hydroponic installation by using a filling pump that will fill the installation within minutes. The flow of nutrient water will circulate back into the water reservoir. The

ultrasonic sensor will read the water level in the circulation bath, and will turn on the relay to start the motor if the water volume decreases. The PH sensor will work if there is a change in the PH of the water and will turn on the relay to turn on the nutrient pump motor so that the nutrient ph in the tub will return to its normal PH. A decrease in pH can be caused by plants and the environment. And the process of watering plants will occur if the humidity is reduced by 65%.

3. Methodology
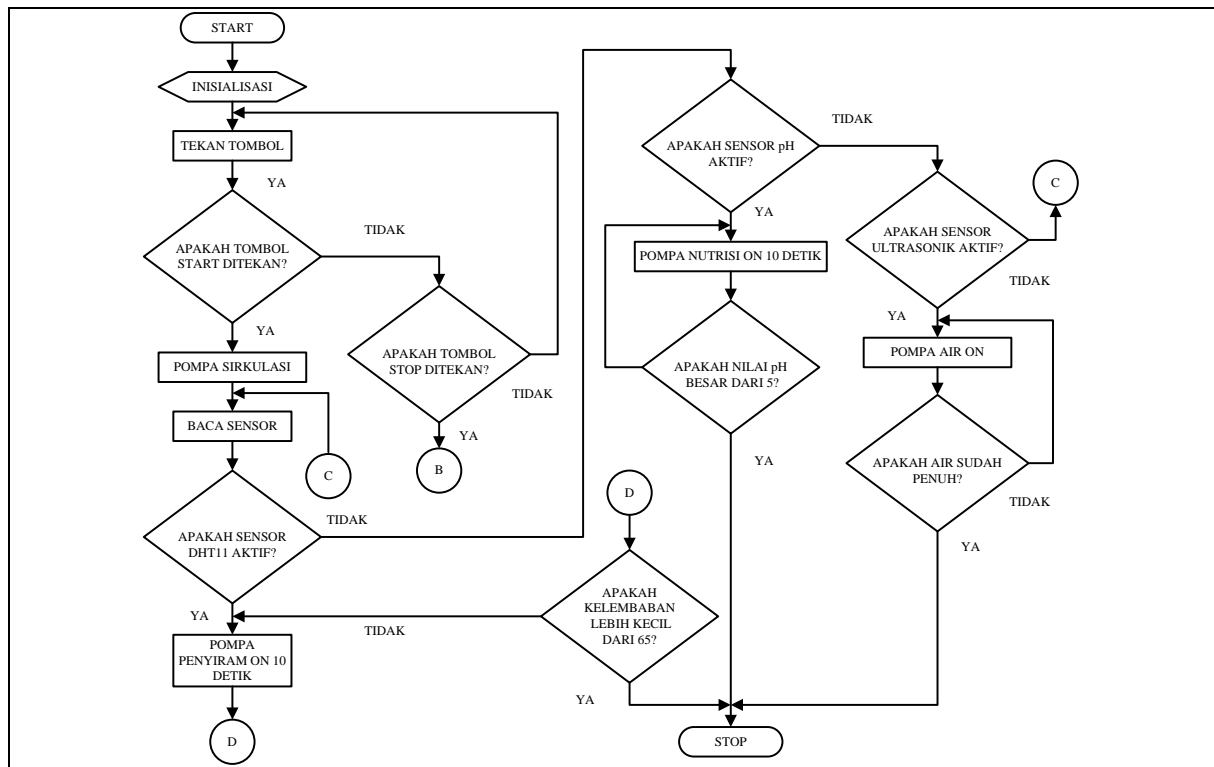
Figure 3. Working system of the hydroponic device.

The working system of the hydroponic device is described as starting from Start, indicating that the program is started. The initialization is the introduction of input and output components on the microcontroller. Press the button to connect or disconnect the flow of electric current with the work system press lock (lock). Is the start button pressed? is asking for a condition, whether the start button pressed is legible or not. If read, the circulation pump and all connected devices are active. Is the stop button pressed? is asking for a condition, whether the stop button being pressed is read or not. If it is read, the circulation pump and all connected devices will be deactivated. Is the DHT11 sensor active? is asking whether the sensor is working or not. If it works, the sprinkler pump will run for 10 seconds. Is the humidity smaller than 65? is asking about the humidity conditions after the watering process. If the humidity is still below 65, then the sprinkler pump will reactivate for 10 seconds and so on until the humidity value is greater than or equal to 65, the sprinkler pump will stop working. Is the pH sensor active? is asking whether the sensor is working or not. If it works, the nutrient pump will run for 10 seconds. Is the pH value smaller than 6? is asking the condition of the acidity of the solution in the tub after the nutrient pump has been running for 10 seconds. If the pH is still below the value of 6, then the nutrient pump will reactivate for 10 seconds a few moments later and so on until the pH value is greater than or equal to 6 then the nutrient pump will stop working. Is the ultrasonic sensor active? is asking whether the sensor is working or not. If it works, the nutrient pump will turn on until the hydroponic solution bath is full with the distance of the water surface to the sensor 5 cm and so on if

the water level in the tub is at a height of 40 cm then the water pump will turn on again and fill the water into the tub until the solution bath is full. Stop indicates that the program has stopped.

4. Research contributions

By regulating the hydroponic system automation can provide convenience in treatment, among others, through the plant irrigation circulation system the impact is the availability of water is maintained, control of plant nutrients, plant watering systems and refilling water tubs.

5. Conclusions

The energy system used is a solar cell with a capacity of 50 WP for one hydroponic installation measuring 94 cm x 13 cm and measuring 105 cm x 13 cm. The hydroponic control system works by processing sensor output data and providing an output response by activating the motor according to the determination that has been made on the program. The HC-SR04 Ultrasonic Sensor works with an accuracy rate of 99.41% in the process of filling water into a hydroponic installation.The DHT 11 sensor works at a sensitivity of 65% and an accuracy rate of 72.35% which instructs the watering pump.The pH sensor works with an accuracy rate of 92.74% for the pH solution testing solution and works with 100% accuracy during testing with a nutrition pump motor with a benchmark reading from the sensor. The entire device works accurately according to the input instructions on the Arduino uno program by reading the values referring to the readings displayed by the sensor.

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Development of ball direction prediction system for wheeled soccer robot goalkeeper using trigonometry technique and neural network method

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Abstract. In this research, trigonometry technique and Neural Network method were implemented to predict the ball direction for wheeled soccer robot goalkeeper. The performance of goalkeeper robot in Wheeled Soccer Robot Contest is very important. The crucial problem with goalkeeper robot is the delay in ball detection by the camera because the results of the captured images are always slower than the pictures that have been captured. This causes the robot response to block the opponent's kicked ball being late. Trigonometry technique is one technique that can be used to predict the direction of the ball based on trigonometric mathematical formulas. The used input variables are the location of the last ball position (x–last ball and y-last ball) and the location of the current ball position (x-current ball and y-current ball). In this system a Neural Network method is also implemented to estimate the ball distance from goalkeeper robot. The result shows the goalkeeper robot successfully predicts the ball direction very well and it can estimate the ball distance with 7.06 cm error accuracy. By implementing this method can optimize the performance of the goalkeeper robot in saving the goal.

1. Introduction

Indonesian Wheeled Robot Soccer Contest is one of division in Indonesian Robot Competition that have been introduced since 2017 [1]. The contest matches refer to the Middle Size League (MSL) which is a robot soccer contest at the world level with adjustments in several rules. The goalkeeper robot is one of the robots in Indonesian Wheeled Robot Soccer Contest which has the task of keeping the goal area from the opponent's kicked ball that coming from all directions. The movements of goalkeeper robot are determined by the position of the ball in the field and the ball was detected by the goalkeeper's camera. The crucial problem that makes the goalkeeper robot's performance not optimal is the delay in capturing pictures by the camera from its actual condition. This caused the goalkeeper robot's response to block the ball too late and increase the chances of the opponent's kicked ball becoming a goal.

In this paper is discussed the ball direction prediction in the goalkeeper robot using Trigonometry Technique and Neural Network method. Trigonometry Technique is one of method that can be used to

predict the ball direction based on trigonometric mathematical formulas [2].The used input variables are the last location of the ball and the current location of the ball on the camera frame. The input data will be calculated using a trigonometric formula, so it can predict the direction of the ball. The goalkeeper has camera sensor that used to detect the ball. In this research, the ball detection system using colour threshold method. In this method, the captured images by the camera are converted to binary images [3] [4]. For simplicity reason, the previous original image with RGB colour space was converted to HSV [5]. The area of the object will be determined as midpoint, so the coordinates of the ball can be known. These coordinates will be processed on the Trigonometric Technique, so it can predict the coordinate of ball coming location. The ball coordinate location and the prediction of ball coming location will be calculated using the Neural Network method. The Neural Network is an information processing system that adopts the abilities of the human brain [6]. With Neural Network algorithm, the system can estimate the ball distance from goalkeeper robot.

2. Methodology

2.1. Mechanical design

Robot mechanics are designed with dimensions of 50 x 50 x 78 centimetres. Robot construction uses 3 millimetres iron plate on the bottom base, and also 3 millimetres aluminium plate on the upper base. As for the robot frame is using a 0.5 x 1 inch aluminium pipe. Figure 1 is a mechanical construction that has been made.
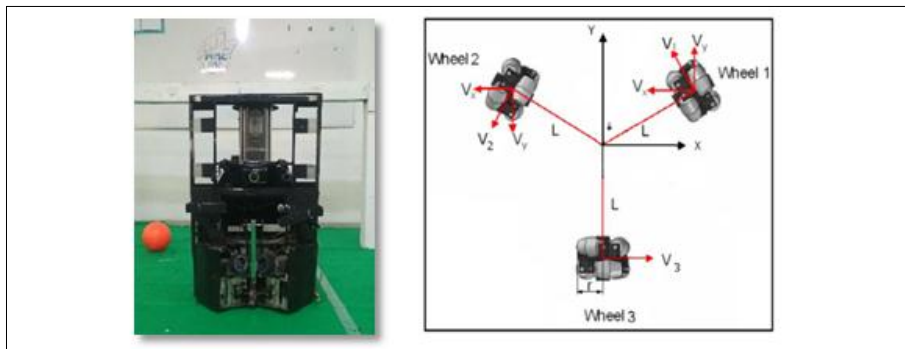
Figure 1. Robot construction (left) and kinematics representation (right).

The three Omni-Directional Drive System is also represented in Figure 1 [7]. Robot kinematics are using Three Omni-Directional Drive Systems which have 3 Omni wheels arranged symmetrically (120°) apart. The three Omni-Directional Drive System is represented to get the speed of each of the Omni wheels that equals to the speed of the motor multiplied by the radius of the Omni wheel. It was arranged symmetrically with different angles between the wheels as in equation $1-3$ [7].

$$V_x = V_3 - V_1 \cos \delta - V_2 \cos \delta \tag{1}$$

$$V_x = V_3 - V_1 \cos \delta - V_2 \cos \delta \tag{2}$$

$$V_\theta = V_1 / L + V_2 / L + V_3 / L \tag{3}$$

$$V_{i\,(1,2,3)} = w \cdot r \tag{4}$$

2.2. Ball detection software design

In this research, ball detection in a robot keeper uses a camera sensor with a ball segmentation method based on colour parameter. The used camera is a webcam type that has 30 fps frame rates. The software mechanisms are : initializing the ball colour, image capturing, RGB to HSV conversion, colour threshold, find the ball counters and the last step is determine the ball location. Here are the explanations of each mechanism step:

2.2.1. Initializing the ball color. The first phase is the initialization of color parameter values like hue, saturation, and value also morphology parameters of the ball with manual calibration. In this research the detected ball was orange.

2.2.2. Image capturing. Image capturing is the process of getting a digital image from a visual sensor, like a camera. A digital image can be represented as a two-dimensional matrix that can be represented by f (x, y), where the values of x and y are the brightness level of an image. Digital images coordinates start at (0,0) and end at (M-1, N-1) [8].

2.2.3. RGB to HSV conversion. RGB is the most commonly used color space in image processing, the RGB color model consists of 3 main components, namely R (red), G (green) and B (blue). Whereas HSV is a better color space when used for image processing. Equation 5 - 8 is a formula for converting RGB values to HSV values [8].

$$V = max\, R, G, B \qquad (5)$$

$$V_m = V - min\, R, G, B \qquad (6)$$

$$S = \begin{cases} 0 & if\ V = 0 \\ \frac{V_m}{V} & if\ V > 0 \end{cases} \qquad (7)$$

$$S = \begin{cases} 0 & if\ V = 0 \\ \frac{V_m}{V} & if\ V > 0 \end{cases} \qquad (8)$$

2.2.4. Color threshold. Color threshold is the simplest image processing method that used to get digital images with binary format (1 or 0) *[9]*. This phase aims to divide the object area (1) and background (0) in digital image. The threshold value is suitable to initialize the color value at initial phase which includes the value of H max, S max, V max, H min, S min, V min, Dilation (Morphology), Erosion (Morphology). Dilation and erosion can reduce the noise by increasing or decreasing the size of object segmentation around the object. Thresholding can be expressed in the Equation 9.

$$g(x,y) = \begin{cases} 1, & if\ f(x,y) \geq T \\ 0, & if\ f(x,y) < T \end{cases} \qquad (10)$$

2.2.5. Find the ball contours. After the image becomes binary, it continues with the ball contour find phase for each pixel that indicated as an object (has 1 value). The contour find phase of the ball is done to simplify the detection of the ball based on the shape.

2.2.6. Determine the ball location. The initial process of determining the location of the ball by drawing a square on the frame. This process aims to get the coordinates of the location of the ball in the frame. The process of drawing this square is based on a point that is tangent to the contour of a ball.

2.3. Ball prediction software design

Trigonometry Technique is one technique that can be used to predict the direction of the ball for a goalkeeper robot based on trigonometric mathematical formulas [10]. In this technique, there are two stages of the calculation process including the initial stage and the prediction stage. The prediction stages are: initialization of time interval, find the last location and current location off the ball, calculate the ball movement distance, determine the ball direction prediction, calculate the ball movement angle, and determine the prediction of ball coming position. Here are the explanations of each step:

*2.3.1. Initialization of time interval.*The first phase is initializing the initial interval time. Interval time's variables will be used in calculating trigonometric techniques in next phase.

2.3.2. Find the last location and current location off ball. The distance between the last frame and the current frame is separated by the initial time interval (t) that is the value was determined at the initial phase. The current ball variable position is the ball coordinates on the x and y axis of the current frame, while the last ball variable position is the ball coordinates on the x and y axes of the last frame.

2.3.3. Calculate the ball movement distance. The Equation 10 and 11 are used to determine the distance of the ball in each axis in the frame.

$$dx = xcurrent\ ball - xlast\ ball \tag{10}$$

$$dy = ycurrent\ ball - ylast\ ball \tag{11}$$

From the dx and dy value, we can get the distance of the ball movement by calculating the hypotenuse of the triangle. Figure 2 illustrates the relationship between dx, dy, and hypotenuse (s).
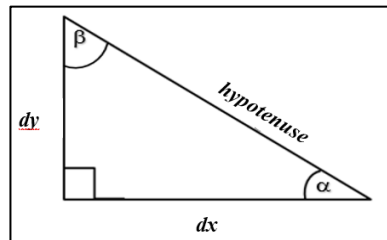
Figure 2. Relationship between dx, dy and hypotenuse.

In right triangle, the hypotenuse can be calculated using dx and dy using Equation 12 based on the Pythagoras concept. In this technique, the hypotenuse of the triangle represents the distance of the ball's movement.

$$hypotenuse = \sqrt{dx^2 + dy^2} \tag{12}$$

2.3.4. Determine theball direction prediction. There are several conditions to determine the direction of ball movement. Figure 3 is the conditioning of ball movement direction with coordinates f (0,0) in the upper left corner of the frame.
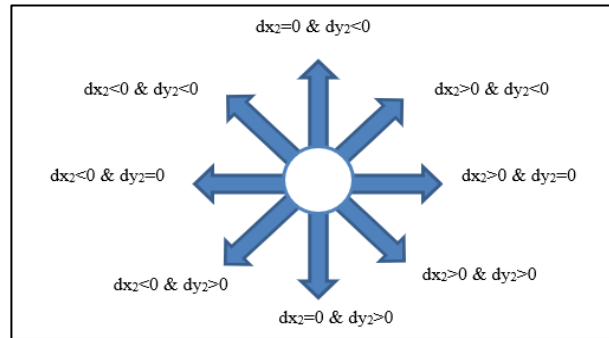
Figure 3. Conditioning of ball movement direction.

2.3.5. Calculate the ball movement angle. The ball movement angle was represented in Figure 4. The ball movement angle can be calculated using trigonometric equation. By dx, dy, and hypotenuse value, the trigonometric concept can be implemented using Equation 13 and 14.

$$\alpha = sin^{-1} \frac{dx}{hypotenuse} \tag{13}$$

$$\beta = sin^{-1} \frac{dy}{hypotenuse} \tag{14}$$
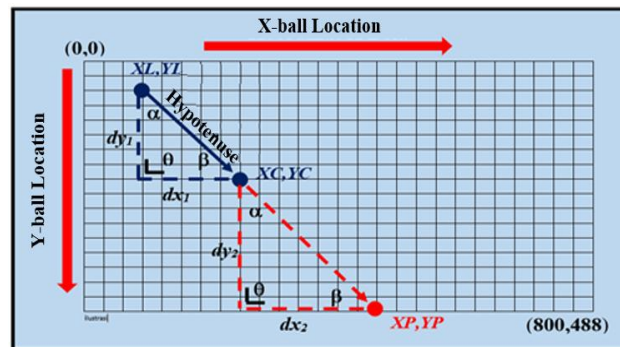
Figure 4. Representation of ball movement angle.

2.3.6. Determine the prediction of ball coming position. From the angle of the formed triangle which is represented in Figure 4, we can find the prediction of next ball location when attracted to the maximum y-coordinate in the frame (YP). These x ball coordinates will represent the predicted value of the ball coming location (XP). The XP can be calculated using Equation 15 - 17.

$$dy_2 = Ymax - YC \tag{15}$$

$$XP = XC + dx_2 \tag{16}$$

2.4. Neural Network Architecture
In this research, Neural Network method is used to estimate the ball distance from goalkeeper robot. The Neural Network architecture is shown in Figure 5.
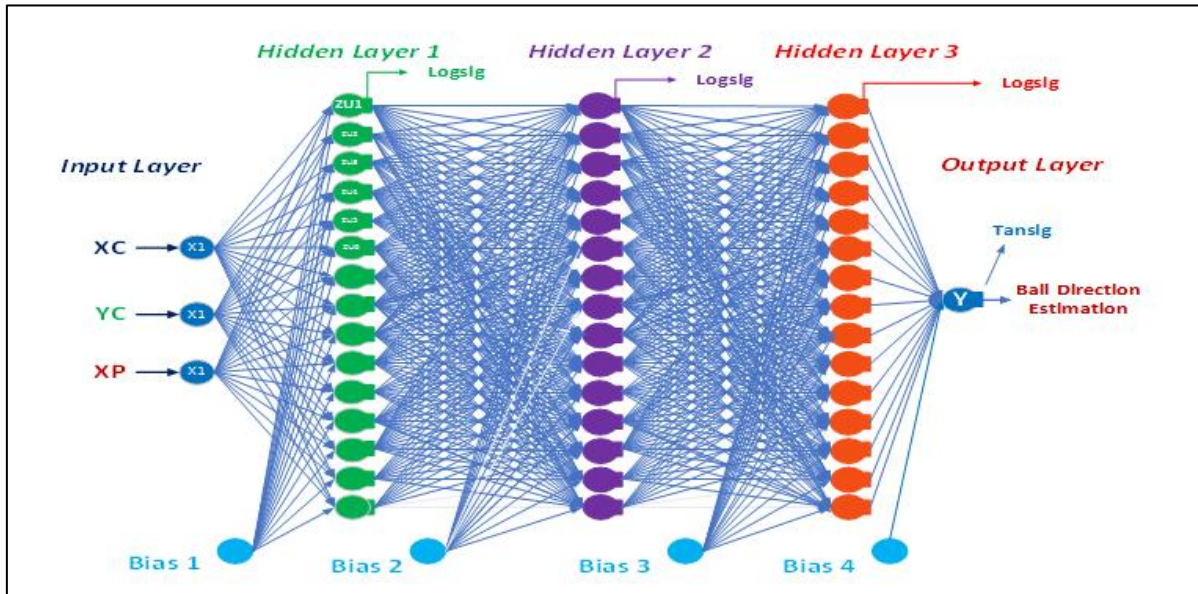
Figure 5. Neural network architecture.

The Neural Network has five layers. They are input layer, 3 hidden layers, and output layer. The input layer consists of 3 nodes (x-ball location (XC), y-ball location (YC), and the prediction of ball coming location (XP)). In each hidden layer consists of 15 nodes. The output layer consists of 1 node (ball distance estimation). The hidden layer and the output layer are connected with biases, it prevent the emergence of zero values because the bias is worth to 1. Each arrow has a weight value that obtained from the results of training using the levenberg marquardt back propagation method. The training stage was delivered by using 601 dataset.

3. Experiments and data analysis

3.1. The experiment of ball direction prediction. This experiment aims to determine the results of the Trigonometric Technique calculation in predicting the ball direction and ball coming location (XP). The experiment was conducted by rolling the ball to the middle, right and left of the robot. The results are shown in Figure 6–8 and Table 1.
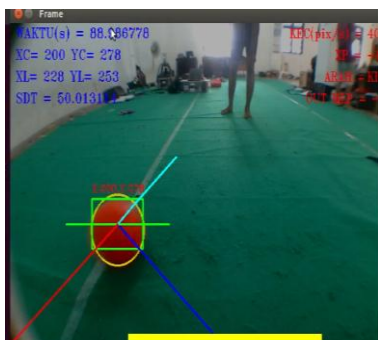
Figure 6. Ball prediction when the ball is rolling to the left.
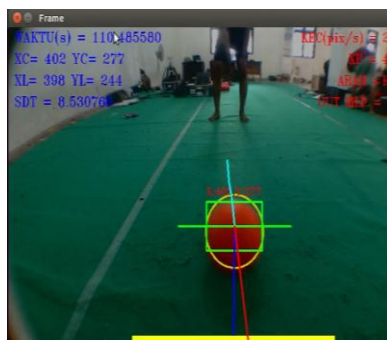
Figure 7. Ball prediction when the ball is rolling to the middle.

Figure 8. Ball prediction when the ball is rolling to the right.

Table 1. The results for ball direction prediction experiment.

XC	YC	Kick Ball Angle	XP	Difference of XC and XP	Direction
397	121	53,13	-39	436	Left
394	124	53,13	-38	432	Left
383	131	57,53	-115	498	Left
388	171	3,37	427	39	Right
388	181	3,37	403	15	Right
389	185	0,00	404	15	Left
428	151	50,20	845	417	Right
441	159	55,62	844	403	Right
447	162	55,62	784	337	Right

Table 1 is the result of ball location prediction experiment. The result shows the system can predict the kicked ball direction and ball coming location very well. If the kick angle is large, then the XP location is far to the current ball location (XC). Conversely, if the kick angle is small, then the XP location is close to the current ball location (XC).

3.2. *The experiment of the ball distance estimation.* This experiment aims to determine the accuracy of the Neural Network method in estimating the distance of the ball from goalkeeper robot. The Neural Network uses 3 input data (x ball location, y ball location, and ball coming location). The experiment was conducted by rolling the ball towards the goal area which is presented in Figure 9. The results of the experiment are shown in Table 2.
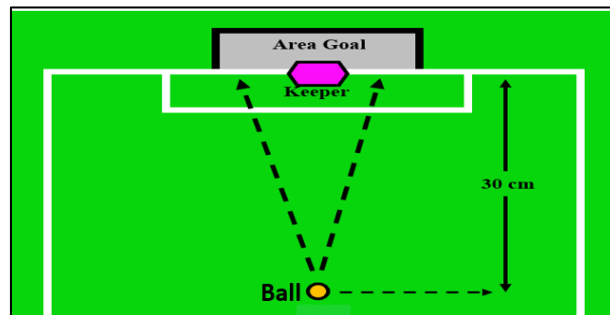
Figure 9. The representation of ball rolling position.

Table 2. The results for the experiment of ball distance estimation

XC	YC	XP	Actual Distance (cm)	Prediction Distance (cm)	Error (cm)
404	101	751	60	51.253	8.747
410	105	867	60	71.219	11.219
414	107	868	60	70.478	10.478
424	114	901	60	66.866	6.866
428	117	891	60	66.846	6.846
439	125	891	60	64.759	4.759
446	129	1004	60	69.252	9.252
458	136	996	60	66.015	6.015
476	146	997	60	64.037	4.037
485	165	1019	60	62.390	2.390
			Error Average		7.06

Table 2 shows the results for the experiment of ball distance estimation. From 10 samples the average error of the actual ball distance estimation is 7.06 cm. The error was caused by the limitations of training data on the Neural Network method, so the system cannot accurately predict if the condition is far from the data that has been trained.

4. Conclusion

The results of ball coming prediction are strongly influenced by the value of ball movement angle. If the angle is large, the ball coming prediction is far from the ball current location. Conversely, if the angle is small, the ball coming prediction is close to the ball current location. Error of the actual ball distance estimation is 7.06 cm, The distance estimation error was existed due to the limited training data on Neural Network method, so the system cannot accurately predict the condition is far from the data that has been trained.

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Academic information system mobile-web based at the cilacap nature school (SACIL)

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Abstract. Nature School is a school that uses nature as a learning medium. Cilacap Nature School abbreviated as SACIL is an educational institution with the concept of education in the open, namely nature as open space, teaching material media, and learning objects. One of the teacher's tasks is to make a Learning Plan. Learning activities and evaluation of students daily learning outcomes are written by the teacher in the communication book. Parents can monitor their children's learning outcomes through the communication book that students take home every day and take to school the next day. The system is considered to be less effective because student communication books are quickly broken, often tucked away, and even lost so that the individual learning history of students is difficult to trace back because there is no back up. Besides that, students often forget to bring back communication books to school while student learning activities must be written in the book so that guardian parents can know the activities at school and know the development of their child's learning. Standards for learning competency in the School of Nature must be delivered in stages. Therefore, the teacher must recap the Competency Standards both those that have not been submitted. This makes the task of the teacher very complex. On the other hand, the management of Academic administration that is currently running is still done manually (paper based). Calculation of student learning outcomes is done manually, so that mistakes often occur. Writing evaluation of student learning outcomes both qualitatively and quantitatively is done by hand writing. The method is considered inappropriate because there are often errors in the calculation and writing of student grades caused by human error. Based on the existing problems, it is necessary to develop an academic information system based on mobile web. The system functions as a medium in managing academic administration of students in Cilacap Nature School and as a medium of communication between parents and teachers using smartphone devices.

1. Introduction

Information Technology has provided an important role as a medium of information and communication in the field of education [1]. Even by paying attention to the demands of information needs that are increasingly fast and precise, encouraging information technology to be developed based on mobile. This is also supported by the role of the community, which currently has the majority of smartphone communication devices.

Nature School is a school that uses nature as a learning medium. In natural schools the child's curiosity can be channeled. Children are given the freedom to satisfy their curiosity without being hindered by the classroom [2]. School of nature is one of the new concepts in education, where

students are taught how to use and maintain nature for life [3]. The school of nature is born with the hope of being able to restore the essential values of human beings in integrating with nature [4].

Cilacap Nature School abbreviated as SACIL is an Educational Institution with the concept of education in the open, namely nature as open space, nature as a medium and teaching material, nature as an object of learning. The education level that is managed is Kindergarten and Elementary School Education. SACIL is located at Randu Street Cilacap.

The teacher in the Nature School is called a Facilitator. One of Fasil's tasks is to make a dayly activity learning plan as a reference in teaching and learning activities (KBM). The daily activity learning plan is written every day according to the competency standards and talents of students with different material on a daily basis. Learning activities and evaluation of student learning outcomes are written by each Fasil in the communication book (paper based) as the student learning report. Guardian parents can monitor the learning outcomes of their sons and daughters through the communication book that students take home every day and take to school the next day.

The system is considered to be ineffective because the communication book containing the student activity report quickly breaks down, is often tucked away, and even disappears so that the learning history of individual students is difficult to trace back because there is no back up. Besides that, students often forget to bring back communication books to school while student learning activities must be written in the book so that guardian parents can find out the activities in the school and know the learning progress of the daughter every day. In basic education institutions, communication with parents is very much needed [5].

Standards for learning competency in the School of Nature must be delivered in stages without being missed. Therefore, Fasil must recap the Competency Standards that have been submitted and which have not been submitted. This makes the Fasil task very complex. On the other hand, the management of Academic administration that is currently running is still done manually (paper based). Calculation of student learning outcomes is done manually, so that mistakes often occur. Writing evaluation of student learning outcomes both qualitatively and quantitatively is done by hand writing. These methods are considered inappropriate because there are often errors in the calculation and writing of student grades caused by human errors.

Based on existing problem problems, it is necessary to develop an academic information system based on mobile web. The system functions as a medium in the management of students' academic administration in Cilacap Nature School and as a medium of communication between parents and Fasil using a smartphone (mobile based) device. With the existence of this system, it is expected that the management of students' academic administration will be more precise and organized, dayly activity report can be known by parents of guardians at any time that can be accessed via smartphone, operational costs of SACIL become lower (paper less), Learning competency standards that have been delivered and what has not been delivered can be controlled properly through automatic notification of the system so that it simplifies and relieves the task of Facilitator. In addition, the Principal can know the academic activities report up to date at any time which can be accessed online using a computer (web based) or smartphone (mobile based).

2. Literature review

2.1. Related research
Research related to the development of electronic applications (Academic Information Systems) has been carried out by several previous researchers with different methods and solutions.

Research related to the title of academic service prototype on mobile based student complaints. In this study, the researcher made a prototype of an academic service application that could facilitate academics in accommodating complaints faced by students in the teaching and learning process. The application developed can be accessed through mobile devices. By using a mobile-based service system it is expected that a campus can serve or accommodate all complaints that students give to the

institution. This mobile-based academic service system is one alternative that can be developed by a campus to become a means of supporting services to students [6].

Other research related to the title of Designing Academic Information System in PAUD Omah Annaafi Children. The researcher made an academic information system on the web-based Omah Bocah Annaafi PAUD that was in accordance with the needs of academic activities at the institution. Data collection methods used are interviews with principals and administrative staff. The system development method uses the SDLC (System Development Life Cycle) approach model. The results of this academic information system research have been able to meet the needs of existing academic activities. In the process of further implementation, this system still needs to be developed by adding a mobile-based system [5].

Other research related to the title of Designing Mobile-Based Academic Activity Reminder Application. In the study, an application was developed to help the distribution of changes in academic information in real time and remind lecturers and students to carry out academic activities on schedule. The target to be achieved is to provide an academic activity schedule reminder application. This application consists of two parts, namely a web application to enter schedule changes, and a mobile application that is used to display daily academic activity schedules along with reminders of the schedule reminders [7].

Other research related to the title of the development of web-based academic information systems as a student value processing system at Kudus 1 Public Vocational School. This study aims to produce a value management information system to facilitate teachers in managing student report cards. This information system is intended for use in Vocational High Schools (SMK). The system developed is web-based, so that it can be accessed by teachers to manage values and students can see the results of their learning. The method used in this study is the research and development method (R & D) carried out at Kudus 1 Public Vocational School. The test results are stated that the web-based academic information system developed is very feasible to be used as a student value processing system. This is based on a number of assessments from 93.1% of system experts, 85.3% of teachers and administrative staff and 82.4% of students [8].

In contrast to related studies that have been done before. In this study, researchers made an Academic Information System Based on Mobile Web in Cilacap Natural School (SACIL). The system developed was in the form of the Cilacap Natural School Academic Information System (SACIL) which can be accessed via computer (web based) and Smartphone (mobile based). Some of the main functions of the system to be developed include administration of student and teacher data, processing of student grades, management of student activity reports as a medium for parents and teachers to monitor the development of student learning on a daily basis, management of Competency Standards and Nature School Learning Plans , and management of lesson schedules.

2.2. Basic theory

2.2.1. Academic information system.
Academic Information System (SIAKAD) is an application or system designed and created to manage data related to academic information. SIAKAD is an online based information system that aims to establish Knowledge Based Systems that can be accessed using the internet [9]. Academic information systems can also be defined as a system created to process data and information relating to academics in an educational institution or institution both formal and informal from the basic level to the university level [8].

2.2.2. Management of nature schools.
School of nature is one of the new concepts in education, where students are taught how to use and maintain nature for life [3]. The school of nature applies learning patterns in the open to train student's cognitive, affective, and psychomotor, with three main materials, namely piety, science, and leadership. The three materials are applied by applying exemplary methods, the development of logic is done by applying theory in the form of practice, as well as outbound training to build students' leadership skills [4].

The preparation of the curriculum is based on the idea of how to create a learning system that is fun and attracts the interest of students to learn it. There are several things that must be considered in creating learning that is fun and attracts the interest of students to learn it so that students really like, appreciate, implement, and engage in this natural preservation process, namely [2]:

- Learning must form an exploratory spirit of students Students who have an explorative spirit will find a way for every problem that is encountered, including every problem in nature conservation.
- Creative activities of creative activities are the other side of the currency of an explorative soul. If students are explorative, they will be creative. Creative students are not easily discouraged and always think of new ways to preserve nature.
- Integral activities are characterized by the success of students who are intact in their soul, meaning that the students fully understand what will be done to this nature. School of nature is a school that uses nature as a learning medium. In natural schools the child's curiosity can be channeled. Children are given the freedom to satisfy their curiosity without being hindered by the classroom.

2.2.3. Mobile web based. Web-based mobile applications generally are display web applications in the form of mobile. So, to use this application, users can simply access the web browser on a smartphone device. Before the popular mobile era, many sites used to appear on mobile devices on the desktop. Mobile applications have faster performance compared to mobile web [10]**.** Academic Information System mobile web based is an information system that is used to process student academic data that can be accessed online via computer (web based) and via smartphone (mobile based).

3. Methodology
The research was conducted in several stages, namely: Viewing and analyzing the management of existing conditions, mapping existing processes, looking for problems in the running administrative process, finding the source of problems, and designing and developing a system that can developed to reduce or eliminate existing problems. The following are research materials, research tools, and research paths "Academic Information System Mobile Web based at the Cilacap Natural School (SACIL)".

3.1. Research materials
In this study, the research materials used are as follows:
- Data obtained from analyst studies that have been conducted at Cilacap Natural School both through interviews and observations.
- Data obtained from a literature study an Academic Information System Mobile Web based.
- The process of academic administration program running
- Information about the development of an existing academic information system.

3.2. Research tool
The research tool used in this study is a computer device that has sufficient specifications, mobile devices (smartphones), developer software, and graphic design software.

3.3. Research path
In the process of developing an Academic Information System Mobile Web Based at the Cilacap Nature School, the researcher refers to the general software development method, namely the System Development Life Cycle (SDLC) development method. This method serves to develop, maintain and use a system that includes a number of phases or stages as shown in Figure 1.
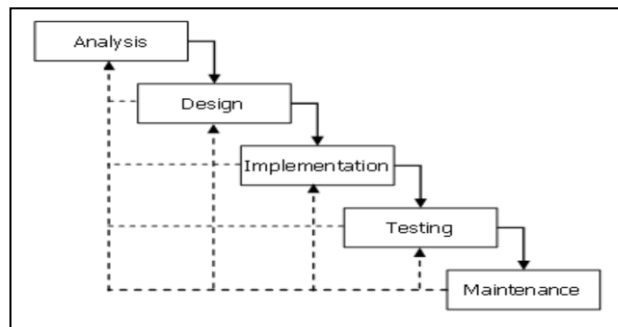
Figure 1. Waterfall model [11].

The method of developing the waterfall model consists of several phases / stages. The method will be used in the development of the academic information system mobile web based at the Cilacap Natural School (SACIL) ".

- Planing Stage
  Feasibility is identifying problems, determining system objectives, and making feasibility studies (techniques, operations and schedules). The investigation system and observations and interviews.
- Analysis & Requirement Phase in the planing stage there are two steps, namely:
  - Information analysis is about the information from the Cilacap nature School and the management process of the Academic administration that has been running.
  - User analysis is to determine user needs, in the sense of identifying users who will use system.
  - Technology analysis is to determine the system needs of both software and hardware.
- Design Stage
  At the design stage there are several stages, including:
  - Development model is a model that will be used as a system architecture. This model describes the relationship (relationship) of the whole system, between all functions in a separate module, changes or transfer of data from modules in the system.
  - Database design is the relation between tables can be normalized, and describe in detail the input and output of data.
- Implementation Phase, that is prototyping software.
- Testing Phase, that is the stage of system testing and system improvement developed.
- Maintenance Phase, that is the stage repairs are made if there is an error and improve the performance and quality of the application developed.

3.4. System design
System design is carried out by estimating an academic administration which are described in the form of activity diagrams, Context Diagram, and Data Flow Diagrams (DFD).
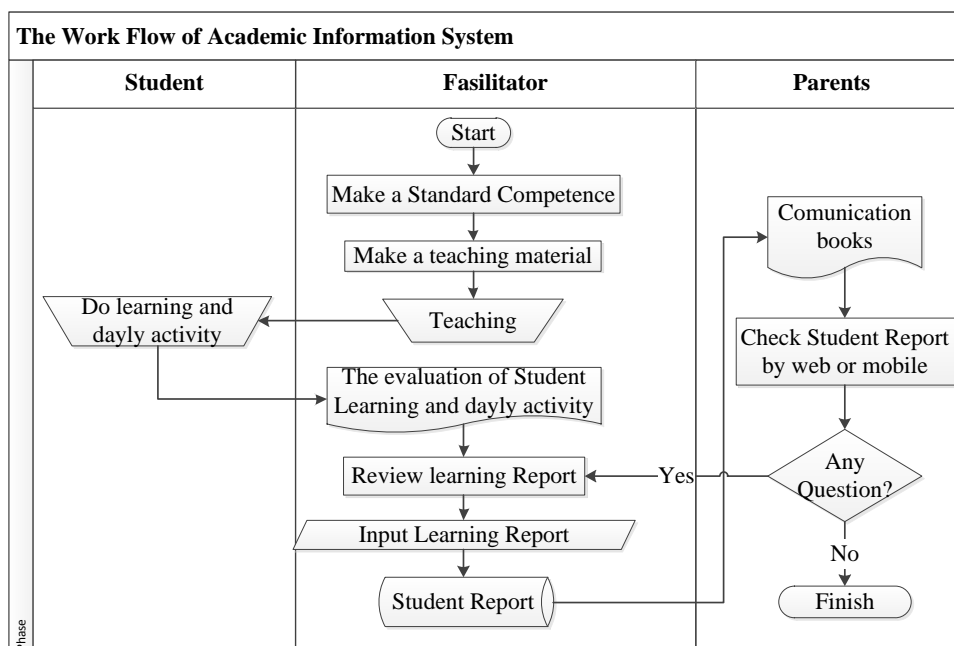
Figure 2. The activity diagram of system.

Figure 2 shows the flow of the academic information system management process that involves three actors. There are teachers, students and parents. The first process starts from the teacher who sets the standard of learning competence, makes learning material, and evaluates student learning outcomes. Parents can find out their children's learning outcomes at any time through the existing communication book features in the application by using a computer or smartphone. The developed information system network topology is shown in Figure 3.

Figure 3. Network topology of information system.
This figure, shows the information system network topology that will be developed. Users can access the system by a computer (web based) or smartphone (mobile based)[12].
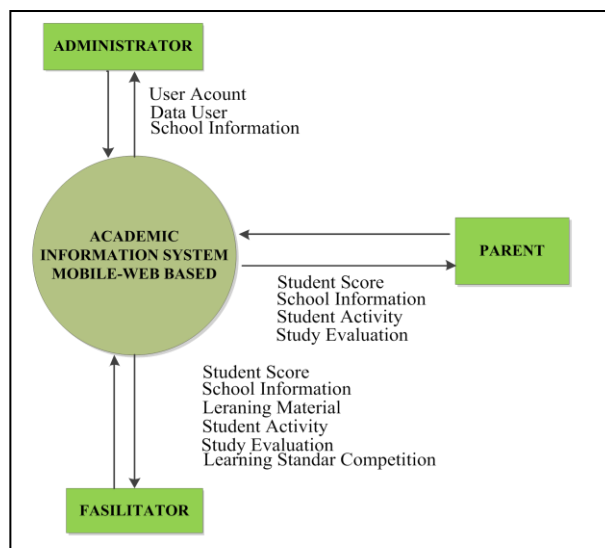
Figure 4. Context diagram.
This figure shows a context diagram that illustrates the overall system function. There are 3 users who can access the system to input data into the system and get data from the system, there are administrators, teachers, and parents.
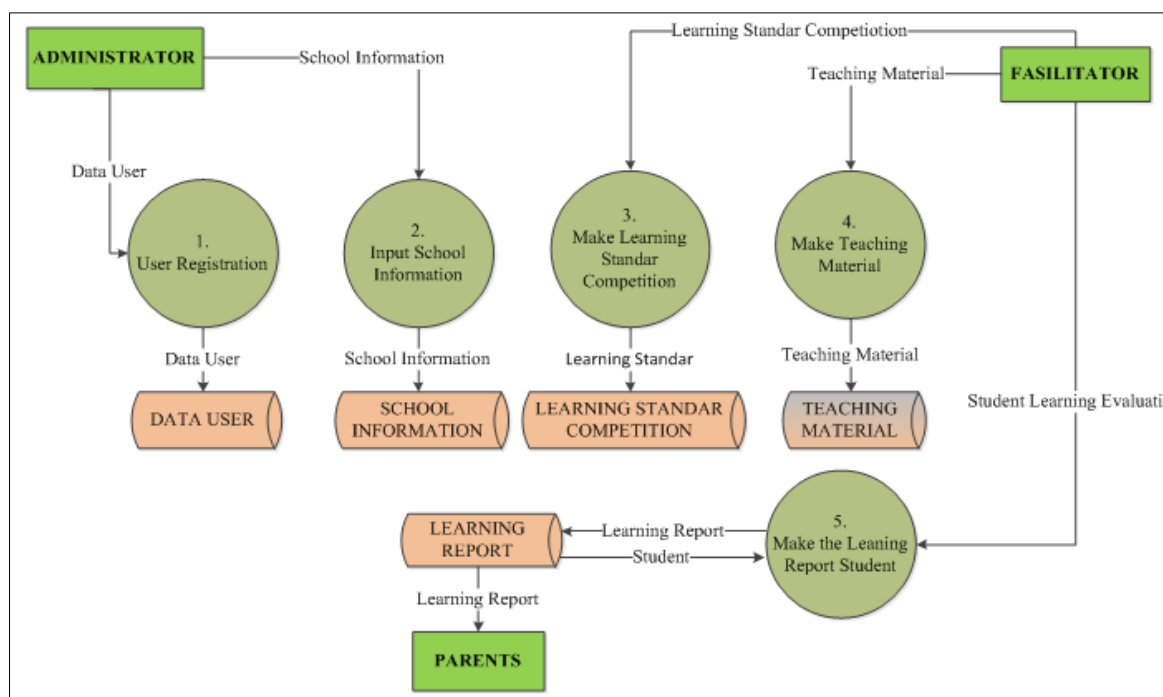
Figure 5. DFD level 0 academic information system proses.
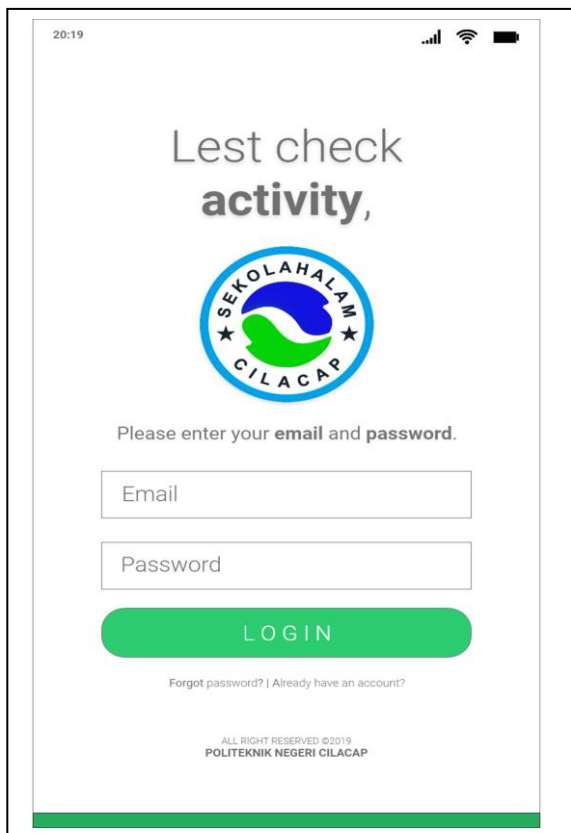
Figure 5 shows the main functions that will be developed in the academic information system which is a derivative of the context diagram. In the picture shows the data streams in each main process.

4. Result and discussion

Design of system that has been made will proceed to the implementation stage, that is developing Academic Information System mobile-web based at the Cilacap Nature School (SACIL). The main outcome developed in the system is the management of learning outcomes evaluation and monitoring of student learning outcomes conducted by teachers and parents by utilizing academic information systems that can be accessed by using a computer (web based) or smartphone (mobile based).
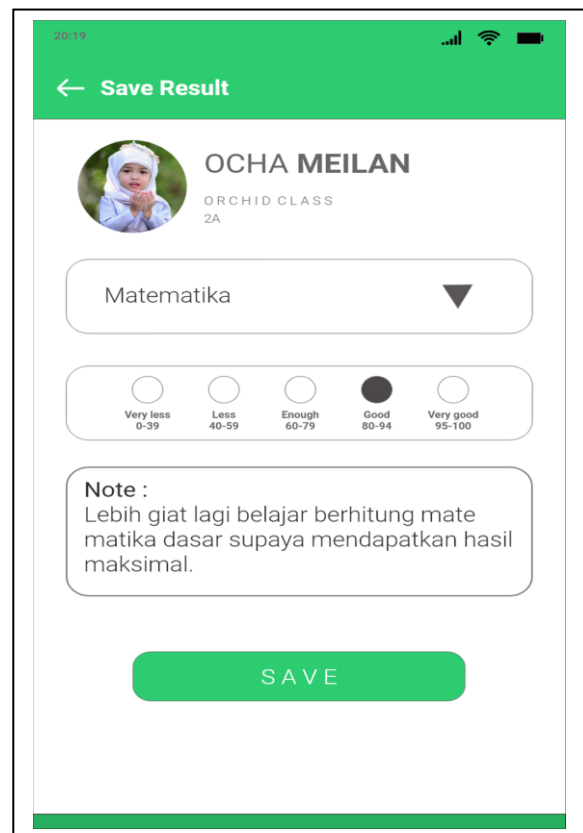
4.1. Manajement of student learning evaluation

Evaluation of student learning outcomes at Cilacap natural schools is carried out in several stages, there are evaluation of daily activities, evaluation of weekly activities, evaluation of monthly activities, and evaluation of middle years (6 months). In the evaluation of daily activities, each student will be given an assessment by the teacher on the same day as shown in Figure 7. Before entering the main menu, the user must login as shown in Figure 6.

Figure 6. Login page.
This figure shows the login page of user.

Figure 7. Daily activity evaluation.

Figure 7 shows the input form of student learning evaluation at the stage of daily activities. First the teacher chooses the subjects studied and then provides a qualitative assessment by selecting one of the radio buttons assessment list that has been provided. There are several criteria for the assessment results are very less, less, enough, good, and very good. The value of daily activities will be recap into the value of weekly activities as shown in Figure 8.

Figure 8. The value of weekly activities.

Figure 9. Graph of weekly activity values.

This figure shows a recapitulation of students' weekly scores. There is an average grade of students in each subject.

This figure shows a graph of subject values in weekly activities. On the graph it can show the development of the average value of lessons each week.

4.2. Monitoring of student learning evaluation

One of the roles of parents in their children's learning activities is to monitor the progress of learning outcomes and evaluate the learning process so that the results obtained are even better. In the academic information system developed, parents can find out the learning activities carried out at school and know the evaluation of learning outcomes through the communication book feature that can be accessed by parents through a smartphone (mobile based). These features can be shown in Figure 10 and Figure 11.
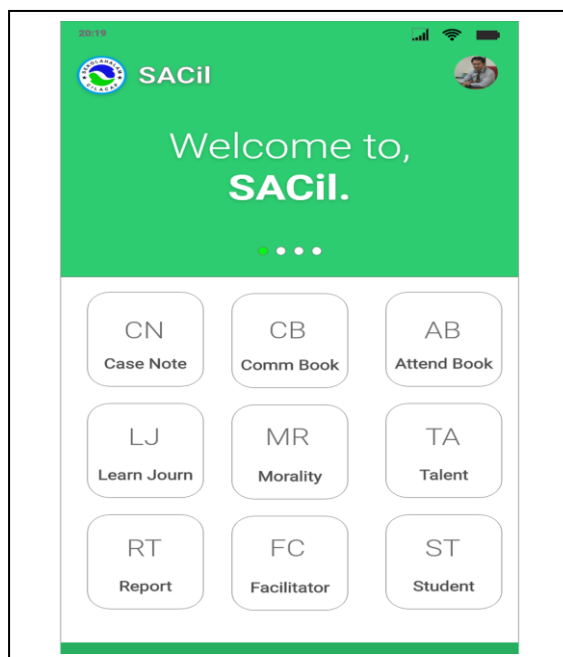
Figure 10. Main page.
This figure shows main page of academic information system at Cilacap Nature School
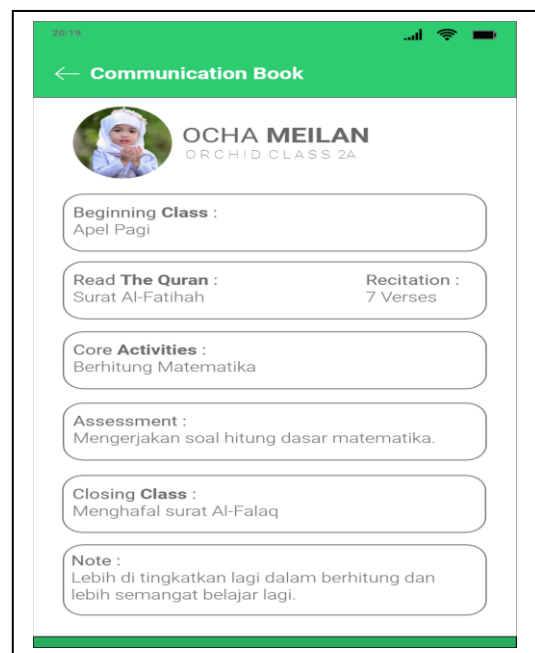
Figure 11. Communication book.
This figure shows the information of student learning activities and learning evaluation. This feature has a function to inform learning activities to parents that are accessed by using a smartphone (mobile based)

4.3. Testing system

Testing System is done by white box testing method. Tests carried out by 10 respondents with results as shown in Table 1.

Table 1. Testing system.

No.	Assessment	Test Result		
		NA	A	SA
1.	Academic management at the Cilacap Nature School is more organized	0	1	9
2.	Parents can find out daily activities up to date through the mobile application	0	2	8
3.	The facilitator can control the learning material that has been taught and which has not been taught to students	0	2	8
4.	Calculation of students score becomes more accurate and reduces human error	0	5	5
5.	Making Competency Standards Student learning becomes easier and more effective	0	6	4
	Amaount	**0**	**16**	**34**
	Presentage (%)	**0**	**32**	**66**

Notes : NA = Not Agree, A   = Agree, SA = Strongly Agree

Table 1 shows the results of the system testing conducted by 10 respondents. Based on the results of these tests it can be stated that in general that an Academic Information System Mobile Web Based at Cilacap Nature Schoole very helpful in the management of the academic administration.

5. Conclusions

Based on the research that has been done by developing an academic academic information system mobile web based at the Cilacap natural schools and has tested the system with 10 respondents, the results showed 66% of respondents stated strongly agree that with the existence of information systems, academic management becomes more organized, parents can know daily activities and children's learning outcomes up to date through smartphones, the facilitator can control the learning material that has been taught and that has not been taught to students, calculating student grades becomes more accurate and reduces human error, making student competency standards easier and more effective.

Suggestions that can be made for system development in subsequent research is the need to develop financial management functions in the Academic Information System at the Cilacap Nature School. thus the leader can know the condition of the school's finances.

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Usability measurement of media interactive learning for primary school students

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Abstract. Currently interactive media is quite widely used to support learning activities in school. The advantage of using interactive learning media is the creation of SCL (Student Centered Learning) so it can to foster an attitude of independence and curiosity of students in order to more understand of a material. Therefore as a determinant of the successful use of interactive learning media, an appropriate system of testing is needed and in accordance with the desired objectives. The author test the Water Saving application with usability using a questionnaire. The result of this interactive learning media test have met the aspects of learnability, flexibility, attitude and affectiveness with the usability test result of 90% in student and 80% in teachers.

1. Introduction
The use of teaching aids as an alternative learning media has reached its momentum. Learning media as a companion learning books both in the form of pictures to interactive applications have now started to popularly used by educations practitioners. According to Nielsen, the analysis to measure the ease of users in accessing the application interface is to use usability measurements, where the application interface is said to be usable if it can perform functions efficiently and effectively and provide satisfaction for its users [1].

Figure 1. User interface water saving learning media.

The author will test the effectiveness of the usability of interactive learning media on Water Safing applications using questionnaires. This study aims to test the effectiveness, whether the interactive learning application of water saving material used by students in Al Muslim primary school is appropriate and in accordance with the expected goals. Water Saving learning media is an interactive learning application on Science subjects for primary school students. Water Saving Application used offline in school computer laboratory.

2. Research method

2.1. Usability

Usability is a condition where users are helped in obtaining ease of the function of a system effectively to achieve the expected goals. According to Jacob Nielsen on [2] mentioned that usability is a measure of the quality of user experience when interacting with a product or system whether software applications, mobile technology, websites, and other systems operated by users [2].

Usability aspect according to Nielson on Yacob can be measured based on the following components.

- Learnability, how users can complete the tasks encountered in the application interface
- Flexibility, how does the form of variation presented by the application for users to exchange information
- Effectiveness, support system that is presented in an application for users to achieve success
- Attitude, how the level of user satisfaction with the system encountered when using the applications.

2.2. Use Questionnaire

According to Jacob Nielsen on [3], usability is an attribute that explains and measures how easy the user interface is in an applications. Usability also refers to methods that can improve the ease of use of the application interface in the design process. Usability is measured by four criteria, there are satisfaction, learnability, memorability, and efficiency. Satisfaction is measuring the level of user satisfaction in using the application interface design. Learnability is measuring the level of ease of doing simple tasks when a user first uses the application interface. Memorability is to see how quickly the user can regain reliability in using the interface design when some time does not use the interface application. Efficiency is measuring speed & effectiveness in carrying out certain tasks in the application interface [4].

3. Result

The first step of the usability test is to give questionnaries to users after completing the Water Saving application trial. Respondents from this trial is 20 people include students and teacher. Data analysis uses a likert scale interval by calculating the presentation of the number of "No" and "Yes"selected by respondents in each statement. Each statement in the questionnaire has been classified according to aspects of usability. The learn ability aspect includes two questions to measure the level of user convenience in learning the application. Aspects of flexibility there are two questions to measure application flexibility. The effectiveness aspect includes two questions measure the effectiveness of the system. Attitude aspect aims to measure user satisfaction in using the water saving application.

Table 1. Average usability students test result.

Learnability	Flexibility	Effectiveness	Attitude
100	95	65	100

The low value of the score on Effectiveness aspect is because the student need help from the teacher when first using Water Saving application. Overall the percentage of usability level of the Water Saving application reaches a value of :

$$\text{Usability (\%)} = \frac{100 + 95 + 65 + 100}{4} \times 100\% = 90\%$$

Usability test result for teachers using different Likert scale intervals (1) Strongly Disagree, (2) Disagree, (3) Doubtful, (4) Agree, and (5) Strongly Agree.

Table 2. Average usability teachers test result.

Code	Observation Element	value
Question 1	Student can choose the button correctly to go to the next page	90
Question 2	Frequency of students to asking teachers is low	60
Question 3	Frequency of assistance and guidance from the teacher is low	60
Question 1	Students can choose the button correctly when heading to the topic materials 1,2, and 3	90
Question 2	Audio in application can help students in learning Water Saving	90
Question 3	Students can choose the button correctly when they want to study on the next topic	80
Question 4	Students can choose the button correctly when they want to evaluate Water Saving topics	90
Question 5	Students can choose the button correctly when they want to return to the previous page	90
Question 6	Frequency of students asking teachers is low	70
Question 7	Frequency of assistance and guidance from the teacher is low	70
Question 8	Student can close the application using the correct button	90
Question 1	Students can choose the button correctly when heading o the exercise page	90
Question 2	Students can follow instructions when reading and answering practice questions	90
Question 3	Students can choose the button correctly when they want to return to the previous page	90
Question 4	Frequency of students asking teachers is low	70
Question 5	Frequency of assistance and guidance from the teacher is low	70
Question 6	Students close the application using the correct button	90
Question 1	Students can choose the button correctly when going to the game page	100
Question 2	Students can follow instructions how to play from the application	100
Question 3	Students have no difficulty when playing puzzels	70
Question 4	Frequency of students asking teachers is low	70
Question 5	Frequency of assistance and guidance from the teacher is low	70
Question 6	Student close the application using the correct button	100

The result of the average calculation of each aspect of usability are obtained from the division of the sum of each aspect measured by statements. The mean calculation result are presented in table 2 with each aspect of usability, learnability 70%, attitude 84%, flexibility 83%, and effectiveness 85%. Overall the percentage of usability level of the Water Saving application reaches a value of :

$$\text{Usability (\%)} = \frac{70 + 84 + 83 + 85}{4} \times 100\% = 80\%$$

.

4. Conclusions

This research was conducted to test the interactive learning media Savig Water at primary AL Muslim school. The average calculation result with students as respondents were learnability and attitude reach 100%, the aspect of flexibility reached 95%, while the lowest value on the aspect of effectiveness was 65%. Overall presentation on the usability level of the Water Saving application scored 90%. While the average calculation result with the teacher as respondent is 70% learnability, 84% attitude, 83% flexibility, and 85% effectiveness and the overall presentation of usability level of Water Saving application gets a value of 80%. This application should be able to using a simple icon or symbols on the user interface so it can improve user experience when using the application.

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Automatic calculation of form accreditation as internal assessment simulation in Electrical Department of Manado State Polytechnic

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Abstract. The form filling system in the Department of Electrical Engineering, Manado State Polytechnic is still manual both in filling data and in making the final report. This situation makes it difficult to collect and report accreditation data because the stored data cannot be easily accessed by the accreditation data manager. Therefore, it is very much made an information system for filling accreditation forms that can regulate and store accreditation forms completeness data. Thus it will greatly facilitate the team to fill accreditation forms in inputting data and evaluating the lack of accreditation forms data. In this research, an application for filling accreditation forms was made using XAMPP which is a tool that can create a Web-based application. Thus this information system can be easily and flexibly used by all users / users. In this information system the user is limited to the Admin, Study Program Leaders, Internal Accreditation Assessment Team and the Accreditation Form Compilation Team. As the final result of the application, the Accreditation Forms Drafting Team can collect data very easily and the internal assessment team can evaluate quickly and accurately so that the study program leader can find out the value of accreditation.

1. Introduction

The existence of a good information system for filling accreditation forms will help the team / admin of accreditation forms makers, it is very helpful in the effectiveness and efficiency of the performance of these forms. With this information system will accelerate the making of accreditation forms so that the results will be more thorough and save budget, time and costs. In addition, the results of the accreditation forms can be predicted accurately because the accreditation forms evaluation parameters can be done in the system. So before the final data is made for the accreditation assessment we can already complete all the shortcomings. The archiving of supporting data will be even better because we can upload and download soft copies of all supporting data in the accreditation form. Thus it is necessary to have an information system for making accreditation forms in this case at the Manado State Polytechnic Electrical Engineering Department. This information system is an application created to facilitate the team for accreditation forms. in compiling and editing data on 9 accreditation forms of higher education standards. The right of access to this information system is divided into: admin, accreditation form compilation team, study program leaders, and internal assessment team. By

using a Web-based tool that is XAMPP makes this information system more dynamic and flexible in data collection / collection, reporting and in the evaluation of items.

2. Literature review

Information systems are a combination of information technology and the activities of people who use that technology to support operations and management. In a very broad sense, the term information system that is often used refers to interactions between people, algorithmic processes, data, and technology. In this sense, the term is used to refer not only to the use of information and communication technology (ICT) organizations, but also to the ways in which people interact with this technology in supporting business processes. The purpose of information systems is to produce information. Information system is data that is processed into a form that is useful for the wearer. Data that is processed alone can not be enough to say as information. To be useful, information must be supported by three pillars as follows: right to the person or relevant (relevance), timely and appropriate value or accurate Outputs that are not supported by these three pillars cannot be said to be useful information, but it is rubbish.

Accreditation is a form of government recognition of a private or government agency based on established assessment standards. The National Higher Education Accreditation Agency (BAN-PT) is the only accreditation body that has the authority of the Ministry of Technology Research and Higher Education of the Republic of Indonesia in improving the quality of higher education, introducing and disseminating new paradigms in the management of higher education, and increasing the relevance, academic atmosphere , institution management, efficiency and sustainability of tertiary education. In carrying out accreditation BAN-PT establishes a checklist containing information from a tertiary institution which will determine the value of the tertiary institution called Accreditation Form. The 2019 Higher Education Accreditation Form consists of Assessment Standards consisting of :

- Visi, Mision, Goal dan Target
- Tata Pamong and Coorporation
- Student
- Human Resource
- Finanance, Advice and Resources
- Education
- Research
- Community service
- Output and Achievement

Higher Education Accreditation Forms Assessment System consists of 100 list of values which are assessed with numbers from 0 to 4. So the maximum total score is 400. With accreditation qualifications:

       361 – 400 = Accreditation of A
       301 – 360 = Accreditation of B
       200 – 300 = Accreditation of C
       < 200 = No Accreditation

3. Result

3.1 Information system requirements
The entities in this information system consist of:

- Admin
  Consisting of information system administrators who can determine who are the users and access rights, can also develop this application.

- The leaders of study program's.
  It Consists of the Chair of Department and the Chair of Study Program. The head of the study program has access rights to compile data into the system and can also view and print reports.
- Accreditation form compilation team.
  This team can compile data in the form of pdf files as evidence of companion data, and also can answer verbal contents and words into the form.
- Internal form assessment team.
  This team will assess accreditation forms that are made manually.

3.2 Data flow diagram

One of the initial stages of designing an information system is to make a data flow diagram of the system called a Data Flow Diagram (DFD). DFD consists of processes, dataflow, warehouse and terminator. While the notation that is most often used to use data flow diagrams is the De Marco notation which includes input / output, function, flow and database. To make the DFD an interview process is conducted with the head of the Study Program by looking at user access rights and activities that can be carried out with the information system.
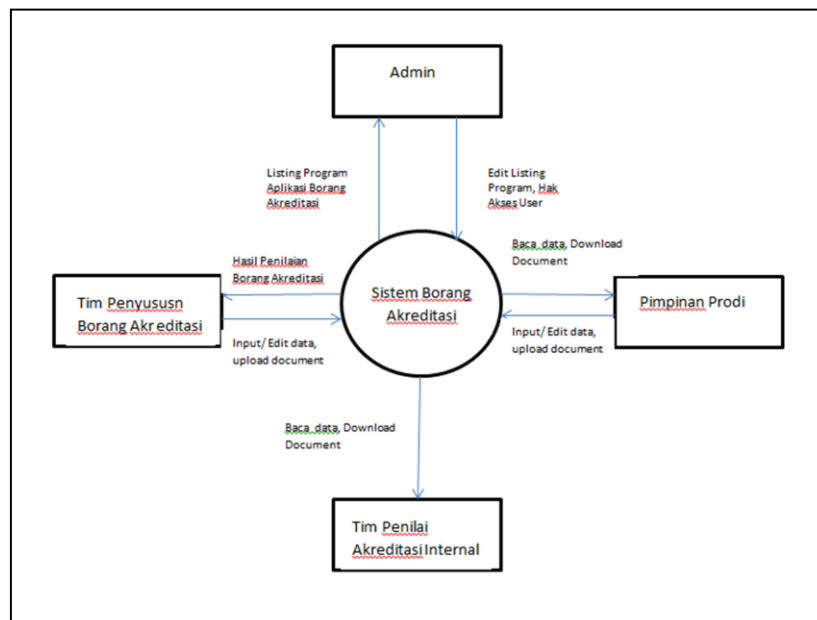
Figure 1. Data flow diagram.

Those three supervised learning algorithms would be compared whether the results are equally useful and accurate for the common malware and when applied to the detection of cryptocurrency mining malware.
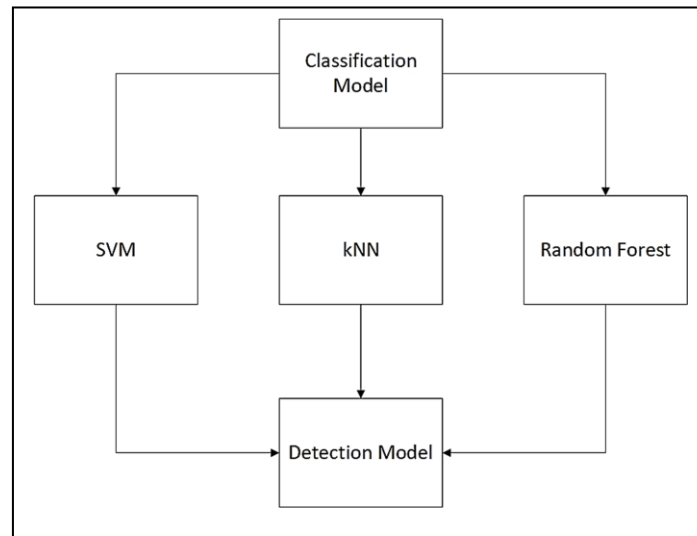
Figure 2. Details of a classification model.

3.3 Data collection method

For data collection used direct interviews with the head of the study program and the accreditation forms assessment team. In this interview data were obtained for system requirements and the relationship between users based on the access rights obtained to access the information system. Then for the standard data and assessment of accreditation forms is obtained from the guidelines and assessment of accreditation forms from the national accreditation board for universities (BANPT).

The method used in making the application is to directly translate all the contents in the Accreditation Form into the information system application. The assessment system is done automatically by using a formula for numerical data while for verbal data assessment is done by manual assessment.

3.3 Implementation of form accreditation application

The application program that is based on the data flow diagram above is to use XAMPP. Then we created the automatic calculation of the standard using the formula of assessment. The following are the results of the implementation of the accreditation forms made:

Figure 3. Input profile of students and graduates.

For the student profile based on Figure 2, it can be seen that in the system student data has been stored in the last 5 years along with the total number of all assessment elements carried out automatically.

4. Conclusions

With the application system for making accreditation forms, filling in the data that was manually can be made easier. The application system for making accreditation forms makes data collection process more accurate and thorough because the supporting files can be placed correctly to the correct file location. The results of the data collection can be printed and the results can be directly evaluated by the leadership of the college and the internal accreditation team. In this information system for automatic assessment is still limited to the assessment of numbers using existing formulas. As a suggestion for developing this application an assessment can be made on the verbal explanation field by using artificial intelligence. Likewise this information system can be developed with a decision support system to get the right solution in increasing the value of accreditation. The result from calculation based on the manual formulation assessment is the same as the result from calculation from the automatic calculation application.

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6. Acknowledgments

Evaluation of the application PermenKUKM No. 13 in cooperative savings and loan accounting Bali State Polytechnic Cooperative

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Abstract. The ministry of cooperatives and small medium enterprises has issued Permen No. 13/Per/M.KUKM/IX/2015 concerning accounting guidelines for savings and loan business by cooperatives which must be used as a guide in preparing and presenting the financial statements of this business unit. With the issuance of the ministerial regulation, it is expected that cooperatives can increase accountability in the preparation of their financial statements. But the fact is that there are cooperatives that have not prepared and presented financial reports in accordance with the guidelines. This study was aimed at evaluating its application in the savings and loan unit of Bali State Polytechnic cooperative. Based on the results of research conducted, it was found that there were three reports that were not presented in the financial statements of the savings and loans unit, namely: statement of changes in equity, cash flow, and notes to financial statements. In addition, in presenting the financial position report, found several accounts that are not in accordance with the guidelines, namely: banks, bank loans, education funds, social funds, and development funds. Likewise, in the presentation of the remaining results business report, there were no cooperative expense accounts, such as: costs for education and training for cooperative hr, organizational meeting fees, and fees for supervisors. The findings of this study are expected to be used as recommendations to the management of the Bali State Polytechnic Cooperative in preparing and presenting the financial statements of the Savings and Loan Unit in the next period.

1. Introduction

In order to facilitate small businesses in preparing financial reports, the indonesian institute of accountants (IAI) issued a statement of revocation of financial accounting standards number 8 (PPSAK 8) concerning revocation of financial accounting standards number 27 (PSAK 27). After that, IAI established the financial accounting standards for entities without public accountability (SAK-ETAP) since January 1, 2011 for entities that do not have public accountability such as; micro, small, medium enterprises and cooperatives.

Furthermore, to improve accountability in the preparation of cooperative financial statements, the Ministry of Cooperatives and Small Medium Enterprises stipulates PermenKUKM No. 13/Per/M.KUKM/IX/2015 concerning accounting guidelines for savings and loans for cooperatives. The guideline was prepared based on general financial accounting standards (SAK-Umum) and entity without public accountability (SAK-ETAP) financial accounting standards which

were modified in accordance with the purpose and uniqueness of transaction characteristics in savings and loan by cooperatives that are different from other commercial entities.

Based on PermenKUKM No. 13 of 2015, cooperative savings and loans accounting is a systematic recording system that reflects the management of cooperative savings and loan businesses in a transparent and responsible manner in accordance with the values, norms and principles of cooperatives. Where the preparation and presentation of financial statements for savings and loan cooperatives, consisting of: balance sheet, calculation of operating results, changes in equity, cash flow, and notes to the financial statements.

- Balance sheet, is a report that provides information on the financial position, namely the nature and amount of assets or resources of a cooperative savings and loan business, obligations to the lenders and depositors, as well as the equity of the cooperative owner at any given time, consisting of: assets, obligations and equity.

  Assets are resources controlled by cooperatives as a result of past events and from which future economic benefits will be obtained by cooperatives. The asset component consists of: current assets, non-current assets, fixed assets, intangible assets, and non-permanent assets.

  Current assets are assets that have a useful life of less than one year, such as: cash, placement of funds, securities, loans, allowance for uncollected loans, equipment, prepaid taxes, prepaid expenses, unpaid income.

  Non-current assets are assets consisting of a number of assets with a useful life of more than one accounting period, which are owned and used in cooperative operations with compensation for use in the form of depreciation costs, such as: long-term investments, investment properties, and accumulated depreciation of investment property.

  Fixed assets are tangible assets that are obtained in the form of ready-to-use or previously built, which are used in organizational operations, which are not intended to be sold in the framework of normal organizational activities and have a useful life of more than one year, such as: land, buildings, machinery and vehicles, office equipment and accumulated depreciation of fixed assets.

  Intangible assets are non-monetary assets that can be identified but do not have a physical form, are owned for use in production activities or are leased to other parties or for administrative purposes, such as: software, accumulated amortization of intangible assets.

  Non-permanent Assets are other assets that are not included as stated in the items, such as: buildings that have not yet been completed.

  Liabilities are current transactions that arise as a result of past events, the settlement of which is expected to cause cash outflows from cooperative resources that contain economic benefits.

- Calculation of operating results, is a report that provides information about the calculation of income and expenses.

- Statement of changes in equity, is a financial statement that presents changes in the structure of the cooperative's equity over a certain period.

- Cash flow statement, is a report that describes the cash transactions and cash equivalents of the organization, both cash in and cash out so that it can be known the increase/ decrease in net cash and cash equivalents.

- Notes to the financial statements, is additional information presented in the financial statements, which contains narrative explanations or details of the amount presented in the financial statements and information items that do not meet the recognition criteria in the financial statements.

2. Findings and discussion

The Bali State Polytechnic Cooperative is located at the Bali State Polytechnic campus, Badung Regency. This cooperative was established on July 1, 2003 with deed of establishment No. 08/KPNB/2003 and approved by the Depatement of Cooperatives Small and Medium Enterprises on December 2, 2003.

The accounting policies adopted by the Bali State Polytechnic Cooperative are as follows:

- Inventory recording uses the perpectual method and inventory valuation uses the FIFO method.
- Recording payments in advance using the balance sheet approach.
- Fixed Assets are depreciated using the straight line method, with rates based on groups.
- Intangible assets are depreciated using the straight line method, with rates based on groups.
- Revenue and expense recognition is based on the accrual basis method.

The financial position of the Savings and Loans Unit in 2017-2018 can be shown in the Balance Sheet report in Table 1. Base on the data in Table 1, the total assets of the Bali State Polytechnic Cooperative savings and loans unit as of December 31, 2018 is seen Rp. 27,560,039,382. These assets were offset by liabilities Rp. 24,118,503,756 and equity Rp. 3,441,535,626.

Then the result operations of the savings and loans unit in 2017-2018 can be shown in the remaining results of operations report in Table II. Based on the data in Table 2, the total remaining operating income before tax for the savings and loans unit at the Bali State Polytechnic Cooperative in 2018 is seen Rp 489,677,003. The results of the operation were sourced from operating revenues of Rp. 2,413,327,664 after deducting operating expenses of Rp. 1,844,525,649 and other expenses of Rp. 79,125,012.

However, for the statement of changes in equity, cash flow statement, and notes to the financial statements are not presented. These reports are only presented in a joint report. Based on data analysis, it can be seen that in the preparation of the financial position report of savings and loans Unit in 2018 there are still several accounts whose presentation is not in accordance with PermenKUKM No. 13/ Per/M.KUKM/IX/2015, namely: banks, debt banks, funds education, social funds, development funds. In this case, the bank account does not need to be presented for each bank, but only with a bank account of Rp 2.943.354.817. The names of banks and their balances can be presented in the notes to the financial statements. likewise, a bank debt account does not need to be presented for each bank, but a bank debt of Rp. 10,680,858,817. Details of each bank's debt can be presented in the notes to the financial statements. Furthermore, for the education fund of Rp. 114,854,656 social fund of Rp 162,960,007 and development fund of Rp. 198,292,551 should be presented in the short term liability component, not as a component of equity. Therefore, the allocation of these funds must be planned every year.

Likewise, in the presentation of the report on the calculation of operating results in 2018, it appears that the presentation of income has not been separated between the main operating income and other operating income. In this case the credit provision and commission income of Rp. 222,146,464 administrative payroll deductions of Rp. 10,236,848 and a fine income of Rp. 4,041,192 should be presented in other operating income. Likewise in the presentation of operating expenses, it appears that there is no separation between operating expenses and operating Expenses. In this case the allocation of the costs of education and training for cooperative human resources, the cost of organizational meetings, and the honorarium of the management / supervisor as part of the post of cooperative burden.

Table 1. The balance sheet report.

Description	At 31-12-2018 (Rp)	At 31-12-2017 (Rp)
Current Assets:		
Cash	267,998,689	199,298,436
Bank of Niaga	2,796,188	2,796,188
Bank of BNI	154,582,037	11,103,742
Bank of BPD	2,785,976,592	1,276,504,646
Loan Given	22,639,511,198	13,574,681,239
Other Receivable	684,692,030	312,533,241
Allo. for Bad Debt	(1,541,483)	(1,541,483)
Seal Inventory	108,000	108,000
Prepaid Lease	143,488,000	-
Total Curr,Assets	26,677,611,251	15,375,484,009
Fixed Assets:		
Building	881,093,748	881,093,748
Acum,Dep,Build	(139,020,559)	(139,020,559)
Office Inventory	434,760,794	367,610,794
Acum. Dep. Inven	(310,874,602)	(245,066,323)
Total Fix Assets	865,959,381	908,672,348
Intangible Assets:		
Software	16,468,750	-
License	-	375,000
Total Intan,Assets	16,468,750	375,000
Total Assets	27,560,039,382	16,284,531,357
Short Term Liablities:		
Savings	8,306,971,666	7,064,968,278
Time Deposit	3,920,000,000	2,060,220,000
Deposit Like	1,038,414,263	897,810,309
Salary Payable	129,427,000	93,482,000
Tax Payable	1,157,758	1,716,511
Other Payable	1,700,000	-
Insurance Payable	39,974,251	-
Total S. T. Liab	13,437,644,938	10,118,197,098
Long Term Liablities:		
BNI Loan	10,680,858,817	-
BPD Loan	-	3,087,752,203
Total L. T. liab	10,680,858,817	3,087,752,203
Equity:		
Principle Saving	5,130,000	5,300,000
Mandatory Saving	1,065,650,982	978,435,091
Reserve	1,423,364,186	1,180,492,802
Education Fund	114,854,656	92,800,841
Social Fund	162,960,007	156,074,434
Development Fund	198,292,551	160,412,578
Current Year RRO	471,283,244	505,066,310
Total Equity	3,441,535,626	3,078,582,056
Total Liab Equity	27,560,039,382	16,284,531,357

Table 2. The remaining operating result report.

Description	At 2018 (Rp)		At 2017 (Rp)	
Operating Revenues				
Interest Income	2,166,676,160		1,890,822,896	
Provision Fees	222,146,464		88,612,441	
Fine Income	4,041,192		3,548,559	
Stamp Income	9,166,000		6,263,000	
Insuran Income				
Adm Income	10,236,848		11,035,852	
Other Income	1,061,000	+	1,670,000	+
Total Revenues	2,413,327,664		2,001,952,748	
Operating Expense				
Saving Interest	199,954,582		330,114,335	
Deposit Interest	336,931,511		145,368,290	
Loan Interest	562,711,849		449,832,879	
Transport Exp	1,012,000		7,289,000	
Telpon Exp	2,251,000		2,830,000	
Light Exp	18,396,952		25,603,276	
Depres. Exp	109,862,966		111,377,857	
Amortis.Exp	906,250		748,752	
Salary Exp	305,005,844		257,356,160	
Supplies Exp	3,948,800		3,420,300	
Stamp Exp	9,749,000		6,244,500	
General Exp	122,829,200		44,396,902	
Advertizing Exp	113,887,400		33,132,760	
Rent Exp	11,432,000		9,000,000	
Maintenan. Exp	7,515,000		7,845,400	
Consumsi. Exp	31,420,395		20,857,000	
Intertaim. Exp	6,710,900		6,720,100	
Other Exp	-	+	33,000,000	+
Total Op. Exp	1,844,525,649		1,495,137,511	
Other Rev/Exp:				
Bank Interest	40,997,489		23,423,259	
Bank Adm,	120,122,501	-	5,152,657	-
Total O. R. E	- 79,125,012	+	18,270,602	+
Income Before Tax	489,677,003		525,085,839	
Tax	18,393,759	–	20,019,529	–
Income After Tax	471,283,244		505,066,310	

Source: Bali State Polytechnic Cooperative.

3. Conclusions

Based on the evaluation results of the application of PermenKUKM No. 13 in the savings and loan unit of the State Polytechnic Cooperative of Bali, it can be concluded as follows:

- Presentation of financial statements for savings and loans units have not been in accordance with the PermenKUKM guidelines. In this case there are three reports that have not been presented, namely: changes in equity, cash flow, notes to financial statements.
- In the financial position report, it appears that there are several accounts that are presented not in accordance with these guidelines, namely: deposits in banks, debt banks, education funds, social funds, and development funds.

- In the remaining results business report, there is no visible account of costs in the cooperative expense group such as: education and training costs for cooperative human resources, meeting fees, and fees.

Suggestions that can be submitted as recommendations to the cooperative management are:
- In presenting the financial statements of the savings and loans unit, it should be guided by PermenKUKM No.: 13 of 2015, which is to compile and present the five required reports.
- In presenting the financial position report, it is advisable to add an equipment account to present the value of stamp inventories, stationery and consumables in the Current Assets component, as well as investment properties and investment property accumulation in the non-current assets component. In addition to presenting education funds, social funds, and development funds in the short term liabilities component, not as equity.
- In compiling the remaining results business report, it should also be presented an account for expenses for cooperative expenses such as: education and training costs for cooperative HR, organizational meeting costs, and fees.

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The development of sokasi woven business management model at Sulahan Village, Susut Sub-district, Bangli Regency

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Abstract. Weaving is a skill activity of someone in making craft goods by arranging certain material alternately by turning, overlapping and folding in order to create a desired woven product. Bamboo woven craftsman is included in domestic industry which is generally located in urban area by employing families as labor. This weaving work is as a part time job that can give extra income for the family. Bamboo woven craft is a simple family business, applying efficient technology, bamboo as raw material is self-planted and it is almost without capital, by skill that is obtained based on experience. The purpose of this research is to find out the business's feasibility and income of bamboo woven craftsman in making sokasi product. Subject or respondent in this research are the bamboo woven craftsman who make sokasi products in Sulahan Village, Susut Sub-district, Bangli Regency, with respondents amount of 12 people. This research was held by using survey and interview methods. Data collected consists of the primary and secondary data. The primary data related to the social economy condition and the condition of the business until today is collected by interview and filling in the questionnaire directly. The secondary data is obtained from the Head of Village office, The Susut Sub-district in Number, and the Central Bureau of Statistics of Bangli Regency, and other references related to the research. Result of this research is expected to be able to become a reference to people in performing bamboo woven crafts business in making sokasi product, and it is be able to increase the production and income of the craftsman.

1. Introduction

In National Research Main Plan, Bali State Polytechnic through the Central Research and Service to People included the Economy and Business as one of research topics that has been determined in Renstra PNB 2016-2019. This economy and business research topic raised the strategic issue in developing business especially the micro and small business (UMK). Related to this topic, it is conveyed the concept of mind that the establishment of micro and small business is started with an understanding about the financing and feasibility of business. In this research topic to be raised is about the Development of Sokasi Woven Business Management Model at Sulahan Village Susut Sub-district, Bangli Regency, as the proposal's title.

The Sulahan Village is one of 9 villages in Susut Sub-district, Bangli Regency. The population of Sulahan Village is 8,868 people that consist of 4,403 male and 4,465 female with total of head of family is 2594 KK (The Ministry of Domestic Affairs General Directorate of Village Government Building, 2019). The average production of each craftsman is about 8-10 pieces per month depends of the size. The sokasi is sold in traditional market with price range of Rp 40,000-80,000 each depends

on the model and size. Thus, the sokasi woven craftsman's income is about Rp 800,000 per month. This income is still assumed to be low and it can be improved by improving the production process.

The bamboo woven business craftsman is included in home industry which generally exists in the rural area by employing families as manpower. The main activities of the rural area people are as farmers whether in wet or dry land, and also as the breeder such as cattle and pig. The weaving activity is as the side job that can give additional income for the family. The bamboo woven handicraft is a very simple family business that implementing the effective technology, the bamboo as raw material is self-planted and it is almost no capital need and the skill is obtained based on the experience from generation to generation.

1.1. Problem
Based on the description above, the problem formula in this research is how much investment needed to develop business in bamboo woven field to produce sokasi in Sulahan Village, Susut Sub-district, Bangli Regency.

1.2. Special purpose
Purpose of this research is to find out the amount of investment and operational cost needed on the process of sokasi woven development, and also the woven business feasibility in Sulahan Village, Susut Sub-district, Bangli Regency.

1.3. Research urgency
The research of sokasi production of bamboo woven of home industry scale in Sulahan Village, Susut Sub-district, Bangli Regency will give description about small business type and also income of craftsman of sokasi maker that has direct correlation with people's welfare. This research also has function to educate the craftsman about the method to handle the production process so the quality of sokasi product can be maintained and the price is stable and even increase. In addition, the small industry activity of sokasi maker has potential in increasing people's income and expands employment opportunities.

2. Literature review

2.1. Bamboo as woven raw material
Raw material to make sokasi is bamboo. The bamboo tree is a very productive plant, where the stem can be processed as many household products in the form of woven crafts, souvenirs, etc. In construction field, bamboo is used in house building for scaffolding, bridges, etc. Bamboo is one of natural Functionally Graded Material (FGM) types due to the vast using and benefit in various fields [1]. Bamboo used is not too old or too young. Old bamboo will easily break if woven, while young bamboo will shrink due to high water content.

Bamboo has hirarchis (neatly formed) structure. Bamboo has fine characteristic such as flexible, very strong and firm, and also light [1]. The most interesting characteristic is the high speed of its growth where it can vertically grow for 5 cm per hour or 120 cm per day and it stops to grow permanently at age of 5 years [2]. Horizontally or in lengthwise direction the bamboo stem is strengthened by strong fibers. Those fibers are distributed densely on the outside surface, and rarely in inside surface. This is why bamboo has greater break tenacity on the outside surface and the tenacity decreases on the inside surface [1]. Some of bamboo types are shown in Figure 1.

Figure 1. Various types of bamboo.

Physical characteristic of bamboo include the water content and specific mass. Water content is an important bamboo physical characteristic because it influences the mechanical characteristic of bamboo. The water content in bamboo stem after it is cut off is between 50-99%, whereas dried bamboo has 12-18% [2]. The specific mass is about 600-900 kg/m^3. For rope bamboo type it has average specific weight of 820 kg/m^3.

Bamboo type that are mostly used is the rope bamboo type (*Gigantochloa apus*) because its fiber flexible characteristic so it is well functioned as rope, material for woven wall, kitchen tools, woven crafts [3]. In addition, this bamboo type has wide range of distribution in Southeast Asia especially in Java and Bali Island. The mechanical characteristic of the rope bamboo is shown in Table 1.

Table 1. The mechanical characteristic of rope bamboo [3].

Mechanic Character	Bamboo (across the fiber)	Bamboo (along the fiber)
Density (kg/m^3)	*802*	802
Tensile strength (MPa)	*8.6*	200.5
Tensile modulus (GPa)	-	24.5
Flexure strength (MPa)	*9.4*	230.9
Impact strengt (kj/m^2)	*3.02*	63.54

2.2. The sokasi woven

Sokasi is a bamboo woven product that consists of two parts they are the lower part (body) and the upper part (cover) which is used as container for rice, container for ritual medium, and as souvenirs. The sokasi production began from the selection of apus (rope) bamboo tree which is not too old or too young in order to be easy to weave and not easy to break. The bamboo was cut with specific size according to sokasi size that wants to be made. The bigger the sokasi to be made the longer the bamboo pieces needed. Practically, it uses section quantification on the bamboo such as two sections, three sections, etc. Then the bamboo is split and splintered, to be whittled until smooth so it will be ribbon-shape.

2.3. Calculation of sample amount

The amount of sample is calculated based on the formula of [4] as the following:

$$n = [\frac{(Z\alpha - Z\beta)\sigma}{\mu 1 - \mu 0}]^2 \tag{1}$$

Where:
n   = amount of sample
Zα   = upper limit of significance on level of confidence 95%, Zα = 1.96
Zβ   = lower limit of significance on level of confidence 90%, Zβ = -1.645
σ   = deviation standard
μ0   = average of initial research variable
μ1   = average of research variable with treatment

From the previous research it is found out that sokasi price is Rp 40,000/piece. The fluctuation of price is for 20%. Thus, amount of sample needed is n = 12 people.

2.4. Cost analysis

From the economic conside-ration, money invested to buy tools and other facilities should be returned at the latest of the economic age of the mentioned tools. The economic age of the tools is the lifespan from buying the tools, used them until the approximation the tools are no longer being economic to be operated. The tools are said not to be economic if the ownership cost and operational cost of the tools including the maintenance cost turned out to be greater than the result accepted if the tools were operated [5]. The ownership cost is the cost since the tools were bought which should be accepted back, which is counted during the economic age of the tools. Thus, the ownership cost consists of the depreciation cost, capital interest and insurance cost [5]. Therefore, the tools should be operated in the minimum as the same total cost of depreciation cost, capital interest and reparation cost.

2.5. Depreciation cost

Depreciation is a process since the tools condition is useful until it is assumed to be less or no longer useful. During the tools are used it should be assumed that the value is depreciated and it needs a cost to cover it which is the depreciation cost. So, when the tools are no longer useful at the same time it has cost as the replacement of the tools which are collected during utilization age of the tools [6]. Depreciation is not always depends on the effective age of the tools. It also occurs due to up-to-date changes, market condition changes, and there are tools with new technology which are more economic so there will be depreciation without being processed by time.

To calculate the depreciation cost it is known the 4 ways, they are: the straight line, balanced reduction, fund investment, and summation of year numbers. The simplest way is the Straight Line Method, with formula as the following:

$$D = \frac{P-L}{n} \tag{3}$$

$$S = P - L \tag{4}$$

Where:
P = initial price/value (fixed cost)
L = first depreciation price value
N = depreciation time (economic time)
S = cost should be returned

2.6. Fixed cost

Fixed cost is the cost that should always be spent without considering production activities carrying out, for example the salary for personnel, office staff, office routine cost, depreciation, etc.

2.7. Variable cost

Variable cost is all costs spent related to the production activities, for example: purchasing materials, renting tools, wage for manpower, fuel, etc.

2.8. Calculation of breakeven point

The method frequently used in evaluating initial planning of investment or as additional analysis in order to validate evaluation result is the Benefit Cost Ratio (BCR) method [7]. Other method that is also frequently be used is the Return Cost Ratio (RCR) criterion that is analyzed by using the following formula:

$$RCR = TR/TC \qquad (4)$$

Where:
RCR= Return cost ratio
TR = Total revenue (Rp/m^3/production period)
TC = Total cost (Rp/m^3/production period)

With criteria, if RCR > 1, the business is said to be efficient and profitable, and it is reasonable to be developed; RCR < 1, the business is not efficient and it is not profitable; RCR = 1, the business is in a breakeven condition (did not experience profit or loss).

3. Methodology

This research is performed in Sulahan Village Susut Sub-district Bangli Regency. Subjects or respondents in this research are the sokasi woven crafts with total respondents of 12 people. This research is performed by using the survey method. Data collected consist of the primary and secondary data. The primary data related to the social economy condition and the condition of the business until today is collected by interview and filling in the questionnaire directly. The secondary data was obtained from the office of head of village, Susut Sub-district in Number, and the Central Bureau of Statistics of Bangli Regency and other references related to the research.

   The primary data obtained from the subjects or respondents of sokasi woven craftsman, and then it is processed and analyzed descriptively. According to Waldiyono [6] any field of business only know two types of cost they are the fixed cost and the variable cost. Furthermore, the financial analysis to find out the business feasibility is calculated with the following formula [6]:

$$\Pi = TR - TC \qquad (5)$$
$$= TR - (TVC + TFC) \qquad (6)$$
$$= (Y.Py) - (\Sigma\ X_1.PX_1 + TFC) \qquad (7)$$
$$= (Y.Py) - ((X_1.PX_1) + (X_2.PX_2) + (X_3.PX_3) + D) \qquad (8)$$

Where:
Π = net income (Rp/production period)
TR   = gross income (Rp/production period)
TC   = total cost (Rp/production period)
Y   = total production (piece/ production period)
Py   = product price (Rp/piece)
TVC = total variable cost (Rp/production period)
TFC = total fixed cost (Rp/production period)
X1   = total bamboo stems (stem/ production period)
PX1   = bamboo price (Rp/stem)
X2   = shaping cost (kg/production period)
PX2   = cost for cutting down (Rp/ stem)
X3   = total manpower (HOK/ production period)
PX3   = wage for manpower (Rp/ production period)
D   = Depreciation (Rp/unit/ production period)

To find out the business efficiency it uses the Return Cost Ratio (RCR) criteria, which is analyzed by using the following formula:

$$RCR = TR/TC \qquad (8)$$

Where:
RCR = return cost ratio

TR   = total revenue (Rp/production period)
TC   = total cost (Rp/production period)

With the criteria, if RCR >1, the sokasi woven business is said to be efficient and profitable, and it is reasonable to be developed; RCR<1, the business is not efficient and it is not profitable; RCR=1, the business is in a breakeven condition (did not experience profit or loss).

4. Results and discussion

The business of sokasi maker craftsman was started from the preparation of working station, which is a place to carry out the activities of cutting down the bamboo, splitting, shaping and weaving. This working place, generally, is very simple place like house's overhang or a house with plaited bamboo walls, completed with seat from wooden block or at the house's terrace. The financial analysis has purpose to find out whether a business is feasible or not to be developed. Analysis base uses the calculation of fixed cost, variable cost, total cost, gross income and net income. The fixed cost calculation for a sokasi production business is shown in Table 2.

Table 2. Cost for tools and working station

Description	Amount		Unit Price (Rp)	Total (Rp)
Work Stasiun	1	Unit	200,000	200,000
Tools (saw, knife, etc)	1	Set	100,000	100,000
Total				**300,000**

The greatest fixed cost component is the cost for working station preparation which takes part for about 66.66% of total fixed price. Whereas the rest is the preparation for tools such as saw, axe, temutik, knife, etc. that take part for 33.33%. Considering that the cost for working station preparation is very great amount then it needs to be maintained regularly in order that the working place will be able to last more than 5 years.

The greatest fixed cost component is the cost for working station preparation which takes part for about 66.66% of total fixed price. Whereas the rest is the preparation for tools such as saw, axe, temutik, knife, etc. that take part for 33.33%. Considering that the cost for working station preparation is very great amount then it needs to be maintained regularly in order that the working place will be able to last more than 5 years.

Table 3. Production cost and income per month.

No.	Description	Total		Unit Price (Rp)	Total (Rp)
1	Production cost				
	- bamboo supply	30	Pc	10,000	300,000
	- labour:cut, whitle, and weaving	1	people	1,500,000	1,500,000
	- tool depreciatio	0,10		300,000	30,000
				production cost	1,830,000
2	Income				
	- sokasi (small)	60	pc	40,000	2,400,000
	- netto income				570,000
3	efficiency				
	RCR				1.31

Whereas income is influenced by total sokasi product produced like is shown in Table 3 and market price which is ranging for about Rp 40,000/piece for small size sokasi. The calculation of RCR

efficiency value is obtained for 1.31 or greater than 1 which means that the business of sokasi maker craftsman is quite profitable and it is feasible to be developed.

5. Conclusions

Business of sokasi maker craftsman is quite promising with RCR value = 1.31 which means that it gives profit and feasible to be developed. The net income is for Rp 570,000 per month and it can be saved, because daily operational cost has been fulfilled from the wage for Rp 1,500,000 per month. The sokasi maker craftsman job is very flexible and it can be done by man (father) and woman (mother) whether they do it together or do it in turn.

6. Suggestion

To improve the development of sokasi woven business it needs an elucidation to weave from related institute, also in weaving skill so in one day there will be more than 2 sokasi can be produced, so people's income will more increase and people's welfare can be fulfilled.

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Analysis of cabbage production in Batunya Village, Baturiti Sub-district, Tabanan Regency

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Abstract. Generally, people make use cabbage as mixed ingredients in making soup, *capcay*, etc, and it is consumed raw as *lalapan*. The variety of cooks that can be mixed with cabbage causing the increasing of cabbage needs. In addition, the change in people's life style from the instant towards the healthy life style has impact on the increasing of vegetables consumption. Healthy life style does not only need protein and calorie but it also needs vitamin and mineral consist in vegetables and fruits. The increasing needs of vegetable causing the increasing of the selling price and this is an opportunity and potential to make profit for the vegetable cultivator. Purpose of this research is to find out the feasibility of cabbage cultivation business, production analysis, and needed investment. Subject or respondent in this research are the cabbage cultivator in Batunya Village, Baturiti Sub-district, Tabanan Regency, with respondent amount of 12 people. This research is carried out by using interview and survey methods. Data collected consists of the primary and secondary data. The primary data related to the social economy condition and the condition of the business until today is collected through interview and filling in the questionnaire directly. The secondary data is obtained from the Head of Village office, Baturiti Sub-district in Number, and the Central Bureau of Statistics of Tabanan Regency, and other references related to the research. This research result is expected to become a reference for people in performing business in cabbage cultivation field, and it is able to increase the production and working productivity to the farmer.

1. Introduction

1.1. Background
In National Research Main Plan, the Bali State Polytechnic through the Central Research and Service to People included the Economy and Business as one of research topics that has been determined in Renstra PNB 2016-2019. This economy and business research topic raised the strategic issue in developing business especially the micro and small business (UMK).

Related to this topic, it is conveyed the concept of mind that the establishment of micro and small business needs to be assisted in order to increase the production capacity which is started from the processes of land preparation, nursery, planting, and maintaining until the marketing. In this research topic wants to be raised is the Analysis of Cabbage Production in Batunya Village, Baturiti Sub-district, Tabanan Regency.

The Batunya Village if one of villages in Baturiti Sub-district, Tabanan Regency, which is as a central of cabbage production. Cabbage is vegetable that many people looking for to be used as a mixture in soup, capcai, etc., and it also be consumed uncooked as lalapan. Various kinds of food that can be mixed with cabbage make the need for cabbage continue to increase [1]. In addition, there is a change in lifestyle of people from instant to healthy lifestyle which has impact in the increasing of vegetable consumption. Healthy lifestyle does not only need protein and calorie but also vitamin and mineral contained in vegetable and fruits to carry out balanced nutrition consumption system [2]. The increasing needs for vegetable make the selling price also higher and this is an opportunity and profitable potency for vegetable cultivator.

Vegetable consumption of Indonesian people is still very low and fluctuated from year to year with average value of 38 kg/capita/year or it's about 52% from FAO's recommendation of 73 kg/capita/year (The Ministry of Agriculture of the Republic of Indonesia 2011). This gap is a good opportunity to develop agri-business in vegetable supply sector which includes the cabbage. Rahim and Hastuti stated that the agri-business has elements that have very important role in agri-business and those are the agriculture land, manpower, capital and management [3].

1.2. Problem
Based on the description above, the problem formula in this research is that how the cabbage production can be increased through process analysis that influences total production in Batunya Village, Baturiti Sub-district, Tabanan Regency.

1.3. Special purpose
Purpose of this research is to find out the process of cabbage production and factors that influence the production in Batunya Village, Baturiti Sub-district, Tabanan Regency.

1.4. Research urgency
Research of home scale cabbage cultivation agri-business production in Batunya Village, Baturiti Sub-district, Tabanan Regency will give a description of small business type that can be developed by the local people to be able to increase cabbage cultivator's income which is directly related to the people's welfare. This research also has function to educate the cabbage cultivator about the method to manage the production process so the cabbage produced will remain in a good quality and the price is stable and even increase. In additional, the small business of the cabbage cultivator has potency in increasing the people's income and expanding the job opportunity.

2. Literature review

2.1. Vegetable
Agriculture sector is the major livelihood for Indonesian people. The agriculture sectors include the crops, horticulture, fishery, livestock, plantation, and forestry. The horticulture includes the fruits plant, vegetables plant, herbs, and decoration plants. Of the four horticulture products the vegetable has very important role for human life whether as source of food and nutrition as well as the family's income [4]. According to [5] stated that vegetables are the horticulture commodity which becomes the important part of menu in Indonesian family.

Vegetable is horticulture commodity which is needed by the people. Beside as the essential commodity to fulfill basic needs of human in supplying vitamin and mineral, it also give contribution for 38.07% in 2008 to horticulture sub sector [2]. Vegetable products are potential to be developed considering that total vegetable consumption of Indonesian people keep increasing according to the high total population growth from year to year. On site data shows that vegetable consumption of Indonesian people during 2005-2010 which is shown in Table 1.

Table 1. Level of indonesia's vegetable consumption 2005-2010.

No	Year	Consumption Level (kg/capital/year)	Recommendation FAO (kg/capital/year)
1	2005	35.30	
2	2006	34.06	
3	2007	40.90	73
4	2008	36.50	
5	2009	40.10	
6	2010	41.90	

Source: The ministry of agriculture of the Republic of Indonesia 2011

As seen from Table 1 it is known that the vegetable consumption of Indonesian people is still very low and fluctuated from year to year with average value of 38 kg/capita/year or it's about 52% from the FAO's recommendation. This gap is a good opportunity to develop the agri-business in sector of vegetable supplying which include the cabbage. The agri-business has elements that play very important role in the agri-business activities which are the agriculture land, manpower, capital, and management [3].

2.2. Planting and taking care
The cabbage (*Brassica*) is vegetable that has round and rather flat shape like a ball which consists of layers of leaves. Cabbage is sub-tropical vegetable plant which is many planted in plateau. Baturiti Sub-district Plateau in Tabanan Regency is a central production of cabbage to supply local needs in Bali Province which is sold in the traditional market of Baturiti. What should be noticed in carrying out cabbage cultivation are the following [1]:

- Growth conditions of cabbage. Cabbage is one of plant types that can be planted during the year so it can be planted during rainy season or dry season. In order the cabbage can grow properly you can plant cabbage at 800 m above sea level height with enough rainfall and at climate temperature between 15 to 20 Celsius degrees. Land that efficient for planting cabbage is the land with loose texture with PH of 6 – 6.5.
- To Cultivate the Land and Water. Before planting cabbage seeds the initial step that should be done is to clean all weeds and remaining plants on the land that will be used. If the weeds and remaining plants are not to be cleaned it will make more plant diseases on the cabbage such as swollen root, rotten and soft, seedling, etc.
- Land Preparation. The land wanted to be used as cabbage planting place should be ploughed with 20 to 30 cm depth. The land used should be mixed with fertilizer in order to keep it fertile.

The above conditions should be noticed in carrying out cabbage cultivation business in order to give optimum result with high productivity. In addition to notice above conditions it also needs business feasibility study in carrying out cabbage cultivation business.

2.3. Marketing
Actually the commodity of Indonesian vegetable has good competitive and comparative superiority because of natural resources support. But the fact is that it is still hard to compete to fulfill export market to neighborhood countries such as Singapore and Malaysia due to the quality and continuity of the supply and the high exploitation during the transportation process [6]. Cabbage price in the level of local farmer is fluctuated from Rp 2,000 to Rp 4,000 per kg depends on the season. If harvest time the price is relatively low and during holidays and other than harvest time the price will increase.

2.4. Calculation of Total Sample
Total sample counted based on Colton formula [7] is as the following:

$$n = [\frac{(Z\alpha - Z\beta)\sigma}{\mu1 - \mu0}]^2 \qquad (1)$$

where:
n   =   total sample
Zα   =   upper limit of significance at level of confidence 95%, Zα = 1.96
Zβ   =   lower limit of significance at level of confidence 90%, Zβ = -1.645
σ   =   deviation standard
μ_o =   average of initial research variable
μ_1 =   average of research variable with treatment
     Fluctuation of production is about 20%. Thus, total sample needed is n = 12 people.

2.5. Production analysis
Production function is the correlation between physical output and physical input. Mathematically the correlation shows the correlation between maximum quantities of output that can be resulted from a series input given [8]. The production function is as the following formula:

$$Q = f(K,L) \qquad (2)$$

Q = output level per unit period,
K = service and reserve flow or capital supply per unit period,
L = service flow from company's worker per unit period

     Purpose of every company is to change input to be output. Farmer combines their power with seed, land, equipments to harvest crops, etc. [9]. In economy field the Cobb-Douglas approach is a functional form of production function which is broadly used to represent the correlation between the output and input. Mathematically the Cobb-Douglas function is

$$Q = AK^{\alpha}L^{\beta} \qquad (3)$$

Q   =   Output
K   =   Capital input
L   =   manpower input
A   =   parameter of technology efficiency/ coefficient
α   =   elasticity of capital input
β   =   elasticity of manpower input

     Completion of correlation between dependent variable and independent variable uses the regression method, where variation of independent variable will be influenced by the variation of dependent variable. Thus, the principles in regression line are also valid in completion of the Cobb-Douglas function [10].

3. Methodology
This research was carried out in Batunya Village Baturiti Sub-district Tabanan Regency. Subjects or respondents in this research are the cabbage Cultivators with total respondent of 12 people. This research was performed by using survey method. Data collected consists of the primary and secondary data. The primary data related to social economy and business conditions until today is collected by interview and filling in the questionnaire directly. The secondary data is collected from

the office of the head of village, Baturiti Sub-district in Number, and the Central Bureau of Statistics of Tabanan Regency and other references related to the research. The primary data obtained from cabbage cultivators as subjects or respondents furthermore is processed and analyzed descriptively.

The dependent variable in this research is the production of cabbage, whereas the independent variable consists of the land width, total fertilizer, pesticide, and manpower. Variable involved in this research is shown in Table 2.

Table 2. Research variable.

Variable	Notation	Definition
Dependent varible:		
Cabage Production	Y	Amount of cabbage production (kg) that yield in production massa that are ammount of cabbage reach that resulted in one year.
Independent Variable:		
1. Wide of area	X1	Wide of aret planted of cabbage in unit of are
2. Fertilizer	X2	Fertilizer amount needed per wide unit in one period (kg)
3. Labour	X3	Amount of labor in one month (people)

In this research the independent variable is more than two variables to one dependent variable so it will use the multiple linear regression by using ordinary least square regression (OLS) method. The function of output value of cabbage production to be researched can be formulated as follow:

$$Y = f(X_1, X_2, \ldots X_n) \tag{4}$$

Furthermore it is described in equation of:

$$Y = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + e \tag{5}$$

Where:
Y = Output value of cabbage production
X_1 = Land width
X_2 = Total fertilizer
X_3 = Manpower employed
a = Constant
b1, b2, b3 = regression coefficient
e = Error estimation

Correlation model between input and output in the form of independent variable and dependent variable is shown in Figure 1.
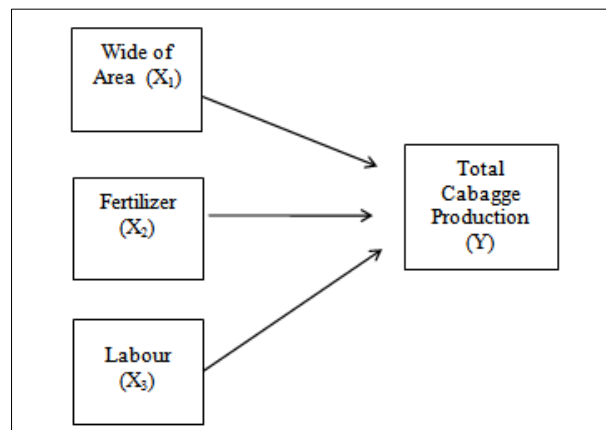
Figure 1. Correlation of input and output.

4. Results and discussion

4.1. Description of production process

Cabbage cultivation is started from the land preparation, treat the soil so it is loose, planting cabbage seed, fertilizing, and spraying plant disease by using pesticide. Fertilizing is carried out twice which is the first time when the plant age is 0-15 days and the second time is when the plant age is 15-60 days. Whereas the spraying is carried out according to condition on site, if there was any plant disease then spraying is immediately done. One period goes on during 60 days or 2 months..

4.2. Financial analysis

Cost to be analyzed in this research covers all cost expended by farmers for production process during one period or for two months. The cost is the variable cost that consists of cost for fertilizer supply, pesticide purchase, and wage for manpower. The cost and average income of cabbage cultivator is presented in Table 3.

Total cost needed by cabbage cultivator with land width of one acre in one period is as shown in Table 3. This business cost is mostly used for manpower wage which reaches for Rp 2,000,000 or 75% of total cost, whereas the other 25% is cost for fertilizer and pesticide supply.

Manpower is a very important production factor in carrying out business activity whether in home scale business (family business) or other small industries. The cabbage cultivator in Batunya Village, Baturiti Sub-district, Tabanan Regency is still traditional by using simple hand tools and it is a family business where it utilizes relatives as the manpower. Average of manpower used is for 50 HOK (day people work) per period (two months).

Table 3. Cost and cabbage cultivator's income in one period.

No.	Description	Quantity		Price Unit (Rp)	Total (Rp)
1	The result of harvest	1.600	kg	3.000	4.800.000
2	Cost				
	a. Fertilizer	1½	zak	350.000	525.000
	b. Pestiside	3	bottle	50.000	150.000
	c. Labour	50	hok	40.000	2.000.000
	Cost Total				2.675.000
3	Income				2.125.000
4	R/C ratio				1,79

Income of cabbage cultivator came from cabbage sale. Cabbage price in the market today is vary between Rp 2,500/kg – Rp 3,500/kg. By taking average price of Rp 3,000/kg, cabbage cultivator's income is for Rp 4,800,000/period. The net income of the cultivator is calculated based on the revenue deducted by cost expended that is for Rp 2,125,000/period. Ratio between revenue and cost expended (R/C ratio) is for 1.79 which means that every cost expending will have revenue for 1.79 times of cost expended.

4.3. Production analysis

Analysis production of cabbage cultivator is carried out by multiple linear regression method that is a model to find out the influence of independent variable which consists of total cabbage and fertilizer given, to dependent variable that is total cabbage production. This multiple linear regression statistics analysis uses the SPSS (Statistical Package for the Social Sciences) program for windows V.21. The conclusion of data processing result is presented in the following Table 4.

Table 4. Multiple linear regression analysis result.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-10.981	83.410		-.132	.898
	Jml Pohon	-1.316	.687	-1.181	-1.915	.088
	Pupuk	10.396	2.960	2.165	3.512	.007

a. Dependent Variable: Produksi

By entering the value of a = -10.98; b_1 = -1.31; and b_2 = 10.39 in linear regression equation $Y = a + b_1 X_1 + b_2 X_2$ it is found out the following equation:

$$Y = -10,98 - 1,31 X_1 + 10,39 X_2 \tag{6}$$

The interpretation of this regression equation can be explained as the following:
- Constant/intercept is for -10.98; mathematically it stated that if the independent variable value which is the total cabbage plant (X_1) and fertilizer given (X_2) has the same value of zero, then the cabbage production (Y) is -10.98, this does not influence significantly where the value of p = 0.898 (p >0.05).
- The regression coefficient total cabbage plant (X_1) is -1.31 which means that the increasing of one unit of cabbage plant with assumption of other independent variable the constant will cause the decreasing of cabbage production for 1.31 kg, and it does not have significant influence either with value of p = 0,088 (p>0.05).
- Regression coefficient of total fertilizer given (X_2) is for 10.39 which means that the increasing of supplying one unit of fertilizer variable with assumption of other independent variable the constant will cause the increasing of cabbage plant production for 10.39 kg and it has significant influence where p = 0.007 (p<0.05). Total fertilizer given has obvious influence to total cabbage production, which means that if the cabbage cultivator increases the fertilizer giving it will increase the total cabbage production.

5. Conclusions

Based on the analysis result and discussion carried out it can be concluded as the following:
- Ratio between the revenue and cost expended in cabbage production process (R/C ratio) is for 1.79 which means that every cost expended will get revenue for 1.79 times of cost expended, so it is quite reasonable to be developed.

- Variable of total fertilizer given has significant influence to the increasing of cabbage production result which means that it can increase the cabbage cultivator's income.

6. Suggestion

To increase the cabbage production the cultivator needs to notice the fertile soil, enough fertilizer, so the cabbage yield increases and it will increase the people's income and family's welfare is fulfilled.

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Decision support system application of education staff performance allowance in Manado State Polytechnic by using Saw Method

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Abstract. The process of employee performance appraisal as generally carried out by institutions, agencies or ministries with certain assessment elements and criteria. The assessment is carried out with the aim to measure the achievement of performance in accordance with the set assessment standards. Assessment is still done using manual calculations without using systems and decision support methods, also in terms of the accuracy of the assessment which tends to refer to the assessment that is less objective. Overcoming such matters, it is necessary to have a decision support system that can process data with several criteria, sub criteria based on grade value so that it can help decision makers for performance evaluation. Decision support systems have several methods used for decision making, one of which Simple Adaptive Weight (SAW) is a research method, which is the author's reference for making a decision support system. The author successfully designs a Decision Support System application design using the Simple Adaptive Weight (SAW) method which is expected to be able to calculate and process the assessment criteria data. so that it can produce results the end is in the form of an appraisal calculation.

1. Introduction

The development of technology in the field of information is growing rapidly even today technology is very important in supporting the needs of a company or government agency. Its role is good to realize the effectiveness and efficiency of work in improving services to the community and systems that can help in making decisions. Employees are important human resources in determining the success of a job so that having high quality and competent human resources is one of the supporting factors to increase the productivity of an institution or agency's performance and to see the quality and competency of employees and whether or not the employee is productive in a unit that work must be assessed. In addition, employee performance appraisals are carried out in general, aiming to measure the extent of their productivity at work on the other hand, as well as to reward employees in an effort to improve performance in work units.Manado State Polytechnic carries out a process of employee performance appraisal as generally carried out by other institutions or agencies with certain assessment elements and criteria. The assessment is carried out with the aim to provide performance allowances for education staff, based on observations and case studies conducted, it is found that the assessment is still carried out using manual calculations without using a decision support system and

method, also in terms of the accuracy of the assessment which tends to refer to the assessment less objective so that it is not optimal. Based on these things, this study aims to develop a "Application of Decision Support System for Calculating Performance Allowances for Education Personnel of the State Polytechnic of Manado with the SAW Method" and the research is focused on creating a computerized system of software applications that can help or facilitate the personnel in performing calculations structured appraisal by weighting the value of sub criteria criteria and using decision support methods Simple Adaptive Weight (SAW) and also the head of general and staff can verify the results of the assessment and the deputy director of the general and financial fields can validate the results of the assessment whether the assessment results are accepted or rejected so it is hoped that this application can produce decisions that are more relevant and acceptable to all parties.

2. Literature review

2.1. Decision making
Decisions are the result of solving the problem it faces decisively. In a large dictionary of decision making knowledge (decision making) is defined as the choice of decisions or policies based on certain criteria. This process includes two or more alternatives because if there is only one alternative no decision will be taken. G. R. Terry argues that decision making is based on certain criteria, on two or more possible alternatives.
Factors that influence decision making according to Terry, namely:

- Tangible and intangible things, emotional and rational, need to be taken into account in decision making.
- Every decision must be made as material to achieve the goal of each decision, not oriented towards personal interests, but must prioritize interests
- Rarely do satisfactory choices, therefore make alternative alternatives.
- Decision making is a mental action from this action must be changed into physical action.
- Effective decision making requires sufficient time
- Practical decision making is needed to get better results.
- Every decision should be institutionalized so that the decision is known to be true.
- Each decision is the beginning of the next set of chain activities.

2.2. Decision support system
The concept of a Decision Support System (DSS) was first introduced in the 1970s by Little. According to Little (1970), Decision Support System is a collection of procedures based on models, which are used as data and considerations to assist managers in making decisions (Turban, 2011: 88). The initial definition of SPK shows SPK as a system intended to support managerial decision makers in a semi-structured decision situation. DSS are intended to be a tool for decision makers to broaden their capacities, but not to replace their judgment. SPK is intended for decisions that require judgment or on decisions that absolutely cannot be supported by an algorithm (Turban, 2011: 88).
Key characteristics and capabilities of DSS include the following (Turban, 2011: 90):

- DSS supports semitructured problems (problems that are routinely repetitive, but human judgment is still needed in applying the solution) or unstructured (problems that are not yet clear and complex so that no immediate solution can be used).
- DSS supports decisions for various layers of managers.
- DSS supports decisions for groups and individuals.
- DSS support decisions that are interdependent and / or collapsed.
- DSS supports a variety of ways and styles of decision making.

- DSS is flexible (users can add, delete, and change the basic elements managed by DSS) and can be adapted (users adapt the system to be able to deal with conditions that are rapidly changing).
- DSS is user friendly so it can be easily adapted by users who are not experienced with computer utilization.
- The purpose of using DSS is to increase the effectiveness of decision making (time and quality), not efficiency (minimizing costs).
- DSS are used to support decision makers, not replace them.
- DSS must be easy to configure, flexible in use, and easily modified to meet the various needs of each decision maker.
- DSS can use modeling to analyze situations and problems that require a decision. Modeling capabilities allow users to try various strategies of action in different configurations and configurations.
- Access is provided for various forms of data sources, formats and types.
- DSS can be developed as a standalone tool used by a decision maker at one location and integrated with other applications, and distributed through network or internet technology.

2.3. SAW method

The Simple Additive Weighting (SAW) method is often also known as the weighted sum method. The basic concept of the SAW method is to find a weighted sum of the performance ratings for each alternative on all attributes (Fishburn, 1967) and (MacCrimmon, 1968). The SAW method requires the decision matrix normalization process (X) to a scale that can be compared with all available alternative ratings. This method is the most well-known and most widely used method in dealing with a Multiple Attribute Decision Making (MADM) situation. MADM itself is a method used to find optimal alternatives from a number of alternatives with certain criteria.

The SAW method requires the decision maker to determine the weight for each attribute. The total score for the alternative is obtained by adding up all the multiplication results between the rating (which can be compared across attributes) and the weight of each attribute. Rating of each attribute must be dimension free in the sense that it has passed the previous matrix normalization process. The decision making process is to choose an alternative. The SAW method is often also known as the weighted sum method. The basic concept of the SAW method is to find a weighted sum of the performance ratings for each alternative on all attributes. The SAW method requires the decision matrix normalization process (X) to a scale that can be compared with all available alternative ratings.

The advantages of the SAW method:

- Determine the weight value for each attribute, then proceed with the ranking process which will select the best alternative from a number of alternatives.
- The assessment will be more appropriate because it is based on the criterion value of the predetermined preference weights.
- The matrix normalization calculation is in accordance with the attribute value (between benefit and cost value).

Weaknesses of the SAW method

- Used in local weighting.
- Calculations are performed using crisp or fuzzy numbers.

2.4. Website

Website or site can be interpreted as a collection of pages that are used to display text information, still or motion pictures, animations, sounds, and or a combination of both static and dynamic that form a series of interrelated buildings, each of which is connected with page networks. The relationship

between one web page with another web page is called a hyperlink, while the text is used as a connecting medium is called hypetext. There are several things that are prepared to build a free website, then the supporting elements must be available as follows:

- Domain name (Domain name / URL - Uniform Resource Locator)
- Home website
- Content Management System (CMS) The development of the website world at this time is more emphasis on content management is a website. Users who can not website programming languages at this time can create a website using the CMS.
- Types of web along with the development of information technology so quickly, the website also experienced a very significant development. In grouping web types, more directed based on the function, nature or style and the programming language used.

The types of web based on nature or style, namely:

- Dynamic website, is a website that provides content that is always changing at any time. The programming languages used include PHP, ASP, NET and utilizing a MySQL or MS SQL database. For example the website www.artikel.com, www.detik.com, www.tecnomobile.co.cc, and others.
- Static website, is a website whose content is very rarely changed. The programming language used is HTML and has not utilized the database. For example: organization's web profile, and others.

3. System analysis and design

3.1. Data flow diagram

Data flow diagrams are an overview of the data flow that runs on the application system where in this design the data flow diagram will be explained either through context diagrams or DFD Level 1 so that it can be known the details of the process related to the data flow from the system process to entities that use the system.

3.1.1. Context diagram. In this stage the author will explain the data flow in the application as a whole where it is known that there is a support system for employee performance appraisal decision which is the core data flow process that is accessed by 3 system user entities, namely admin, leader and also officers.
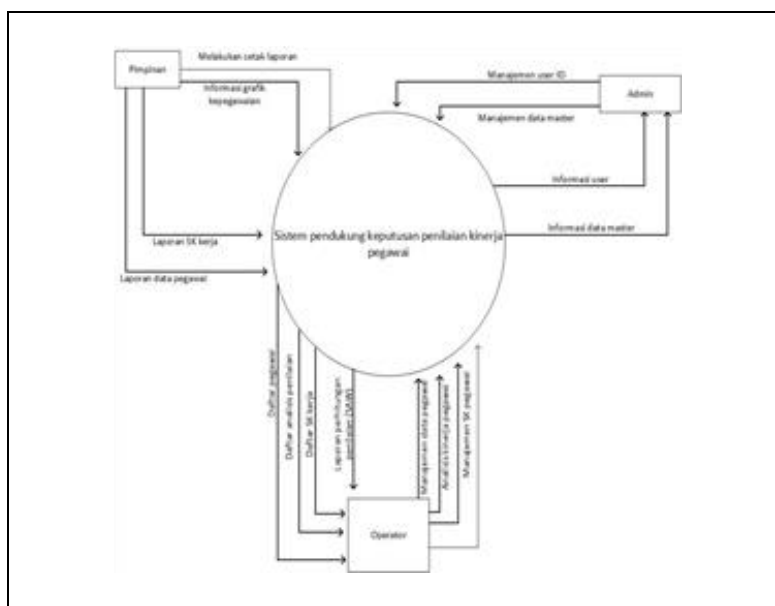

Figure 1. Context diagram.

3.1.2. Level 1 Diagram. Next will be described about the system process flow in more detail per sub-process system for each application page, the following will be divided process data flow for each application page, among others.
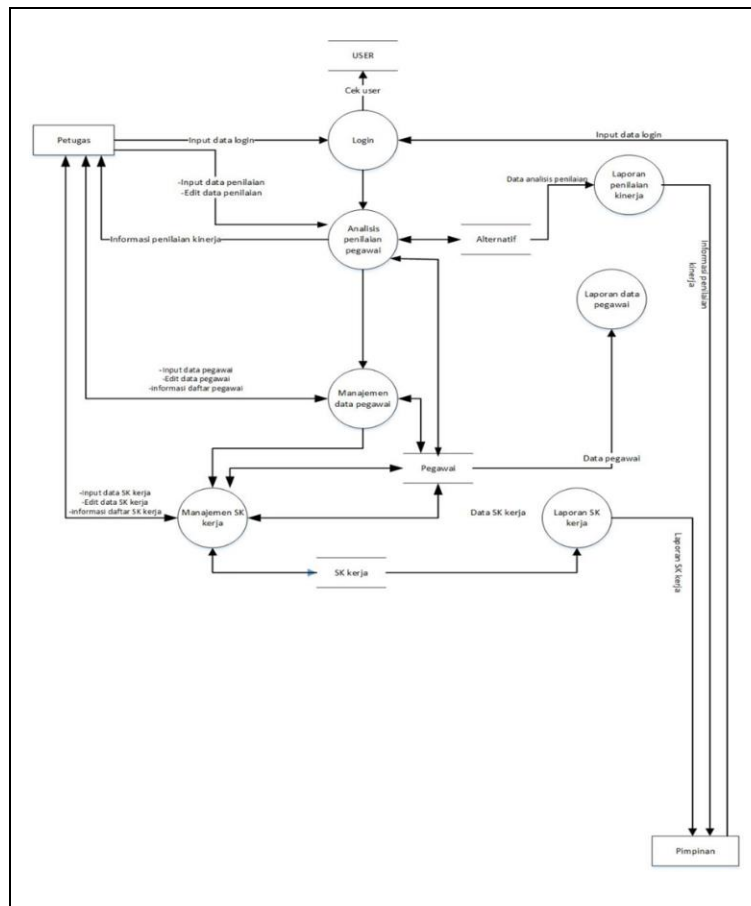

Figure 2. Level 1 diagram.

3.2. System design
In the plan to implement a computerized system that is so that the system is ready to operate, it is necessary to carry out activities of its application. The steps that need to be taken to implement the system are making programs, testing programs, training and receiving documentation, but in writing this thesis the implementation of the system is carried out only to the stage of making the program. From the results of the needs analysis, the design, design and manufacture of the application program the author succeeded in making a decision support system application related to performance appraisal in providing performance allowances can also function as an employment information system. Where in the system created by the author will be operated by 3 users with access capacity of each according to the needs of the user officer, leader and admin user.

The ability of the application made is that it can process employee data related to each employee's personal data information, educational data and work experience data, in addition there is also an analysis of employee assessment criteria where each employee will be assessed and the value is inputted into the application to be processed in accordance with weighting per assessment criteria set in the program by applying the SAW weighting calculation method. There are 3 evaluation criteria namely attendance, performance and integrity which have different weight values for each criterion so that the method will get an accurate weighted calculation analysis results for each criterion as well as

the accumulated value of each alternative. Another advantage of the application is that there is data collection related to work information or work history of employees so that each employee can be known about his work history according to the existing work scheme and then there is information regarding salary and benefits data for each employee and finally the system is also equipped with information processing related to employees who excel and employees who get punishment. And each data processing menu either employee information, employee performance appraisal analysis information, work and rank information, list of employee benefits and employees who excel and who receive the penalty of each menu there are reports that can be accessed and printed by the lead user. In addition, there is a special admin user to manage the user either creating or deactivating or activating the user. So it is hoped that by applying this application in the official section of the Manado State Polytechnic campus, staff can help staff in the processing of employee data also help in making assessments related to employee performance more accurately because it uses the SAW weighting system method.

4. Results and discussion

4.1. Assesment page

To access this page the user must enter the performance assessment menu and then a list of employees will be displayed along with the criterion value and then the user can select the employee to update the assessment data. This page contains nip information, name and assessment criteria column. For the name and nip columns cannot be edited, while the criteria column can be edited according to the data in the combo box selection.
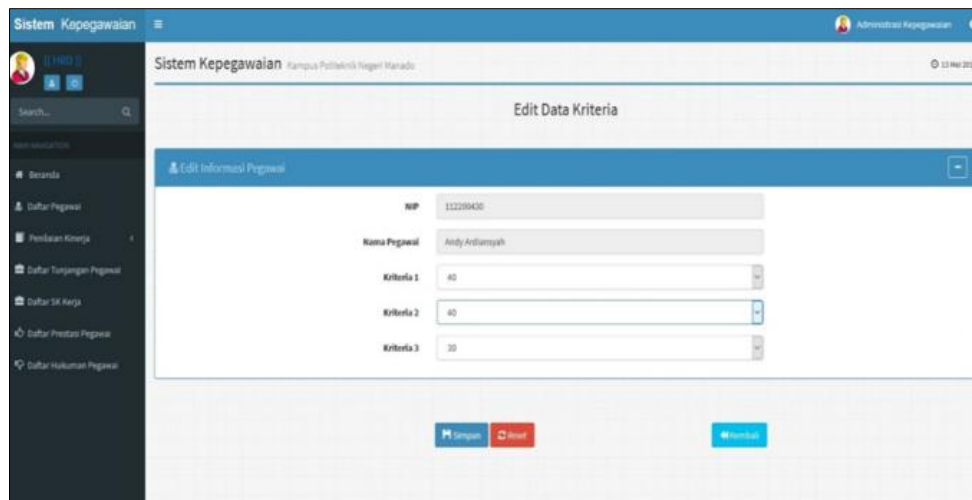

Figure 3. Form criteria.

4.2. Home page

After the user has successfully logged in to the login page using the lead user then the user will then be directed to the home page. on this page will display percentage information about employee data by gender in the form of pie pie then employee data per work unit or department is displayed in a bar graph while data on employee achievement and penalties is displayed in graphical form. Besides that, this menu also contains a list of access reports on the menu to the left of the application layout.
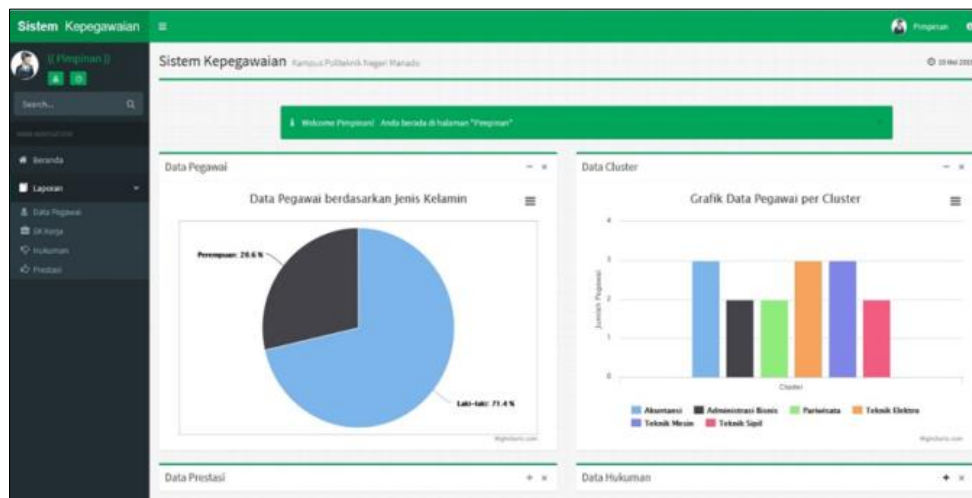
Figure 4. Home page layout (employee and cluster).
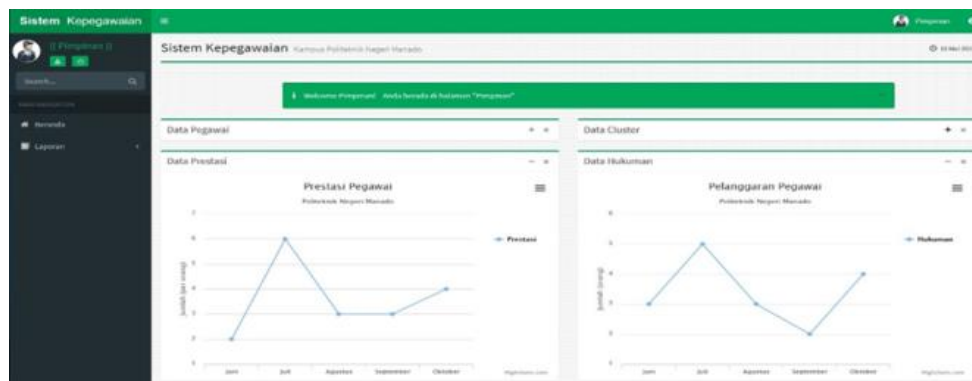

Figure 5. Home page layout (achievements and violations).

4.3. The page of list working

This page will display the input data of assessment weights for each criterion given by the HRD officer besides that there is an action menu for editing assessment data.

Figure 6. Employee assessment page.

Data input page and to input employee performance appraisal. And this page explains about inputting assessment criteria data where to access this page is to click the add data button on the performance evaluation data list page. There is a choice of employee data that will be given a value based on nip and there is also an assessment option for criteria 1-3 with a choice of values from the scale of 10-1.

Figure 7. Input form data assessment.

Figure 8. Performance appraisal report.

Report page calculation results of weighting assessment criteria. In this page contains information on the results of the calculation of employee performance appraisal criteria where this page will display the final calculation of the weighted values added for each criterion and sorted by the highest value.

5. Conclusions
With this application, calculations can be made more quickly, and the results of the calculations can be verified by the leadership of the Head of the general section and Staffing and subsequently validated by the deputy director of the general and financial fields whether it is appropriate or not and whether it is accepted or not. decision support by applying the SAW method that can calculate weighting based on 3 criteria, namely the attendance criteria with a weight of 30%, the performance criteria with a weight of 40%, and the integrity criteria with a weight of 30% that are accumulated using the SAW weighting calculation formula so that it generates a report in the ranking value for each alternative. Employee data and list of employee benefits are stored in the SPK application database and can be

quickly accessed besides the archiving of data in a neatly structured application making it easier to find data and there is no possibility of scattered data such as permas the old system. therefore the data can be managed properly and correctly through applications made based on the web so that it can be accessed from anywhere using the internet.

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Experience of the faculty of knowledge in the application of quality management system to obtain ISO certification

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Abstract. We had examined the applicability of ISO 9001: 2015 to the Al Ma'arif University College, and due to the absence of ISO 9004: 2015, we have sought to adopt ISO 9004: 2009 after minor modifications. After identifying the team responsible for writing the quality manual, procedural manuals and work instructions, we distributed the questionnaire questions, which represent the summary of standard 9004, to all relevant officials. After analyzing the findings, we found a large gap between what actually exists and what is applicable. We identified the constraints that prevent the application of the standard, and we gave the solutions to overcome them and the benefits expected to be achieved when applied.

1. Introduction
The quality management system was applied in accordance with the requirements of the standard of the quality management system ISO 9001: 2015 on the faculty facilities, which will reflect positively on the level of performance as it significantly reduces the waste in the capabilities of the faculty in terms of resources and staff time and also contributes to enable the university to analyze the problems faced and to deal with them Through corrective and preventive measures to prevent such problems from happening in the future, the system also enables all faculty and staff to participate effectively in management, to achieve development, improvement and organization that will have a positive psychological impact on the workers and therefore It will reflect positively on the college for an advanced global ranking, The internal audit will make the system work for the service of the College, in addition to that the system will contribute to linking all departments of the College and its units for harmonious institutional work instead of having a separate administrative system for each department or unit.

2. Practical application and results
Based on the desire of the Deanship of the College to implement the quality management system in accordance with the requirements of the standard of the quality management system ISO 9001: 2015 and qualify for a certificate of conformity, the induction session of the system was held on December 15, 2017 with a number of concerned with quality, and the course was introduced in the system on 20 December 2017. In addition to the analysis and study of the gap between the levels already in the application of the system and what is supposed to be applied over the course of 3-4 January, through many field visits to all the main units of the college included in the scope of work, including those

units Information Technology Continuing Education and Management Projects, operation and maintenance, financial and administrative affairs administration, development and quality division, admission, registration and laboratories unit. Since we have not obtained the ISO 9004 Guideline for ISO 9001: 2015, we have adapted the Guideline 9004: 2009 for the ISO 2008 Standard to fit the ISO 2015 Standards to prepare the College for ISO certification once we have obtained the ISO 9004 Guidelines. Guideline 9004: 2009 Self-evaluation as an important tool for the evaluation of all elements of the quality management system, in the faculty and all departments, which includes methods of leadership, strategy, management system, resources and processes. Quality applied to the college circuit and then identifies opportunities for improvement or innovation, or both. Finally, I see no significant change in ISO 9001: 2008 and the change is a formality in which the number of items has been changed from 8 to 10, with the emergence and focus of several new terms, and the disappearance of some terms and concepts from the old version of ISO 9001. What appeared in the new version of ISO 9001: 2015 is the following terms and concepts certain terms have also disappeared from the new ISO 9001: 2015 quality manual and management representative. External Provider instead of Supplier In accordance with the above, all the main procedures of the system were approved on 20/1/2018, and a number of faculty members were named to prepare the internal auditors of the system, in addition to preparing the internal audit plan for the system within the main units of the faculty including the scope of work during the first week of February 2018. In order to develop the mechanism of continuous improvement of the quality of the institutional performance and obtaining the ISO 9001: 2015 certificate from the Central Organization for Standardization and Quality Control, the College started to implement the quality management system in those units. Conduct internal audits, detect non-conformities and remedy them through corrective actions and conduct ongoing reviews and evaluations to verify that the system is working as intended, and find out where the identified problems can be improved, corrected or prevented. This is done through internal auditing by the faculty staff trained for this process or what is known as internal audit, as well as by an external certification body or what is known as external audit. All this is to ensure the application of the system entirely in accordance with the requirements of ISO 9001.
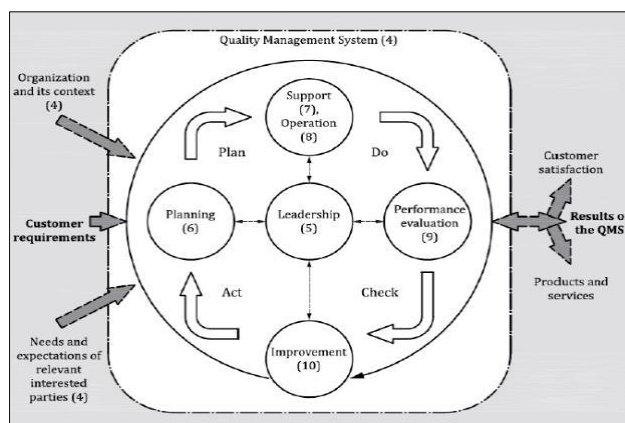
Figure 1. The elements of ISO 9001: 2015.

The Quality System Management Unit is one of the building blocks of the college for development and quality with its main tasks in maintaining the application of the quality system within the college and its main units after the college obtained the ISO 9001: 2015 certification including the scope of educational services, research and partnership. The college should review its performance against specific criteria, determine current maturity levels and identify strengths and weaknesses. Standards raised at higher levels of the college maturity model can help identify issues and issues that require attention from the college as well as identify improvements.

Tables A1 and A2 (in Appendix A) provide examples of complete tables based primarily on this standard used to determine the level of maturity in achieving sustainable success. Figure 2 shows the numbers of Annex A.

The main element	Level of maturity for sustainable success				
	Level 1	Level 2	Level 3	Level 4	Level 5
Element 1	Standard 1 The basic level				Standard 1 Best practice
Element 2	Standard 2 The basic level				Standard 2 Best practice

Figure 2. Comprehensive model of the elements of self-assessment, standards for maturity levels.

After distributing the questionnaire forms to the professors and staff in the units for the purpose of determining the level of maturity in the understanding and application of the specification, we analyzed the results and compared them with the elements in the guiding specification. It was found that there is a big gap between what is required and what is achieved. Figure 3 shows the level to be achieved and the actual achieved. Through field study and realism, we found out the reasons and obstacles that prevent the application of the system. We then developed appropriate solutions in accordance with the content of the standard.
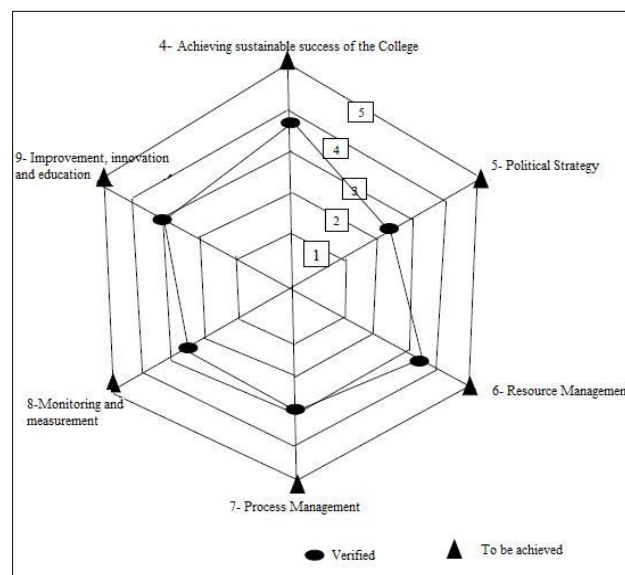
Figure 3. The level to be achieved and the actual achieved (verified).

3. Obstacles facing the application of the standard in the college

- Not to achieve a balance between the needs of the parties concerned emerging, and to identify the best possible performance as a major goal to achieve and follow a proactive approach oriented to learn while taking advantage of the energies of all teachers and staff at all levels and to achieve a

high reputation for the faculty through research and publication at the same time and make decisions based on The need for flexibility, responsiveness and consistency.

- Lack of sufficient understanding of the importance of the application of the standard in raising the efficiency of the educational process and thus obtain a graduate with the ability to achieve the wishes and needs of society in addition to the ability to research and development and the completion of graduate studies.

- The need to seek opportunities to improve the planning of scientific curricula and laboratories through comparative measurement. And the allocation of sufficient financial resources is to achieve the objectives of the college with a continuous process to re-evaluate this allocation. Through comparative measurement.

- The absence of a mechanism to involve the parties concerned to contribute to the success of the work of the College with their contribution to the implementation of effective monitoring and application of reporting mechanisms, which includes feedback from all concerned parties and reviewed by the Deanship with the provision of a mechanism to communicate with the College to ensure that the needs of the parties concerned.

- The absence of a risk analysis mechanism to identify additional opportunities for improvement, the failure of the College to carry out self-assessment processes at all levels, and the use of comparative measurement as a tool to identify opportunities for improvement, innovation and learning.

4. Solution

Solutions to be followed to achieve the optimum application of the standard and raise the educational level and graduate student achieve the ambition of the community and the relevant stakeholders beneficiaries:

- Focusing on achieving a balance between the needs of the new parties concerned, identifying the best possible performance as a main objective and achieving a proactive approach that is oriented to learning, taking advantage of the capabilities of all teachers and staff at all levels and making decisions based on the need for flexibility, responsiveness and consistency of performance.

- Distinguished planning to give scientific material and distribute effectively to produce a superior student, and to exceed the results achieved the average level of the college and maintain these results in the long term to be applied improvement and innovation in all faculty educational and service facilities.

- Integrate KPIs (Key Performance Indicators) in real time to monitor all processes and effectively deliver performance to all stakeholders involved in those processes.

- Setting priorities for continuous improvement on the input of new stakeholders and share the learning processes in the college with the parties concerned with stimulating creativity and innovation.

- The quality management system should cover the overall policy of the college with sustainable performance improvement and planning for the distant future (e.g. the next five years). With continuous planning and risk assessment in permanent and continuous is operations altogether to reduce all constraints.

- The needs and expectations of all parties concerned over the past years should be clearly met and the strategies of the college resulted in achieving the objectives of the college and meeting the needs of the parties concerned.

- The concerned parties should be involved and contribute to the success of the work of the College and confidence in maintaining this level of contributions while showing the desire and confidence in the continuity of maintaining this success. Contribute to the implementation of effective monitoring and the application of reporting mechanisms, which includes feedback from all parties concerned. The policy, planning and strategy dissemination is reviewed and updated using data

from the monitoring and analysis of the performance and work of the college. With the provision of a mechanism to contact the College to ensure that the needs of the parties concerned.

- Seeking opportunities to improve curriculum and laboratory planning through comparative measurement. And allocate sufficient financial resources to achieve the objectives of the College with an ongoing process to reassess this allocation.
- Compare the basic cost of the infrastructure and performance of the college with other educational institutions preferably those similar to them in the activity and is used contingency planning to reduce potential threats and discover more opportunities. And create processes to improve the work environment that support competitiveness and compare it with similar institutions in activity. Comparing the results achieved by the College of Information, Data and Technology Management with other colleges.
- Comparing the performance of the educational process with leading universities and using the results in the planning of the process.
- The monitoring process should result in reliable data that can be relied upon and a clear trend. The changes that occur or are expected to occur in economic policies, educational curricula, technological means, environmental protection or any social or cultural issues that may or may affect the performance of the faculty are monitored.
- Using systematic analysis of comprehensive data to predict the future performance of the college and confidence in the results of this prediction. Indicators contribute to appropriate strategic decision-making. Key performance indicators are selected and handled in a manner that ensures reliable information to predict serious trends and make strategic decisions.
- Risk analysis is used as a tool to prioritize improvement, with college reviews to involve other stakeholders in order to identify additional opportunities for improvement.
- Making strategic and policy decisions on the information collected and analyzed in a planned and systematic manner. The different sources of information show the quality of performance in all strategic and technical areas of the college.
- Review outputs should be shared with partners and used as input to improve the quality of graduates and processes that can affect their performance and satisfaction. The auditor's findings show that the efficiency of the actions taken will be demonstrated by a strong correlation between improvement activities and achievement of above-average college outcomes.
- Improvement should be included as a routine activity within the entire faculty as well as for its suppliers and partners. Focus on improving the performance of the faculty, including the ability to learn and change.
- Innovation activities are expected to make possible changes in the overall environment, so preventive plans must be developed to avoid or minimize the specific risks that can accompany innovation activities.
- The need to apply innovation to the student and the educational process and organizational structures and model of education and management system college, and must learn the culture of learning the possibility of the occurrence of risks and failure to occur, provided that this leads to learning from mistakes and discover more opportunities for improvement.

5. Expected benefits
- To significantly reduce the waste in the potential of the college in terms of resources and staff time.
- Enable the college to analyze the problems it faces and make them deal with them through corrective and preventive measures to prevent such problems from happening in the future.
- All faculty and staff can participate actively in the management, to achieve development, improvement and organization that will have a positive psychological impact on the staff and thus will reflect positively on the College to obtain an advanced global classification.
- Linking all departments of the college and its units for harmonious institutional work instead of having an isolated administrative system for each department or unit.

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[3]   International organization for Standardization 2008 *International Standard ISO 9001:2008 Quality Management Systems - Requirements* London: ISO & IEC
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Tick (√) to choose the most suitable:

Table (A1): Self-assessment of key elements - linking key elements to maturity levels.

What is the focus of management (deanship)?

Level 1	Level 2	Level 3	Level 4	Level 5
Focus on scientific material, students and their parents, and a number of reactions to problems and opportunities for improvement.	Focus on students and legislative and legal requirements with some structured procedures towards potential problems and improvements.	-Focus on the faculty of the teaching and staff -Processes are identified and applied to respond to problems and opportunities for improvement.	-Focus on balancing the needs of the current stakeholders. -Stress that continuous improvement is part of the concern of origin.	-Focus on balancing the needs of the current stakeholders. -Stress that continuous improvement is part of the concern of origin. -Focus on balancing the needs of emerging parties concerned. -The best possible performance is set as the main objective.

What is the leadership approach (administrative)?

Level 1	Level 2	Level 3	Level 4	Level 5
The curriculum is interactive and is based on top-down instructions.	The curriculum is interactive and is based on the decisions of managers of different levels.	The approach isproactive or preventive and delegated decision-making authority.	Proactive or preventive approach with a large involvement of workers (administrators, employees and teachers) in decision-making.	Proactive curriculum isoriented to learning while taking advantage of the energies of all workers at all levels.

How do you define important and vital things?

Level 1	Level 2	Level 3	Level 4	Level 5
Decisions are made based on input from the periphery and student families.	Decisions are made based on students' needs and expectations.	Decisions are made based on students' needs and expectations.	Decisions are made based on the deployment of the strategy in operational and operational needs.	Decisions are made based on the need for flexibility, responsiveness and consistency.

What you need to get the desired results?

Level 1	Level 2	Level 3	Level 4	Level 5
The material is managed in a random and unstructured manner.	The scientific material is managed efficiently.	The scientific material is managed effectively.	Scientific material is effectively managed in a way that takes into account the individual scarcity of resources.	The management and administration of the scientific material is planned And distribute them effectively to produce a superior student.

How are activities organized?

Level 1	Level 2	Level 3	Level 4	Level 5
There is an unorganized approach to the management of activities with some basic work procedures or instructions.	Activities are organized according to the function of each activity with the implementation of a basic quality management system.	The activities are organized according to a process-based quality management system that is effective, efficient and flexible.	There is an efficient and effective quality management system and interaction between all of its operations and is called the speed of response and improvement and cover the operations to the needs of the current stakeholders.	There is a quality management system that supports innovation, comparative measurement and coverage of current and emerging stakeholders' needs and expectations.

How are results achieved (monitoring and measurement)?

Level 1	Level 2	Level 3	Level 4	Level 5
Results are achieved randomly. Temporary corrective measures are issued when	Achieving and achieving some expected results Corrective and preventive measures shall be carried out	-Achieving and achieving the expected results especially with regard to the specific stakeholders.	-Achieve and achieve predictable, positive and consistent results while maintaining trends and	-The results achieved exceed the average level of the college and these results are maintained in the long run.

needed.	In a systematic way.	-Monitoring, measurement and improvement are always used.	tendencies. -Improvements and innovations are implemented in a systematic manner.	-Improvement and innovation are applied throughout the college.

How are priorities for improvement (improvement, innovation and learning) identified?

Level 1	Level 2	Level 3	Level 4	Level 5
Priorities for improvement are based on errors, complaints or required standards.	Priorities for improvement are based on student level data or corrective and preventive actions.	Priorities for improvement are based on the needs and expectations of some stakeholders as well as suppliers and all faculties.	Priorities for improvement are based on the inputs and inputs of other stakeholders as well as analysis of social, environmental and economic variables.	Priorities for improvement are based on input from emerging stakeholders.

How is the learning process (improvement, innovation and learning)?

Level 1	Level 2	Level 3	Level 4	Level 5
Learning is done randomly at the individual level.	Learning is done systematically through successful and failed college experiences.	The learning process is systematically applied and shared in the college.	The College adopts a culture of learning and participation that it uses in the process of continuous improvement.	The learning processes of the college are shared with the parties concerned while stimulating creativity and innovation.

Table (A2): Self-assessment of the detailed elements of item

Achieving sustainable success of the college (general)

Level 1	Level 2	Level 3	Level 4	Level 5
A quality management system is in place and based on business processes.	There is a quality management system based on the process approach.	There is an extensive quality management system based on the principles of quality management.	The quality management system in the faculty has been strengthened to integrate with other systems such as environmental management, occupational health and safety, and other activities.	The QMS covers the entire policy of the college.

Sustainable success

Level 1	Level 2	Level 3	Level 4	Level 5
It compares the actual performance of the college with the required level annually.	There are periodic performance reviews in the light of the action plan.	The results show a continuous and lasting improvement in performance over the past years.	There is sustainable performance improvement with planning for the near future (e.g. next two years).	There is sustainable performance improvement with planning for the distant future (e.g. the next five years).

College environment

Level 1	Level 2	Level 3	Level 4	Level 5
The College interacts with the changes that affect them.	There are plans to reduce the frequency of previous problems.	Risk assessments are carried out periodically to accommodate and identify potential impacts on the college.	There are contingency plans to reduce the risks to the college.	Planning and risk assessment in permanent and on-going operations to minimize all risks.

How learning is done (improvement, innovation and learning)?

Level 1	Level 2	Level 3	Level 4	Level 5
The ultimate purpose of the college is to make an annual profit.	The basic engine of the college needs of the student and his level of study.	The needs and expectations of all concerned individuals are met when possible.	Representation of stakeholders' needs and expectations Key inputs for decision-making by senior management.	The needs and expectations of all concerned parties have been met during the past years.

Choice model of transportation mode for international tourists based on travel characteristic in Bali

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Abstract. This study aims to analyse the travel characteristics of the most influential tourists trip in mode choices model with alternative modes based on operators. Analysis and modelling are using the Mix Logit. The distance of tourist trip could reach 190 km and for the majority of trips it's around 10-30 km per day, and for the majority of travel time it's 20-60 minutes per day. The most influential travel characteristic factors on rental for nearly all factors such as trip attraction location, number of group member, trip chains, distance, travel time and cost, then travel agent are influenced by number of group member only. Online and Public transportation also are influenced by all factors except trip attraction location. According to the mode choices model analysed, it shows that the highest probability is to use both rental-car and rental-motorbike with 22.5% and 20.2% respectively, then the choice of Agent-Bus and Agent-Car with probabilities of 18.9% and 11.7% respectively. Public transportation-Car also have a high probability of 18% to be used. The choice to use other modes such as Public-Bus and online transportation both by car and motorcycle modes, the probability is less than 5%.

1. Introduction

With the growth of international tourism which tends to increase, tourism in Indonesia is in fourth place in Southeast Asia in bringing foreign tourists compared to neighbouring countries such as Thailand, Malaysia and Singapore. According to the Asian Statistical Yearbook, 2018 [1] is known that Thailand is able to attract 32.58 million tourists, Malaysia attract 26.76 million tourists, Singapore arrives at 16.40 million tourists, while Indonesia in 2017 can only attract 14.04 million tourists [2]. With the same potential, Indonesian tourism needs to make efforts to attract more foreign tourists as well as other countries in Southeast Asia. Tourism plays an important role in the economy of Bali, but on the other hand, tourism travel contributes to the impact of transportation externalities such as delays, traffic jam, traffic accidents, parking problems in tourist areas and environmental problems [3]. These problems occur not only due to the limited transportation infrastructure system compared to the increasing number of tourist arrivals, but also with other problems, such as too much demand for movement compared to the systems and capacities of available transportation infrastructure [4]. As a tourism area, the highest ratio of travel destinations in Bali is for working with 47.19% of travels, followed by 20.84% for tourism activities [5], indicating that tourism travel contributes significantly to total trips in Bali. The magnitude of the movement is closely related to the type and intensity of

activities in the tourist attraction location. In favourite tourist attractions such as Kuta, Jimbaran and Ubud, high congestion occurs on weekdays and holidays. It will cause a bad image of tourism in Bali, so it must be addressed immediately.

The choice of travel mode as important elements in transportation and tourism planning, plays an important role in determining transportation policies in tourism destinations. Therefore it is necessary to analyse tourist choices and make models that are sensitive to travel attributes that affect tourists in the choice of travel modes [6]. These processes and results are important to be known by the government and stakeholders in planning, drafting regulations related to innovation in the development of transportation and tourism technology, developing appropriate tourism marketing strategies, preparing infrastructure and managing traffic. Based on the background and description as described above, the problem could be formulated with the factors of travel characteristics of foreign tourists that influence the choice of transportation modes in tourism destinations and the model of mode choice of foreign tourists based on the characteristics of their trip.

2. Literature review of tourism transportation and modelling

Mode selection modelling is a dynamic model and is highly necessary in transportation planning, because it involves the efficiency of movement, the space that must be provided by a region, transportation infrastructure and the number of choices of transportation modes that can be chosen by users [7]. It is important to make a model that is sensitive to the attributes of travel that affect individuals in mode choice. This can be obtained by an aggregate approach. For this reason, the innovation in this research is to develop a travel diary-based questionnaire design, by involving tourists directly as an important source in tourism planning, so that they can explore the characteristics of tourist travel directly to the choice of modes, operators, number of group member , travel time and costs.

2.1. Tourist travel component

Tourism is a travel activity carried out by individuals or by a group of people while visiting certain places for recreational purposes, personal development or studying the uniqueness of tourist attractions visited [8]. According to [9] the components of travel include the destination of the trip, the duration of the activity, the mode of transportation, travel time, distance, group, traffic conditions and travel satisfaction as in Figure 1.
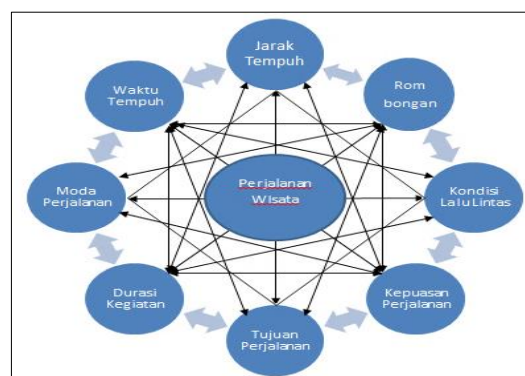

Figure 1. Tourist travel component.

2.2. Characteristics of international tourist travel

Based on the country of origin of foreign tourists who come directly to Bali during 2017, the five countries as the main market share of foreign tourists to Bali are Australia, China, Japan, Britain and India reaching 56.37% of the total of foreign tourists who come directly to Bali. Most of the foreign tourists coming to Bali mostly arrive through the entrance of Ngurah Rai Airport, which is 98.47% and

through the sea port are only 1.53% [10]. To get to the tourist attraction visited, the largest movement of the tourist trips production is amount 72.22% and trip attraction of 65.11% are from and to the Sarbagita region (Denpasar, Badung, Gianyar and Tabanan). This is because the location of tourist attractions and accommodation places are mostly located in the area located in South of Bali.

Characteristics of tourist travel towards tourist attractions are including distance, travel time and travel costs. Reduction in travel time and costs tends to increase travel between two places. However, in a number of cases, physical distance seems to be the main attraction for the location of tourist attractions that have certain characteristics, in fact the farther away the place will make it more attractive, the most important is the existence road network and modes of transportation so there is no problem with long distance. The travel cost to a tourist attraction can be estimated and will affect the possibility of a tourist trip. In general, the more expensive a tour will be, the fewer the requests. Cost is relative if people see costs as something relative to the value that can be obtained. In a small number of cases there is an inversion relation between cost and demand. In this case the higher the cost, the higher the demand [12].

2.3. Modes of transportation

The mode of transportation is one of the important attributes of the tourist movement. The existence of various choices of tourism transportation modes grow rapidly. The modes choice in tourism destinations is influenced socio-economic characteristics of tourists and availability transportation characteristics. In the study of mode choice behaviour by tourists in Bali [13] can be identified the factors considered by foreign tourists in the choice of modes of travel in Bali, which are factors of travel costs, safety, comfort and travel time.

The modes of tourist transportation in Bali depend on the characteristics of operators and modes. Available operators are using travel agents, rental agents, public transportation and online transportation. While the characteristics of available modes include heavy vehicles, namely buses with a capacity of 20-40 seats, light vehicles including passenger cars with a capacity of 4 - 12 people, motorbikes and non-motorized vehicles.

2.4. Mode choices modelling

The model is a reflection and simplification of reality for certain purposes and a good model is the more similar a model is to reality [14]. Although it is a simplification, the model can be very complex and requires a lot of data and a long execution. Models in mode choice vary greatly, depending on the purpose of transportation planning. Each mode is analysed separately during the stages of the modelling process, and user characteristics greatly influence the process of selecting travel modes. Each mode is considered to be competing in seizing of passengers, so the determinant attributes of the movement are the main factors that influence the choice of mode. Decision making to use certain modes is strongly influenced by factors according to the characteristics of road users, for example individual characteristics, travel characteristics and attributes of the trip.

To explain the mode of choice behaviour, except the socio-economic variables there are also affected by travel attributes. The travel attributes are time in the vehicle, time to stop, waiting time, transfer time, travel costs and behavioural. The results of the study [4] found that the travel attributes that influence the mode choice behaviour in Yogyakarta are: travel costs, parking fees, travel time, time between bus arrivals and time to bus stops. If more than one mode is available, the mode chosen usually has the shortest route, or the fastest, or cheapest, or a combination of the three.

3. Research instruments and variables

The main instrument in this study is a questionnaire, which is designed to collect various data, including travel characteristics and attributes of travel modes. The questionnaire format refers to the questionnaire compiled in a previous similar study to record the daily travel of respondents [15]. The questionnaire was compiled in English in the form of "Travel Diary Survey Form", to record data on

the characteristics of tourist travel and daily travel for tourists when visiting tourist attractions [16]. The data collected are as follows:

● The origin and destination of the trip, including the location and number of tourist attractions visited in one day
● Time departure and time arrival so that it can be known the travel time
● Travel costs for transportation only
● Operators and modes of transportation are used
● Number of group members

4. Results and discussions

The population and sample as objects of observation in this study are expected to be able to represent the foreign tourist population visiting Bali with the aim for holiday. For this reason, in determining respondents according to the nationality of tourists visiting Bali, the majority were from Asia (38.50%), Europe (29.4%) and Australia (18.65%).

4.1. Characteristics of tourist travel in bali

The characteristics of tourist travel during vacation in Bali are reviewed according to the location of tourist attraction, the number of group members and the number of trip chains according to figure 2.
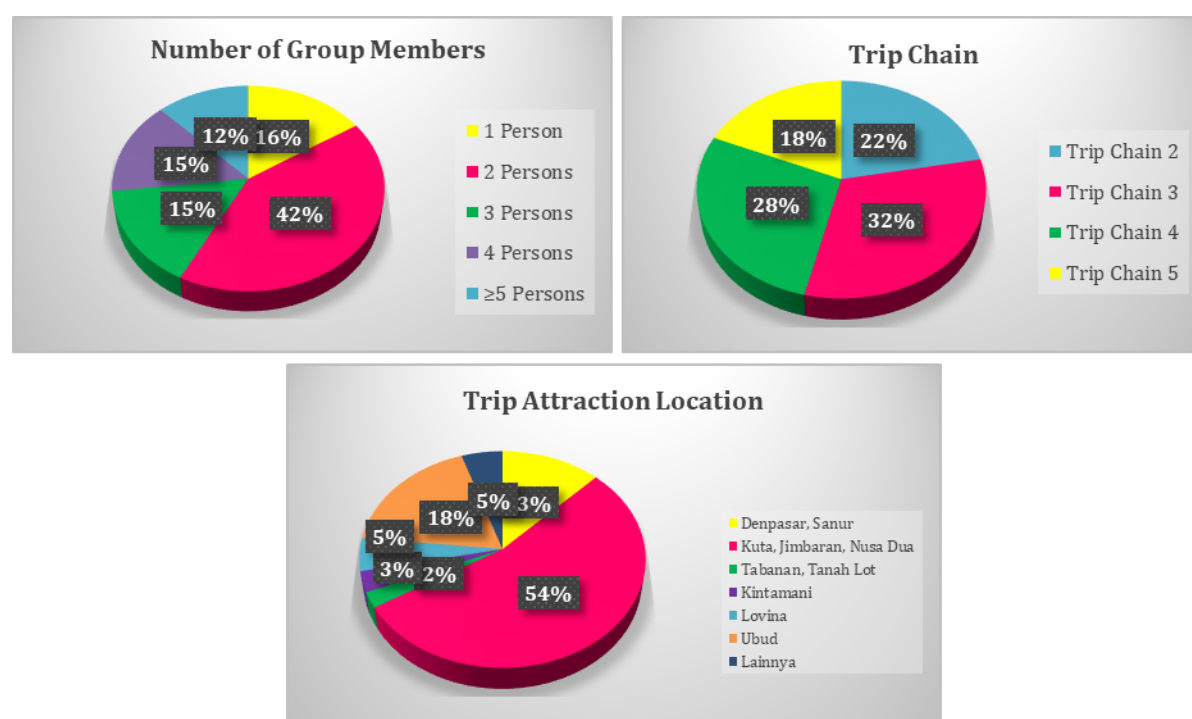

Figure 2. The characteristic of tourist travel in bali.

The tourist attraction locations visited by most tourists are the South Badung region (Kuta, Nusa Dua, Jimbaran and Kerobokan) of 54%, which is in accordance with the government data in [16]. Whereas the second location is Ubud, visited by 18% tourists, and the third is Denpasar and Sanur, which are visited by 12% tourists. In [11], it was concluded that the highest production and attraction of tourist movements were from Kuta and Nusa Dua as much as 61.05% and the second was Ubud as much as 16.69%, it indicates the same results as this research survey. The number of members in a group towards the most tourist attraction is 2 people with 42% of group composition, one person with 16% and groups of 3 or 4 people, each with 15%. The number of members of a group going to the tourist

attraction location is related to the type of mode used, for those who are alone or both using motorbike or car modes while if the number is 3-4 people will use a car and for more than 5 people will use minibuses or buses. Furthermore, regarding the number of travel chains carried out, the survey results showed that most tourists choose 3 travel chains per day, namely 32%, then 4 chains as much as 28% and then 2 chains were chosen by 22% of tourists.

4.2. The characteristic of travel mode attributes

The characteristics of the travel mode attributes that will be described are distance, travel time and travel costs as in Figure 3.

Figure 3. The characteristic of travel modes.

4.3. The significant analysis

The characteristics of the travel mode attributes that will be described are distance, travel time and travel costs as in Table 1.

Table 1. The result of significant analysis (travel agent and rent).

Variable	Coef.	p > |Z|	Coef.	p > |Z|	Coef.	p > |Z|
Agent-Bus				*Base Category*		
Category		Agent-Car		Rent-Car		Rent-Motorbike
Location	-0.0432	0.421	-0.144	0.009***	-0.3596	0.000***
Trip Chain	-0.1099	0.353	-0.0166	0.888	0.9637	0.000***
Number of Group	-0.3649	0.000***	-0.4862	0.000***	-0.8771	0.000***
Distance	-0.0194	0.905	-0.3258	0.054**	1.512	0.000***
Travel time	-0.1633	0.276	0.405	0.006***	0.8996	0.000***
Travel Cost	0.0993	0.528	-0.3809	0.018***	-3.58	0.000***
_cons	2.252	0.000	3.915	0.000	4.504	0.000

Table 2. The result of significant analysis (public transportation and online).

Variable	Coef.	p > |Z|	Coef.	p > |Z|	Coef.	p > |Z|	Coef.	p > |Z|
Agent-Bus					*Base Category*			
Category		Public-Bus		Public-Car		Online-Car		Online-Motorbike
Location	-0.4825	0.189	-0.0329	0.709	-0.02	0.792	-0.0756	0.503
Trip Chain	1.641	0.001***	1.719	0.000***	0.6171	0.001***	1.998	0.000***
No. of Group	-0.9238	0.021***	-0.6331	0.000***	-0.676	0.000***	-1.03	0.000***
Distance	4.719	0.000***	3.182	0.000***	-0.0699	0.763	2.781	0.000***
Travel time	1.357	0.068**	1.207	0.000***	0.3834	0.057**	1	0.000***
Travel Cost	-11.36	0.000***	-7.901	0.000***	-0.7179	0.003***	-6.722	0.000***
_cons	3.213	0.084	3.804	0.000	0.81	0.307	1.449	0.141

Notes:
*** Level of Signification 95%
** Level of Signification 90%

4.4. Modelling of mode choices

Based on CLogit estimation, utilities function, the Mode choices are as follows :

$$Z_{ij}(X) = \beta_{J-1} + \beta_j X_{i1} + \beta_j X_{in} \tag{1}$$

$Zi_1(X) = -0.002Xi_{22} + 0.008Xi_{23}$
$Zi_2(X) = 2.068_{(2)} - 0.051Xi_1 - 0.347Xi_2 - 0.148Xi_3 - 0.002Xi_{22} + 0.008Xi_{23}$
$Zi_3(X) = 2.937_{(3)} - 0.149Xi_4 - 0.439Xi_5 - 0.191XI_6 - 0.002Xi_{22} + 0.008Xi_{23}$
$Zi_4(X) = 2.456_{(4)} - 0.250Xi_7 - 0.701Xi_8 + 0.212Xi_9 - 0.002Xi_{22} + 0.008Xi_{23}$
$Zi_5(X) = -0.408_{(5)} - 0.059Xi_{10} - 0.671Xi_{11} - 0.067Xi_{12} - 0.002Xi_{22} + 0.008Xi_{23}$
$Zi_6(X) = 2.121_{(6)} - 0.023Xi_{13} - 0.527Xi_{14} - 0.063Xi_{15} - 0.002Xi_{22} + 0.008Xi_{23}$
$Zi_7(X) = -0.928_{(7)} - 0.026Xi_{16} - 0.627Xi_{17} + 0.297Xi_{18} - 0.002Xi_{22} + 0.008Xi_{23}$
$Zi_8(X) = -0.634_{(8)} - 0.039Xi_{19} - 0.948Xi_{20} + 0.531Xi_{21} - 0.002Xi_{22} + 0.008Xi_{23}$

The probability of modes choices based on operator can be seen on Table 3.

Table 3. The probabilities of all modes.

Choices	Probabilities
Agent-Bus *(Base Category)*	0.117
Agent-Car	0.189
Rent-Car	0.225
Rent-Motorbike	0.202
Public Transportation-Bus	0.086
Public Transportation-Car	0.180
Online-Car	0.051
Online-Motorbike	0.027

The models also was validated using Pearson correlation with value 98.7% and Root Mean Square Error with value 1.8%, that indicated that the mode choices model is valid.

5. Conclusions

The trip characteristic shows that the most attraction location visited is the South Badung region with around 54% of travel destination, then 42% of group composition who travel are composed by two people and the most choose three chains. The distance of tourist trip could reach 190 km and the most of the trips are around 10-30 km per day, while the travel time could reach 270 minutes, and the most of the trips are around 20-60 minutes per day. Travel costs per day are around Rp.20, 000-Rp.1, 250,000 per person depending on the distance, operator or mode choices used, and the most of majority cost by 24% is around Rp.100, 500-Rp.200, 000. The most influential travel characteristic factors on rental for nearly all factors such as a trip attraction location, number of a group member, trip chains, distance, travel time and cost, then travel agent are influenced by number of group member only. Online and Public transportation also are influenced by all factors except trip attraction location. According to the mode choices model analysed shows that the highest probability is to use both rental-car and rental-motorbike with 22.5% and 20.2% respectively, then the choice of Agent-Bus and Agent-Car with probabilities of 18.9% and 11.7% respectively. Public transportation-Car also have a high probability of 18% to be used. The choice to use of other modes such as Public-Bus and online transportation both by car and motorcycle modes, the probability is less than 5%. All models validated by observations data, and It has a very good significance level with a validation level of 93.194%.

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Low-cost transformer tester for laboratory module

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Abstract. This paper presents a low-cost transformer tester for experiment module in electric machine laboratory. Unlikely the expensive transformer tester on the market, this module is built by using Arduino Uno in the hardware side, and LabView in the software side to make it less expensive. Three voltage sensors and one current sensor are used in this equipment for making some several test on transformer such as, short circuit test, open circuit test, polarity test and winding resistance test. The results of all tests can be presenting in LabView as a data and graph. The calculations are also processed in LabView using some functions on it. By using this strategy, the student will be able to learn the transformer test procedures and to compare the results of their calculations by hand with the software's results. This module has been testing by comparing the results with the standard measuring equipment with the error for voltage and current measurements are at 0.81% and 15.29%, respectively.

1. Introduction

A transformer is one of the electrical components that are widely used both in household electrical appliances and in the electricity grid network. The transformer is used to transfer energy from one electric circuit to another without changing its frequency. Two type of transformers are a set-up transformer where the voltage can be increased and step-down transformer for lowering the voltage. The condition of the transformer needs to be known by conducting several tests to find out the parameters of the transformer. A test in detection for transformer winding insulation defects was performed based on applied voltage test [1]. In order to test a current transformer (CT) on site, a new portable intelligent accuracy tester using the microprocessor ARM (S3C2440A the embedded Linux operation system are performed [2]. A good anti-interference performance of selective filtering characteristics also has been proposed for transformer winding deformation tester [3]. In its operation, the transformer will have losses both due to leaky fields and current flow that cause core losses and copper losses. These losses will certainly affect the performance of the transformer and subsequently will affect the performance of the electrical system in it. For this reason, it is necessary to know the value of the transformer parameters by using a no-load test or open circuit test and a short circuit test. In addition, the polarity of the transformer needs to be known for eliminating the reversible connection to the transformer.

In conducting transformer testing generally used a transformer tester that can provide the output of the transformer parameters tested. But the price of this transformer tester is very expensive that can reach tens of millions of rupiah, even for the upper class can reach 100-300 million rupiahs. Another way is to use a separate wattmeter, voltmeter and ammeter to determine the amount of power, voltage

and current according to the tests conducted. Experience in the field, especially at the Electrical Machines Laboratory in the Department of Electrical Engineering, Bali State Polytechnic shows that the measuring instruments used by students in carrying out the experiments are easily damaged, even though they use good quality measuring instruments. The replacement requires a long waiting time because it is an imported product and must be ordered from a distributor at a high price. For this reason, it is necessary to build a transformer test equipment that is cheap, reliable, and can be quickly replaced if damage occurs

2. Literature review
Transformer testing.
To find out some parameters of a transformer such as its efficiency, the ratio of primary and secondary coils, the resistance of a transformer coil, the polarity of a single-phase transformer, and the losses contained in the transformer, several tests are used. These tests include an open circuit test or no-load and short circuit test [4] and a polarity test [5].

Open circuit and short circuit test.
Open circuit and short circuit testing are performed to find several parameters of transformers such as efficiency, voltage regulation, circuit constants, etc. This test is done without using the actual load so that in its implementation the power used is not large. These open circuit and short circuit test results provide accurate results as well as tests at full load.

2.1. Open circuit test
The purpose of this open circuit test is to determine the current at no-load conditions and losses from the transformers obtained from the parameters of the no-load test results. This test is carried out on the transformer primary coil. A wattmeter, ammeter, and voltmeter are connected to this primary coil. The nominal voltage applied to this output is sourced from the ac power supply.
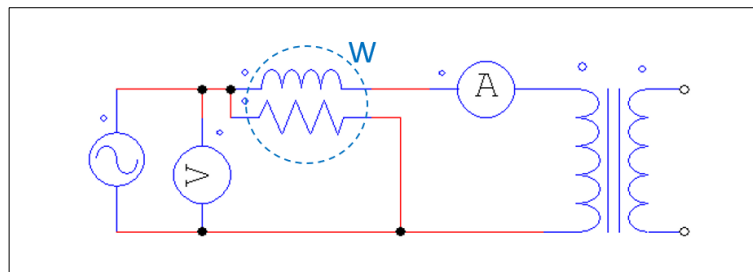

Figure 1. Open circuit test circuit diagram on transformers.

2.2. Open circuit test calculation
If W_0 is a Wattmeter reading, V_1 is a voltmeter reading, and I_0 is the ammeter reading, the copper loss at full transformer condition $P_1 = W_0$ can be stated as:

$$W_0 = V_1 I_0 \; Cos \; \varphi_0 \tag{1}$$

With the value of the power factor in the no-load state:

$$Cos \; \varphi_0 = \frac{W_0}{V_1 I_0} \tag{2}$$

The value of I_w current component is:

$$I_w = \frac{W_0}{V_0} \tag{3}$$

By taking the value of W_0 from equation (1) and including it in equation (2), a working component value of:

$$I_w = I_0 \cos \varphi_0 \tag{4}$$

and as a component of magnetization:

$$I_m = \sqrt{I_0^2 + I_w^2} \tag{5}$$

For the no load, equivalent exciting resistance is

$$R_0 = \frac{V_1}{I_w} \tag{6}$$

And equivalent exciting reactance is

$$X_0 = \frac{V_1}{I_m} \tag{7}$$

At no load or when the open circuit test is performed, the phasor diagram of the transformer can be shown in Figure 2. Iron losses are measured by conducting an open circuit test to calculate transformer efficiency.
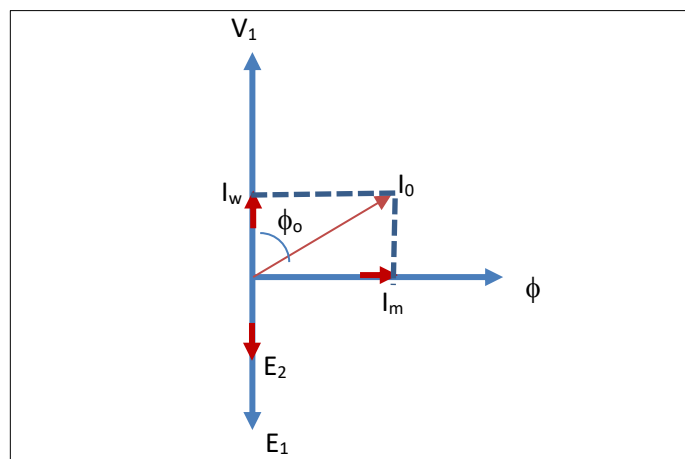

Figure 2. Phasor diagram for open circuit test.

2.3. Short circuit test
Short circuit tests are carried out on the transformer to find out the copper losses that occur when full load. This copper loss is used to determine the efficiency of the transformer. It also to find equivalent resistance, impedance and leakage reactance can be determined from this short circuit test.

Short circuit tests are performed on the transformer secondary or on the high voltage coil of the transformer. Measuring instruments used are wattmeter, voltmeter, and ammeter connected to the high voltage coil. The transformer primary coil is short-circuited using a cable or using an ammeter connected to both terminals.

The low voltage source is connected to the secondary coil because the full load current flows from both coils, both the primary and secondary transformer coils. The circuit diagram for this short circuit test can be seen as shown in Figure 3.
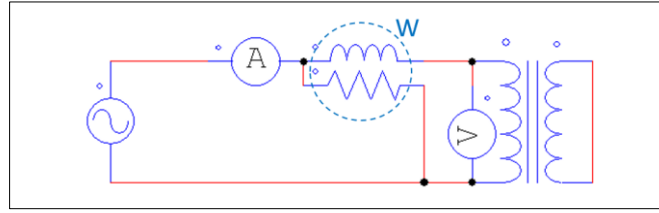
Figure 3. Circuit diagram for short circuit test.

A low voltage source is injected into the secondary coil with a value of about 5 to 10% of its rated normal voltage. Flux will occur in the transformer core but the value is very small compared to normal fluxes. Iron loss in the transformer depends on the flux. The value will be very small in this short circuit test because of the small value of the flux. The measurement results of the wattmeter will only show the copper losses that occur in the coil. A voltmeter will measure the voltage applied to a high voltage coil. The secondary current induces the transformer due to the voltage applied to the transformer.

2.4. Calculations on the short circuit test
For short circuit test calculations can be explained as follows:

If W_c is a Wattmeter reading, V_{2sc} is a voltmeter reading, and I_{2sc} is the ammeter reading, the copper loss at the transformer full load condition can be stated as:

$$P_c = \left(\frac{I_{2fl}}{I_{2sc}}\right)^2 W_c \quad \text{dan} \quad I_{2sc}^2 R_{es} = W_c \tag{8}$$

Equivalent resistance refers to the secondary part:

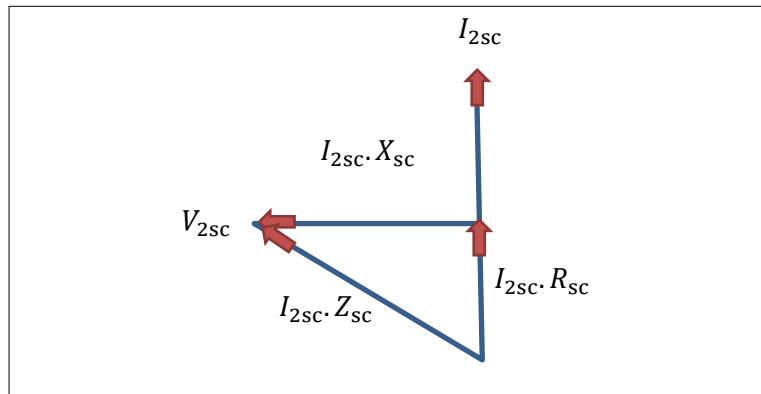The phasor diagram for the short circuit test can be seen in Figure 4 below.

Figure 4. Phasor Diagram of Short Circuit Test.

From the phasor diagram

$$I_{2sc}^2 Z_{es} = V_{2sc} \tag{9}$$

The equivalent impedance referring to the secondary portion is:

$$Z_{es} = \frac{V_{2sc}}{I_{2sc}^2} \tag{10}$$

The equivalent reactance referring to the secondary portion is:

$$X_{es} = \sqrt{(Z_{es})^2 - (R_{es})^2} \tag{11}$$

Voltage regulation voltage of transformers can be obtained at various loads and various power factors after knowing the value of Z_{es} and R_{es}.

In the short circuit test, the wattmeter records total losses including core losses but the value of these core losses is very small compared to copper losses, so that core losses can be ignored.

2.5. Transformer polarity testing

The direction of the induced voltage on the transformer primary and secondary coils is known as a polarity of the transformer. The polarity needs to be determined especially when two transformers are connected in parallel. There are 2 types of polarity, the first one is additive polarity, the same terminals on the primary and secondary coils are connected and the second one is subtractive polarity where terminals that are different from primary and secondary coils are connected. The polarity testing step can be carried out in accordance with Figure 5.
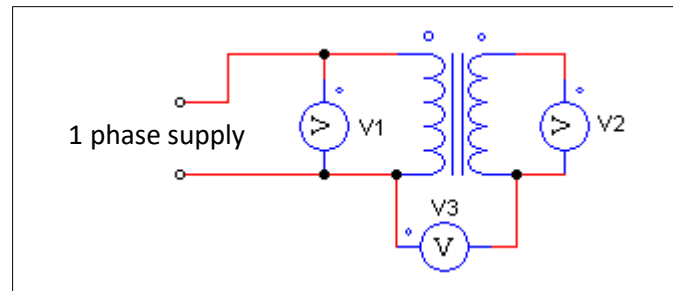

Figure 5. Transformer polarity testing.

2.6. DC resistance testing

DC coil resistance testing per manufacturer recommendation is generally carried out during periodic maintenance and after the internal faults occur [6]. This test can test the performance of the transformer coil, tap changer, and also the connection inside the transformer. The 3 main methods for conducting this test [5] can be described as the voltmeter-ammeter method, the bridge method, and the micro-ohmmeter method. The most commonly used method is the voltmeter-ammeter method, which uses a dc source injected into the transformer coil. In this method, current and voltage are measured for finding the resistance of the coil of a transformer. The tolerance value is 5% when comparing to the transformer manufacture specifications [6]. This test can be seen in Figure 6.
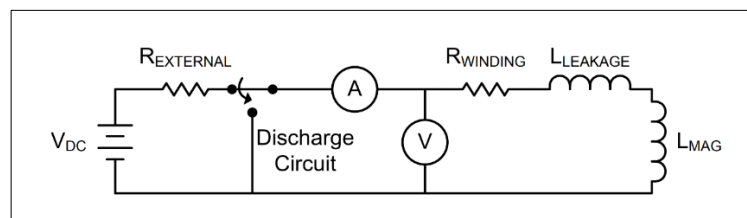

Figure 6. Testing DC resistance.

It should be noted several things in testing the DC transformer coil resistance, including the configuration of coil connections, allowable current and voltage, temperature and safety [6-8].

Calculation of coil resistance is very important to know the possibility of damage to the transformer. This damage can occur due to inadequate design, improper assembly, handling both during shipping and installation, unfavourable environmental influences, and overloaded or inadequate maintenance.

In this test, we will look for gross differences between the coils and the open terminal part. By calculating the transformer coil resistance, bias can be used to ensure each circuit is well connected and strong. The resistance of the transformer coil from time to time will experience changes that include the result of a short circuit on the coil, loose connections, or the occurrence of erosion on the tap changer. Calculation of the transformer coil resistance is carried out according to Ohm's Law, bypassing the DC current to the tested coil and calculating the voltage drop at each terminal.

3. Methodology

This research was conducted at the electrical machine laboratory at the Department of Electrical Engineering, Bali State Polytechnic. An initial survey was conducted to find out how the measurements were previously carried out as well as the quantities measured and the tools used. Furthermore, after knowing the amount you want to know, the design of measuring devices is done using an Arduino microcontroller and its supporting components. Furthermore, the finished tool is tested by comparing the measurement results with standard measuring tools owned by the Department of Electrical Engineering.
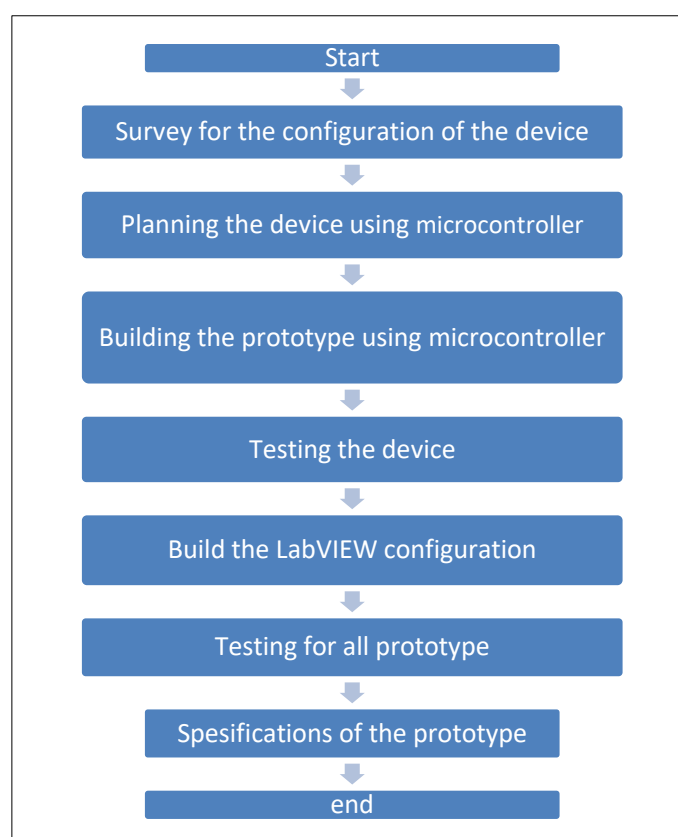

Figure 7. Research flow chart.

The next step is to build a system that can record data (data loggers) to the computer. This operation can be performed using LabVIEW software. From the results of this data recording, then the data can be plotted or carried out the necessary calculations such as to look for power losses.

The entire system, both the measuring device that uses a microcontroller and the program that has been built using LabVIEW will be tested so that later the specifications of the tool that has been built will be obtained.

4. Results and discussions

4.1. Design and manufacture of measuring instruments

To build this Transformer Tester, a number of measuring devices are needed where each test will require a slightly different measuring instrument. For open and close circuit tests, a current and power voltage gauge is required, while the dc resistance test is sufficient to use a current and voltage measuring device only. Unlike the other measurements, the transformer polarity test is enough to use a voltmeter but there are 3 of them. DC source voltage is also required with additional switches and external resistors. The front panel design of this test tool can be seen as in Figure 8.
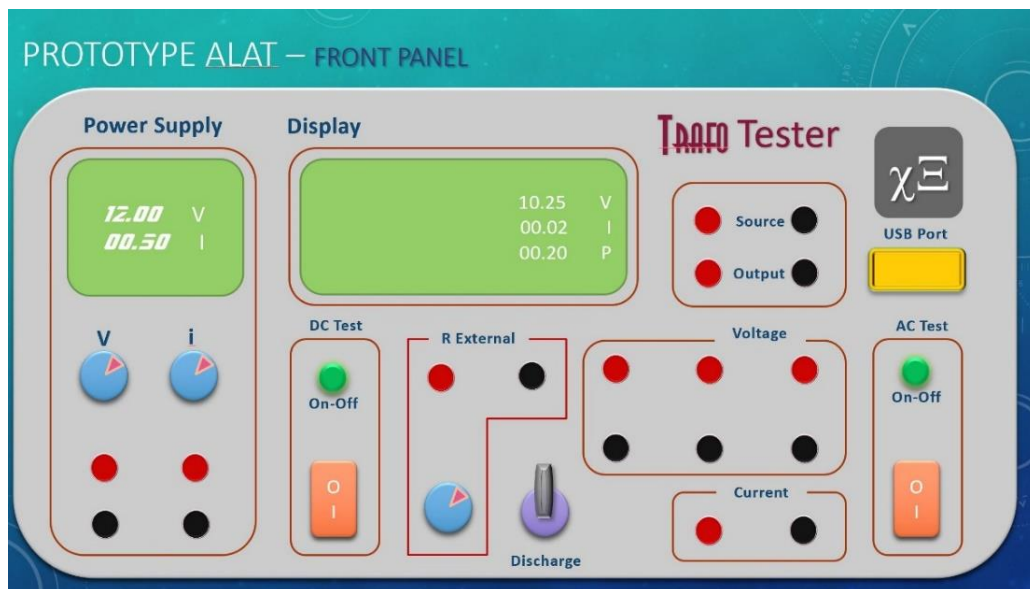

Figure 8. Front panel of prototype transformer tester.

4.2. The series and layout of the transformer test equipment

The transformer tester circuit can be seen as shown in Figure 9 to 12. The sensor circuit using the current transformer and the voltage sensor circuit using a voltage transformer can be seen as in Figure 9. While for the display and Arduino Uno used, the circuit can be seen as in Figure 10 with the supply source as in Figure 11. For the layout of the circuit on the PCB can be seen in Figure 12.
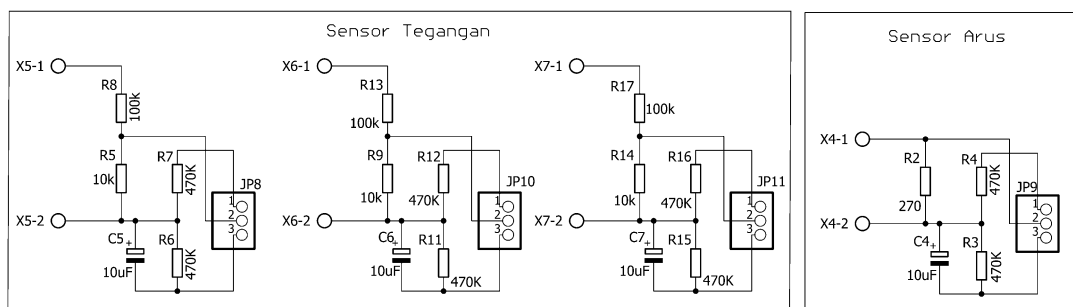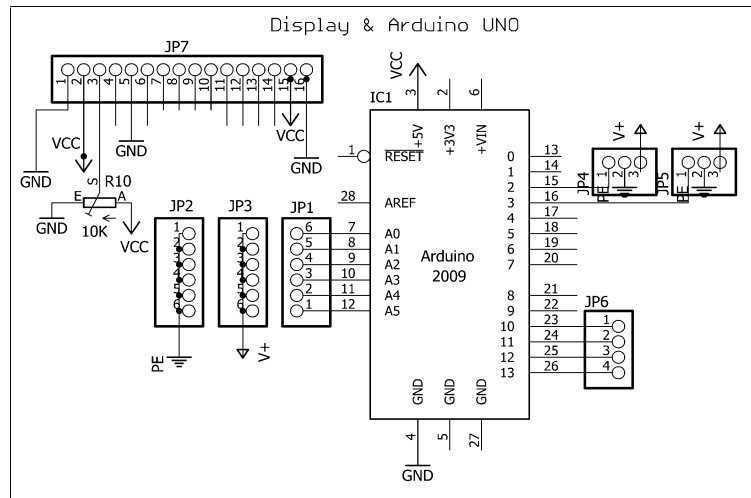

Figure 9. Voltage and current sensor.

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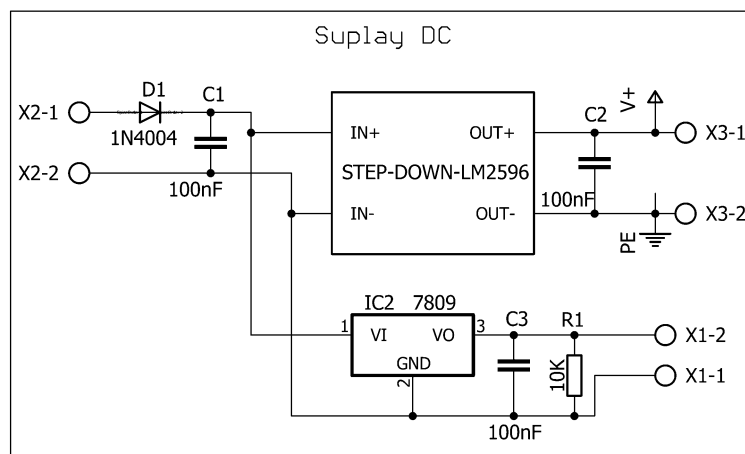**Figure 10.** Display using Arduino Uno
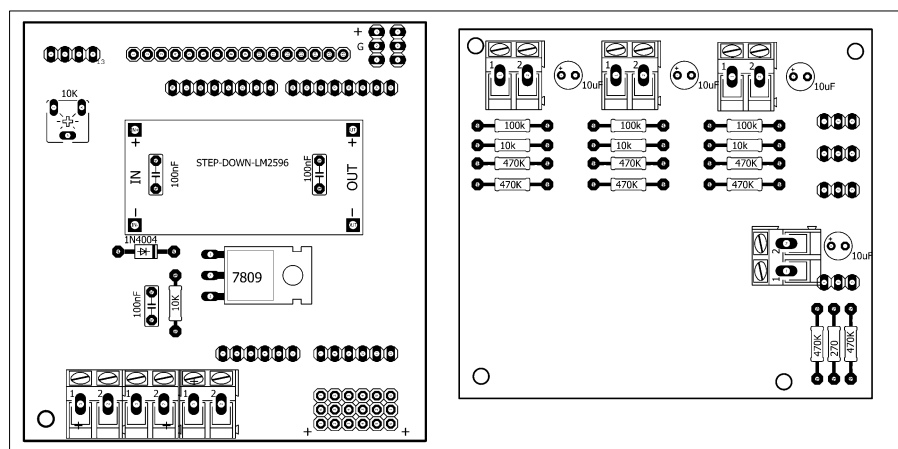

Figure 11. Power supply

Figure 12. Layout of PCB

4.3. Analysis and testing of transformer test equipment
The testing of this transformer test is carried out by comparing the results of current and voltage measurements from a device made against a multi meter measuring instrument. The results can be seen in Table 1.

Table 1. Result of the voltage test.

No	Voltage source	Standard meter	Voltage - Using Module			Error (%)		
			V1	V2	V3	R	S	T
1	30	30	30.1	30.2	30.1	0.33%	0.67%	0.33%
2	40	40	40.3	40.5	40.3	0.75%	1.25%	0.75%
3	50	50	50.9	50.5	50.2	1.80%	1.00%	0.40%
4	60	60	60.6	60.6	60.4	1.00%	1.00%	0.67%
5	70	70	71.0	71.1	70.5	1.43%	1.57%	0.71%
6	80	80	81.0	81.1	81.1	1.25%	1.37%	1.37%
7	90	90	90.6	91.6	90.9	0.67%	1.78%	1.00%
8	100	100	100.2	100.1	101.5	0.20%	0.10%	1.50%
9	110	110	111.3	111.1	111.1	1.18%	1.00%	1.00%
10	120	120	121.1	120.7	121.5	0.92%	0.58%	1.25%
11	130	130	130.1	130.2	130.1	0.08%	0.15%	0.08%
12	140	140	141.3	141.1	141.2	0.93%	0.79%	0.86%
13	150	150	151.1	150.2	151.3	0.73%	0.13%	0.87%
14	160	160	161.2	161.2	161.1	0.75%	0.75%	0.69%
15	170	170	171.1	170.3	171.5	0.65%	0.18%	0.88%
16	180	180	181.2	181.0	180.2	0.67%	0.56%	0.11%
17	190	190	192.1	192.2	192.0	1.11%	1.16%	1.05%
18	200	200	201.1	201.1	200.5	0.55%	0.55%	0.25%
19	210	210	212.1	212.2	212.0	1.00%	1.05%	0.95%
20	220	220	221.5	221.2	221.4	0.68%	0.55%	0.64%
				Average error:		0.88%	0.85%	0.81%

From the test results of this transformer test equipment, it was found that the voltage test showed a very small error rate of 0.81% as in Table 1. For currents, a large enough error was tested in the amount of 15.29% as shown in Table 2.

Table 2. Result for Current measurement.

No	Input	Current - Standard Meter	Current - Using Module	Error (%)
	(A)	(A)	(A)	(A)
1	0.50	0.50	0.70	40.00%
2	1.00	1.00	1.20	20.00%
3	1.50	1.50	1.70	13.33%
4	2.00	2.00	2.20	10.00%
5	2.50	2.50	2.70	8.00%
6	3.00	3.00	3.30	10.00%
7	3.50	3.50	3.70	5.71%
				15.29%

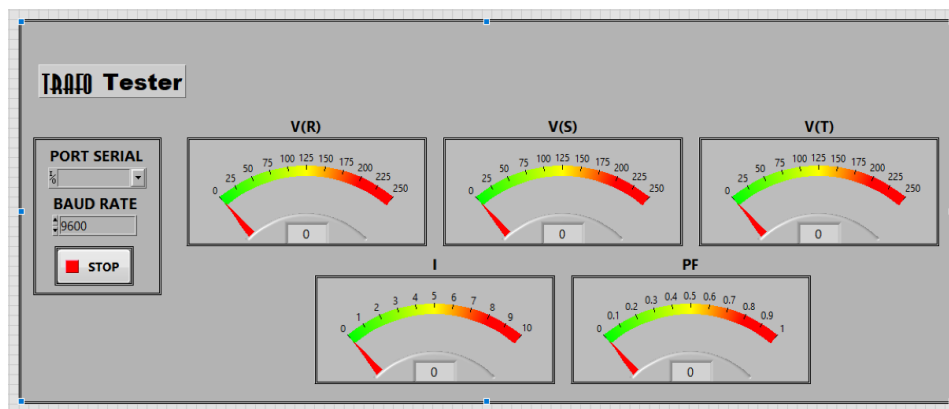**Figure 13.** Transformer tester module.

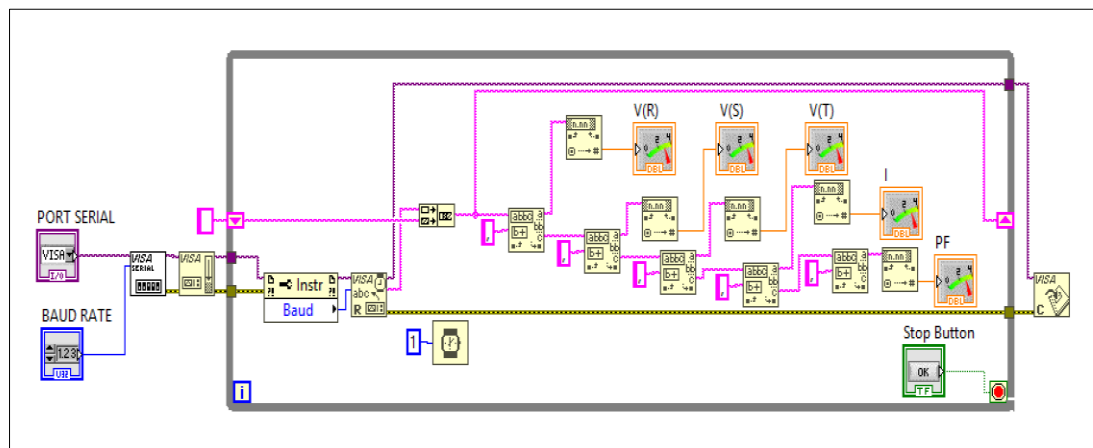**Figure 14.** LabVIEW front panel for transformer tester.

Figure 15. LabVIEW block diagram for transformer tester.

5. Conclusions

This research makes a simple transformer test tool using Arduino and LabVIEW. This test tool can be used to carry out open circuit test, close circuit, polarity, and DC resistance. Errors that occur when voltage and current measurements are 0.81% and 15.29%, respectively.

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Development of spreadsheet-based applications for analysis and design of reinforced concrete beam as a learning tool in the Departmet of Civil Engineering at Bali State Polytechnic

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Abstract. This study aims to develop spreadsheet-based applications for the analysis and design of reinforced concrete beam structures as a tool in learning courses in Reinforced Concrete Structures in the Bali State Polytechnic Civil Engineering Department. Reinforced concrete is still one of the most widely used construction materials and is applied in the construction world, especially in Indonesia, which belongs to a region with a high level of seismic risk. The process of calculating reinforcement of reinforced concrete structures involves quite a number of stages. In the practice of classroom learning it is not uncommon for students to miscalculate at one or more stages that lead to inaccurate design results. The results of field trials on the use of applications developed in this study provide significantly better average scores for students who use the application compared to students who do not use the application.

1. Introduction

One material that is widely used in civil engineering buildings is reinforced concrete. In order to achieve the expected competencies, the 2016 curriculum for both Civil Engineering Study Program and Construction Project Management Study Program has courses on Reinforced Concrete Structures, taken in the second year or in the fourth semester. This course is given a weighting of 3 credits and learns about the characteristics of concrete materials, analysis and design of reinforced concrete structural elements that emphasize bending (beam), flexural and normal (column), shear and torque elements and taking into account the ability to fulfill requirements service of the structure.

The process of analysis and cross-section design of reinforced concrete structures go through many stages by involving formulas that are relatively complex, which have the potential for errors if done manually. For this reason, the existence of applications for cross-section planning of reinforced concrete structures is needed. Some of the previous studies that have been carried out are related to the auxiliary application of cross-reinforced concrete structure design, among others by Mello et al (2013) designing web-based reinforced concrete structure reinforcement applications; Handoko et al (2017) designed an android-based application for calculating reinforced beam cross sections.

In contrast to previous studies, the application of reinforced concrete reinforcement design developed in this study is spreadsheet-based, and is devoted as a learning aid to courses in reinforced concrete structures.

2. Methods

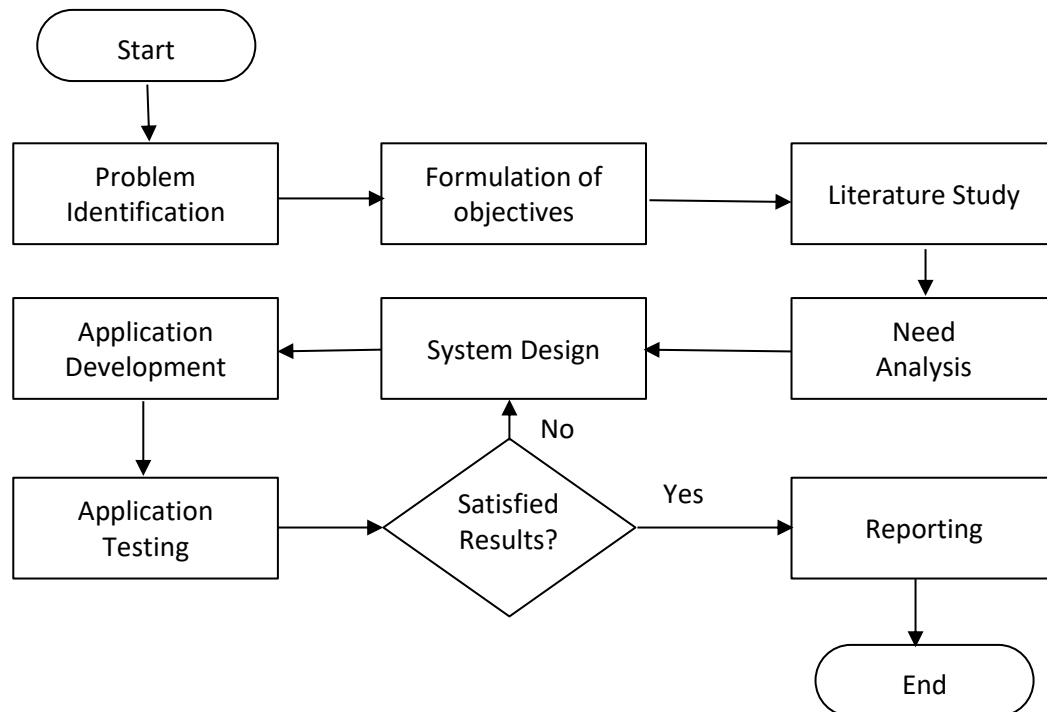In brief, the stages in carrying out this research can be described as in Figure 1.

Figure 1. Stages of research.

2.1. Population and samples

The population of this study are all fourth semester students of Diploma IV in Construction Project Management, Civil Engineering Department, Bali State Polytechnic as many as four classes or 112 people.

Sampling in this study uses a cluster method with the following steps:

- From the fourth semester student population of four classes, two classes were randomly drawn.
- From each class selected in step 1, 20 people were randomly sampled as trial participants so that the total sample was 40 people.

2.2. Data analysis

Data obtained from the trial test will be analyzed with a different average formula.

- Different average formula

$$\overline{X}_1 - \overline{X}_2 = \Sigma Xi1 /n - \Sigma Xi2 /n \tag{1}$$

$\overline{X}_1$ is the average student achievement using the application and $\overline{X}2$ is the average achievement of students who have not used the application developed in this study.

- Average difference test

    Ho: $\mu1 = \mu2$

    H1: $\mu1 > \mu2$

The statistical tests used are:

Ho : μ1= μ2

H1 : μ 1> μ2

Where μ is the mean of the variable under study.
The statistical tests used are:

$$t = (\overline{X}_1 - \overline{X}_2)/\sqrt{[\{(n1-1)s12+(n2-1)s22\}/\{n1+n2-2\}/\{1/n1+1/n2\}]} \qquad (2)$$

where:

$$\overline{X} = (\Sigma Xi)/n$$

$$S = \sqrt{\{(X-\overline{X})2/n\}}$$

n = sample size
Accept Ho if t <= t (n1+n2-2,5%)
Reject Ho if t > t (n1+n2-2,5%)

3. Results and discussions

3.1. Application interface

A	B	C	D	E	F
1	**PERENCANAAN PENULANGAN BETON**				
2	A. DATA BESARAN STATIK				
3	MOMEN MAKSIMUM [M]	(ton.m)			5.00
4	GAYA NORMAL [N]	(ton)			
5	GAYA LINTANG [Q]	(ton)			5.00
6	B. DATA TEKNIS DAN METODA				
7	JENIS KONSTRUKSI		BALOK		
8	BENTUK PENAMPANG		PERSEGI		
9	METODE PERHITUNGAN		KEKUATAN BATAS / ULTIMIT		
10	TIPE PENULANGAN		TIDAK SIMETRIS		
11	MUTU BETON		K-500		
12	MUTU BAJA TULANGAN		U-32		
13	JENIS PEMBEBANAN		BEBAN TETAP		
14	C. DIMENSI PENAMPANG				
15	TINGGI TOTAL ['ht' minimum 1/35 panjang bersih ℓo]	(cm)			30.00
16	LEBAR ['b' minimum 1/50 panjang besih ℓo]	(cm)			55.00
17					
18					
19					
20	TANGGAL PERENCANAAN		1/7/2019		
21	Copyright (2019): I Nyoman Suardika		KLIK...LANJUT...!!		
22	Politeknik Negeri Bali				
23	HP. 081338111011 / e-mail : nsuardika@gmail.com				

Figure 2. Application interface.

Figure 2 shows the interface of the application being developed. As input are data of cross section dimensions, concrete compressive stress at the age of 28 days, moments and shear forces acting on the beam. Figure 3 below shows the output of the application.
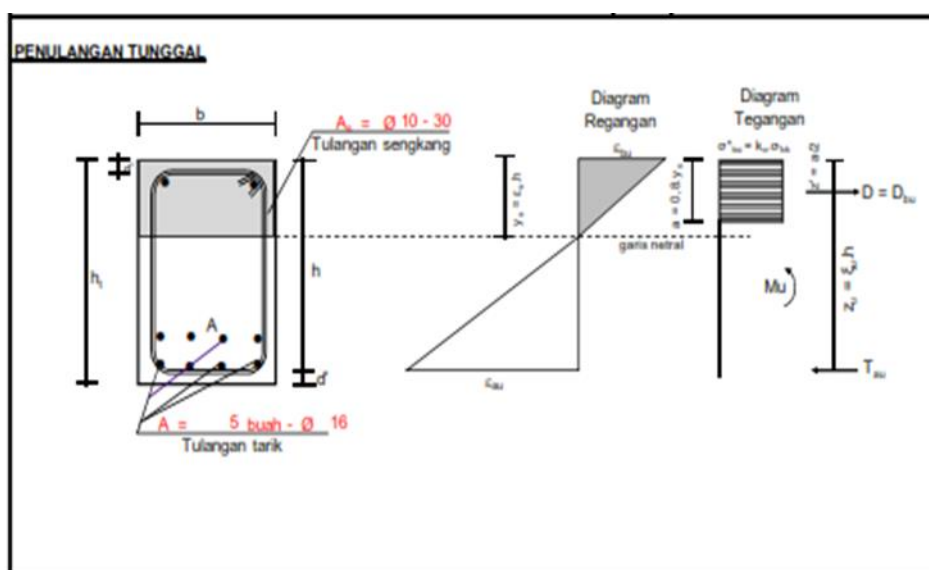
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Figure 2. Application output.

3.2. Field trials
The population for field trials is all fourth semester students of the Project Management Study Program in the Department of Civil Engineering, Bali State Polytechnic, Academic Year 2018/2019, with four classes or 112 people. Sampling with cluster method, by randomly selecting two classes from four classes, then randomly drawn 20 people from each class selected so that the total sample is 40 people. The first group (Group A) was given a test to calculate reinforcement of reinforced concrete beams manually, while the second group (Group B) was given the same problem but using the help of an excel application module for calculating reinforced concrete beams developed in this study. The distribution of test results is shown in Table 1 and Table 2 below.

From Table 1 and Table 2, it can be calculated that the average value of Group B = 77.00, is greater than the average of Group A = 61.00 with each standard deviation are 13.99 and 18.04. The average difference test with Student's T-Test obtained the value of calculated t-value = 3.135 is greater than t-table value (1.663) with significance level of 5%. Thus H0 is rejected, meaning that the average value of the group using the excel application module for calculating reinforced concrete beams is significantly higher than the group not using the module.

Table 1. Distribution of test results for Group A.

Category	Range	Frequency	%
A	81-100	1	5.00
AB	76-80	2	10.00
B	66-75	6	30.00
BC	61-65	0	0.00
C	56-60	6	30.00
D	41-55	1	5.00
E	0-40	4	20.00
	Total	20	100.00

Table 2. Distribution of test results for Group B.

Category	Range	Frequency	%
A	81-100	5	25.00
AB	76-80	3	15.00
B	66-75	7	35.00
BC	61-65	2	10.00
C	56-60	3	15.00
D	41-55	0	0.00
E	0-40	0	0.00
	Total	20	100.00

4. Conclusion

Based on the results of the discussion above it can be concluded that the use of a spreadsheet-based application developed in this study provides a significantly better average score for students who use the application compared to students who do not use the application.

5. Suggestion

The application developed in this study is still limited to the reinforcement calculation on reinforced concrete beams, for the future it is necessary to develop other modules such as reinforcement calculation on reinforced concrete columns.

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Mini Simlitabmas software development in P3M Bali State Polytechnic

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Abstract. The purpose of this study is to provide a forum for researchers in order to input profosal research, history of research, development of semester systems and research reports. This report-based research means that each researcher must pass through the phases that have been determined by the system, without being able to pass the previous phase. At P3M Bali State Polytechnic SIMLITABMAS application has been available from 2017. In the system there is no Year content for the next period, research history, assessment forms for each researcher and research levels that must be obeyed by a researcher. In the development of the Simlitabmas application a researcher must really follow the rules that have been determined by the system such as; researchers cannot upload 100% reports if researchers have not reported 70% research progress, so also reports on the use of research funds must remain tiered. The final result of this research is a Simlitabmas software that can be used as a reference in conducting the research process at the Bali State Polytechnic.

1. Introduction

The development of information technology cannot be separated from the role of the existing software infrastructure, because software is the backbone of all systems that have used computers in their work processes. The speed and quality of data access will be largely determined by the quality of the software. This is what causes computer software to be a very valuable asset for all organizations, and this also applies to the Bali State Polytechnic.

Currently there are a number of software development methods including the process of developing mobile applications, wireless development, mobile application development life cycle models (MADLC), Agile Methodology for Mobile Software Development, MASAM methodology, Mobile Application Development Methodology, and Mobile Development (Mobile D). In order to meet the needs of users, specifically in terms of system changes, it can use Agile in developing software. Agile methodology is an alternative to traditional project management, supporting planning between clients, supporting clients, improving project quality, and increasing client satisfaction. When changes occur in the system, changes must be made in all phases.

The Bali State Polytechnic (PNB) is one of the State Universities which consists of 6 majors and 16 study programs. In part of its performance, the Bali State Polytechnic has utilized the Information System. In addition to information systems, many entities within the PNB scope use the Internet to help their performance. With the increasing number of entities involved, of course it will require better quality infrastructure.

So far, PNB already has Simlitabmas applications from 2017. Often the application development process is taken for granted without looking at the models and needs of each unit or agency. This is of course a high risk, considering that investing in the procurement of computer software is an expensive investment. Development failure will certainly affect the financial side.

In addition to economic problems, from a technical point of view there are often difficulties in the tracking process if there is an incompatibility in an activity. No documentation of the model developed is one of the causes. Searching for software mismatch requires a long time (± one year). Psychologically, of course this process will increase work pressure on employees and users.

Based on the above, in this study Simlitabmas software will be developed at a report-based Bali State Polytechnic.

Based on the things described in the background, the problem can be formulated, namely how to develop Simlitabmas software at a report-based Bali State Polytechnic.

The purpose of this study is to develop Simlitabmas software at report-based Bali State Polytechnic. While the benefits that can be obtained from this research are the formation of Simlitabmas software which can be used as a basis or reference for researchers and P3M units in conducting research activities at the Bali State Polytechnic.

2. Research methods

This chapter will discuss the location and object of research, types and sources of data, data analysis and system design proposed in this study.

2.1. Research place and time

The location of this study is located at the Bali State Polytechnic having its address at Bukit Jimbaran, South Kuta, Badung, Bali. The research will be conducted for eight months starting from April to November 2019.

2.2. Research objects

The object under study is the development of Bali State Polytechnic Simlitabmas software. Observations will be made on the existing conditions of the applications currently owned. Next will be a report-based software development plan.

2.3. Research objects

The data used in this study are related to the results of interviews, literature studies and observations, on block software and existing conditions at the Bali State Polytechnic. While the stage of research is carried out by the following steps:

- Collection of existing data and block software for Simlitabmas of the Bali State Polytechnic.
- Software configuration analysis and design.
- Software compilation.
- User acceptance testing of the Simlibtamas Bali Polytechnic software design.

2.4. Scope of simlitabmas software development

The scoope in the development of Simlitabmas includes the following components:

- Menu list of new proposals.
- List of proposed review.
- Active research and service activities.

3. Discussion

In this study there are several menus that have been fixed according to the scopes that are in the development of Simlitabmas.

3.1. Menu list of new proposals

See list of new proposals for research & service.

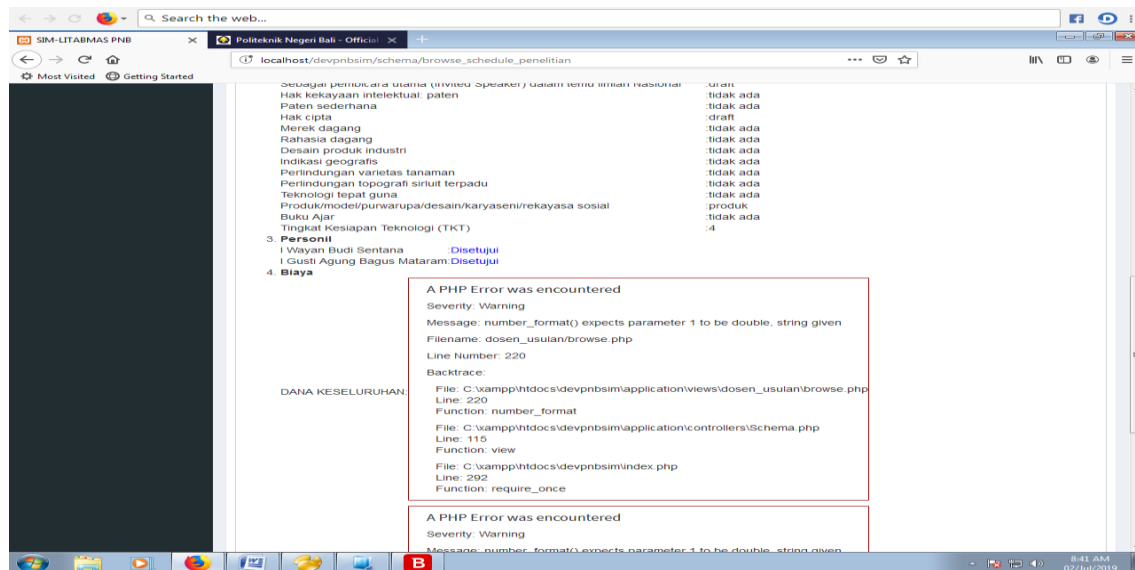Bugs system: appears when displaying the detailed costs that have been posted.

Figure 1. Bugs in menu list of new proposals.

Improvements:

Bugs are caused by a lack of validation of form entries for numeric data, when the entry column is emptied, an error will appear when the data is displayed.
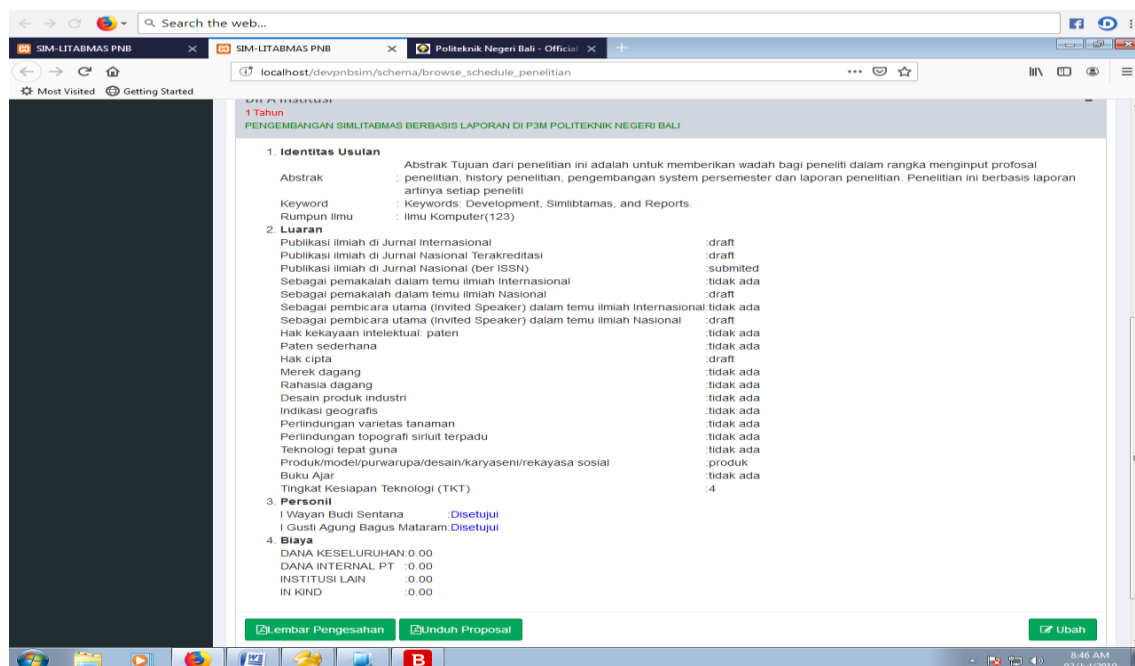

Figure 2. Improvements for menu list of new proposals.

3.2. Lecturer menu » List of review proposals
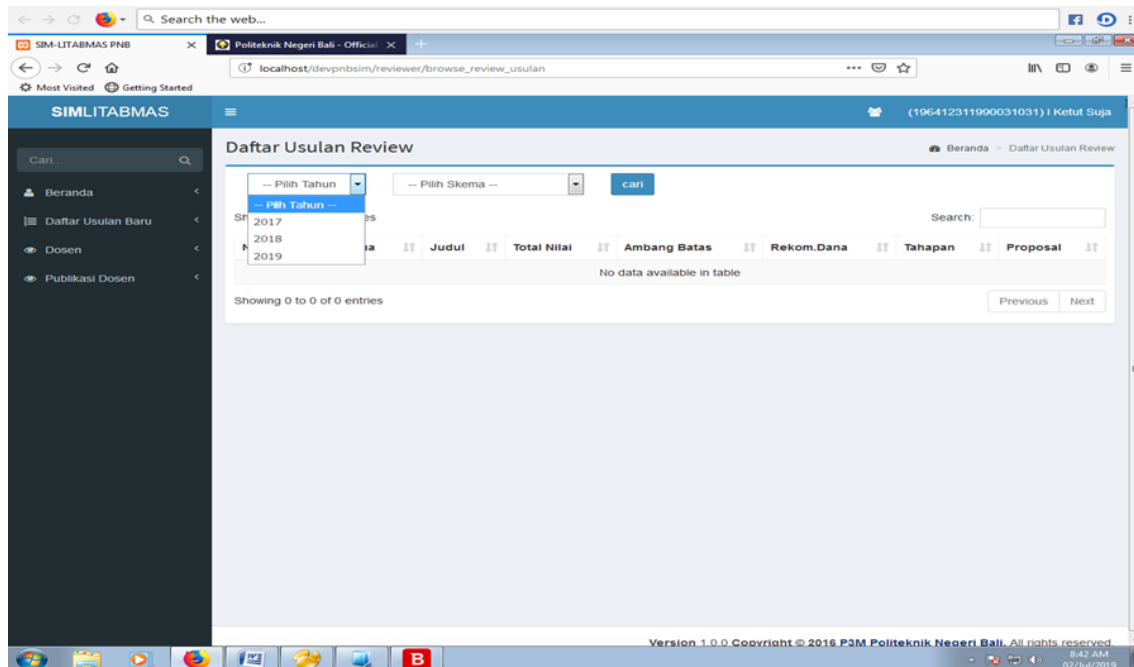Bugs system: the system only displays 2017 and 2018 when data filtering.
Improvements:

Figure 3. Improvements for menu list of review proposals.

3.3. Lecturer menu » Active activity
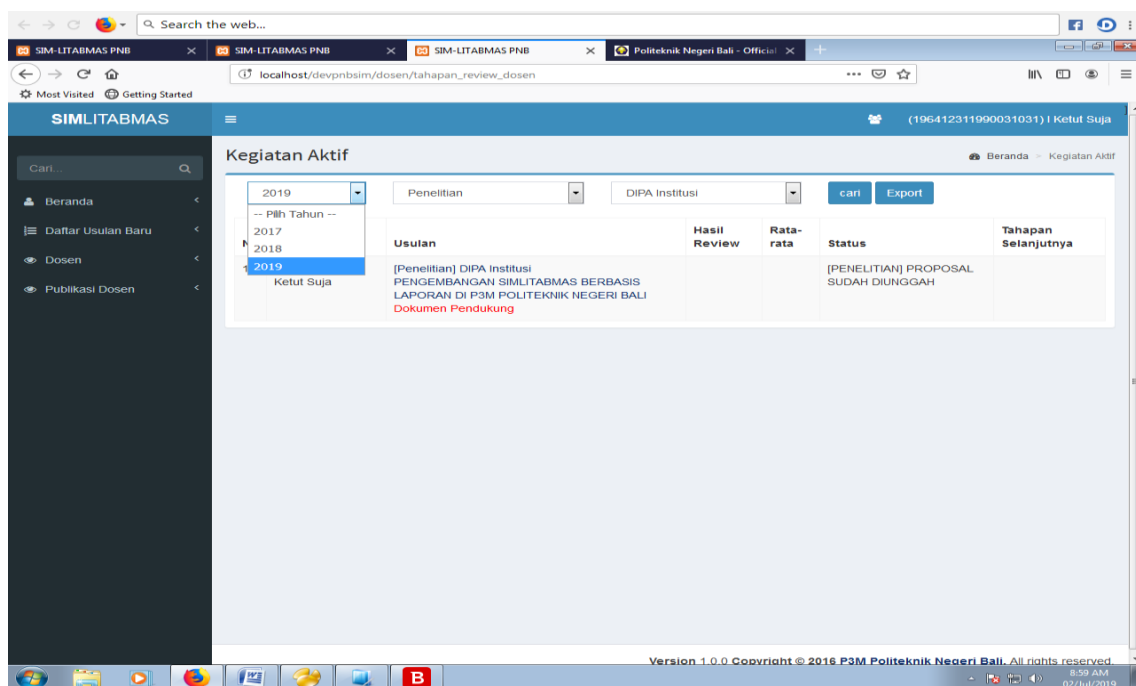Bugs system: system only displays 2017 & 2018 when data filtering.
Improvements:

Figure 4. Improvements for menu active activity.

3.4. Lecturer menu » history
Bugs system: the system only displays 2017 & 2018 when data filtering.
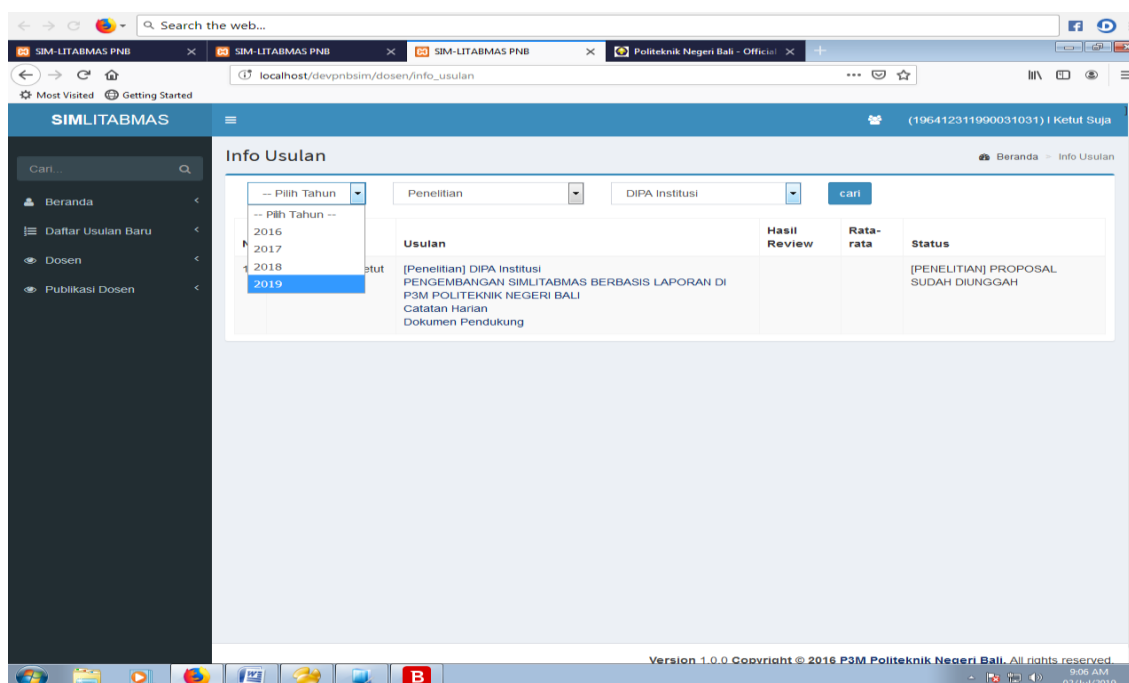Improvements:

Figure 5. Improvements for menu history.

4. Conclusions

In this study there are several menus that have been fixed according to the scopes that are in the development of Simlibtabmas, including menu list of new proposals, list of proposed review and active research and service activities. Before repairing the Simlitabmas Application often came out with an error sign, so the process of inputting data, uploading and downloading was often problematic. After the Simlitabmas Application was perfected, the process of input, output, upload and download was normal, in accordance with the rules and procedures set by the Bali State Polytechnic P3M Unit.

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A design of pyrolysis test-bed for plastic waste

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Abstract. The problem of plastic waste is a serious environmental problem because plastic waste takes hundreds of years to be decomposed into elements that can be naturally accepted by the environment. On the other hand, there has been an increase in the accumulation of the spread of plastic waste to the environment. The utilization of plastic waste as its conversion into oil is one alternative to reduce the exposition of plastic waste to the environment while also offering benefits in the form of new energy sources. The pyrolysis process without a firm understanding of the science of its process may lead to a utilization is far from optimum. Optimization of this process requires research on the properties of the spectrum and the behavior of the pysrolisis process such as the relation of temperature of pyrolysis to the spectrum of oil products. Due to this reason, a pyrolisis test device was designed in this study that can regulate the temperature of the prolysis furnace so that the results of pyrolysis associated with the temperature can be analyzed chemically. This test equipment was designed with the aim to determine the effect of pyrolysis temperature on the composition of the resulting pyrolysis products.

1. Introduction

The use of petroleum as an energy source continues to increase which results in the decline of world oil reserves. This decline will be a global crisis for the next few decades. The search for new energy alternatives is an urgent topic for world current research trends. One alternative energy that is considered as an energy source is plastic waste.

The problem of plastic waste is a serious environmental problem because plastic waste takes a long time, up to hundreds of years, to be decomposed into elements that can be naturally accepted by the environment. On the other hand there has been an increase in the accumulation of the spread of plastic waste to the environment. The use of plastic waste to be compiled into oil is one alternative to reduce the exposition of plastic waste to the environment while also offering benefits in the form of new energy sources.

The environmental crisis in the form of the accumulation of plastic waste disrupts the healthy balance of the environment for humans and threatens the sustainability of vegetable diversity both on land and sea. The obstacle in overcoming this problem is that there is a lack of favorable incentives in handling plastic waste. With the utilization of plastic waste into fuel which has economic value, it will trigger many parties to enter this field.

The pyrolysis process without a firm understanding of the science of its process may lead to conversion process that is far from optimum. Optimization of this process requires research on the

properties of the spectrum and the behavior of the pysrolisis process as in the relation of temperature of pyrolysis to the spectrum of oil products. For this reason, a pyrolisis test device was designed in this study that can regulate the temperature of the prolysis furnace so that the results of pyrolysis associated with the temperature can be analyzed chemically. This test equipment was designed with the aim to determine the effect of pyrolysis temperature on the composition of the resulting pyrolysis products.

Plastic decomposition products through pysolysis are strongly influenced by temperature. Different temperatures will produce different compositions on the product. Departing from this background, the researchers intend to design a pyrolysis test device that will be used as a research tool to know the chemical behavior of the process of pysrolysis from plastic waste. The tool designed will be able to map the effects of temperature variables in the pyrolysis process on the composition of the oil produced. Thus the results of this study will be useful in designing the pyrolysis tool in the future in determining the parameters of the temperature setting of the design of the plastic garbage pyrolysis device.

In this research, the configuration of the pyrolysis test tool including its components and its working principle was designed. The optimal size of each component of the tool so that it can function as a research tool capable of mapping the effect of pyrolysis process temperature on product composition was also determined.

The purpose of this study is to design a pyrolysis test device that functions as a research tool capable of mapping the effect of process temperature on product composition. The specific objectives of this study are to determine the configuration, components and how the pyrolysis test equipment works. Calculations to determine the optimal size of each component so that it can function as a pyrolysis test tool was also performed.

2. Method

Pyrolysis is the thermochemical decomposition of organic matter through a process of heating without or little oxygen or other chemical reagents, where the raw material will break down the chemical structure into a gas phase [1]. Pyrolysis is a special case of thermolysis. Extreme pyrolysis, which only leaves carbon as a residue, is called carbonization.

Carbonized coal briquettes are briquettes that have previously undergone a carbonization process. Carbonization is the process of heating coal to a certain temperature and time (200–1000 ° C (390–1800 ° F) [2] in oxygen-poor conditions to remove the coal fly substance so that it produces solid coal or coal coke or semi coke with tar and gas byproducts.

This process is used in general in the chemical industry, for example, to produce charcoal, activated carbon, and other chemicals from wood, to convert ethylene dichloride to vinyl chloride to make PVC, to produce coke from coal, to convert biomass into synthesis gas and biochar, to convert plastic waste back into usable oil, or waste to be a disposable safe substance, and to convert hydrocarbons of medium molecular weight such as oil to lighter ones like gasoline. Pyrolysis is also used in the manufacture of nanoparticles, zirconia and oxides utilizing ultrasonic nozzles in a process called ultrasonic spray pyrolysis (USP) [3].

Several studies have been conducted in rcent years regarding pyrolysis of plastic waste. The characteristic of the char produced in the fast pyrolysis of the high density polyethylene was investigated by Jamradloedluk and Lertsatitthanakorn [4]. Plasma pyrolysis is an innovative technology for transforming high calorific plastic waste into a valuable synthesis gas (syngas) by means of thermal plasma. The process developed is a drastic non-incineration thermal process, which uses extremely high temperature in an oxygen-starved environment to completely decompose input plastic waste into syngas, composed of very simple molecules: CO, H2 and small amount of higher hydrocarbons [5]. The use catalist in the pyrolysis of biomass and plastic mixtures has been investigated by Sebestyén et al. [6]. Areepraserta et al. have conducted composition study of plastic waste in Bangkok and its feasibility for energy recovery [7]. Pyrolysis of plastic waste in microwave oven was studied by Aishwarya and Nangarthody [8]. Ghenai et al. have investigated the plastic waste

pyrolysis using solar energy [9]. Hossain et al. conducted the combined pyrolysis of plastic waste and rice straw [10].

3. Results and discussions

The first phase of the 2019 research is the beginning of the future applied research plan to develop pyrolysis machines for pastic waste to become oil fuels that have economic value such as gasoline and diesel fuel.
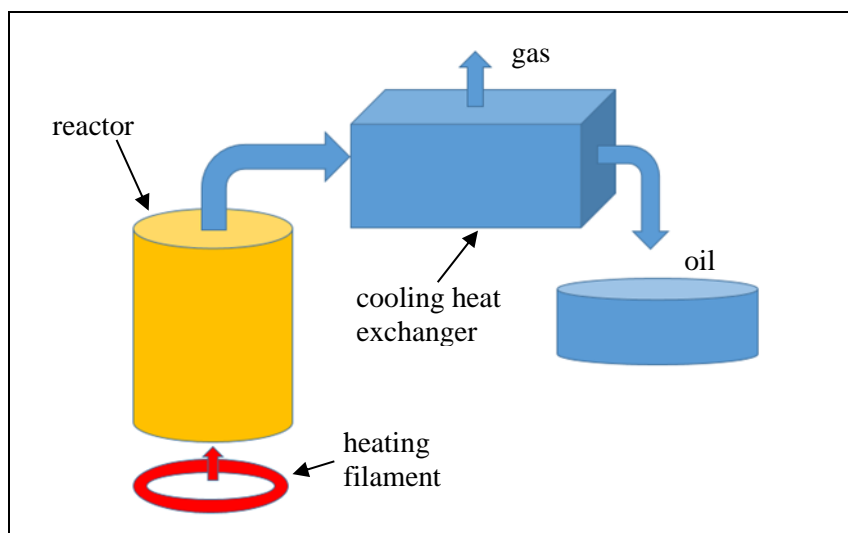

Figure 1. The design of pyrolysis test-bed.

This plastic waste is usually in the form of a polymer compound. This polymer has the same basic structure as oil which is in the form of hydrocarbons or C-H, but because it has experienced hydrocarbon polymerization it has a very long chain. In other words, the chemical structure of plastic and oil is similar. This pyrolysis process returns the plastic back to oil by cutting the long chain of hydrocarbons.

As a preliminary study this study focused on the design of pysrolysis test bed. Plastic waste is placed on a reactor tube that is heated with heating elements controlled by a thermostat. Heated plastic will melt and decompose into shorter hydrocarbon compounds and then evaporate. The gas flow from the hot pysrolysis will flow into the cooling tube. The oil that has been cooled will be collected with a storage vessel.

The oil product from the decomposition of plastic waste will be in the form of short chain hydrocarbons where the composition will depend on the temperature of the reactor. The test equipment made in this study will be able to control the temperature of the reactor so that it can set the temperature of the process related to the specific product, which in the next study will be a research tool to map the effect of process temperature on the composition of pyrolysis products.

Tests carried out in this study were to try tools in pyrolysis of one type of plastic waste. The testing criteria are the ability of the tool to produce pyrolysis products and also the stability of the process temperature.

4. Conclusions

A test bed has been designed as research tool to investigate the effect of temperature to the pysrolysis products of plastic waste. The continuation of this research will be to utilized this tool to investigate the pyrolysis products for various plastic waste compositions.

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