

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

O Melo ¹, A Kimbal ¹, A Wauran ¹

¹ Department of Electrical Engeneering, Manado State Polytechnic, Manado, Sulawesi Utara, Indonesia

E-mail: olgameoak@gmail.com

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 semistructured 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 hypertext. 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.

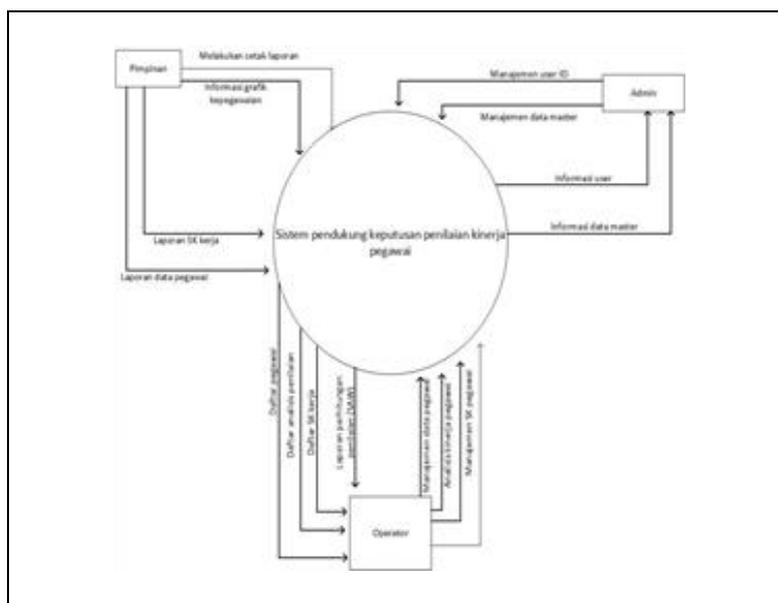


Figure 1. Context diagram.

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.

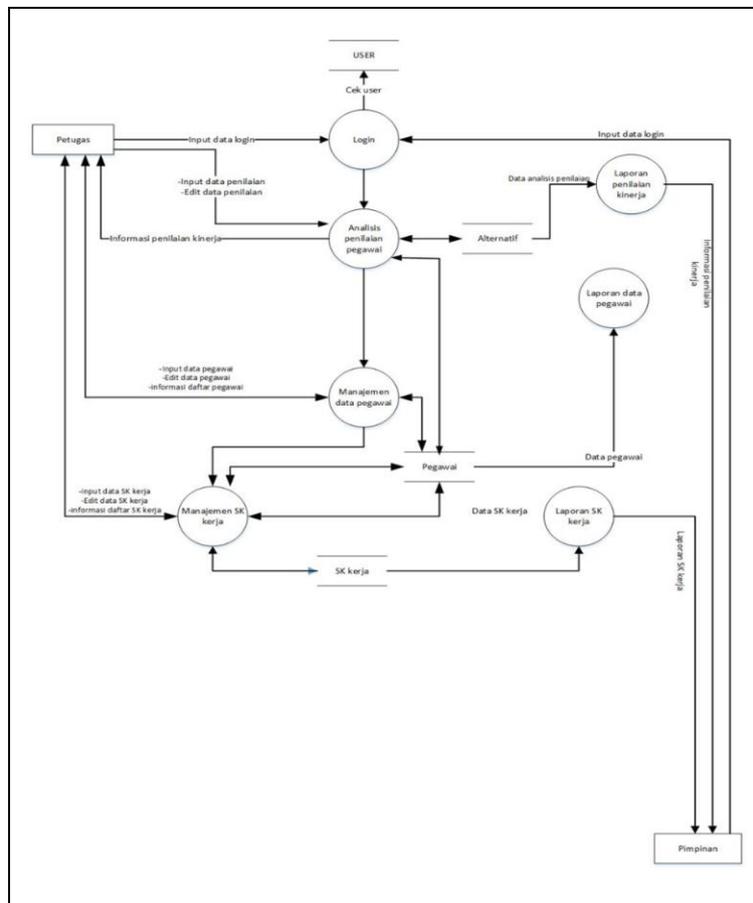


Figure 2. Level 1 diagram.

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.

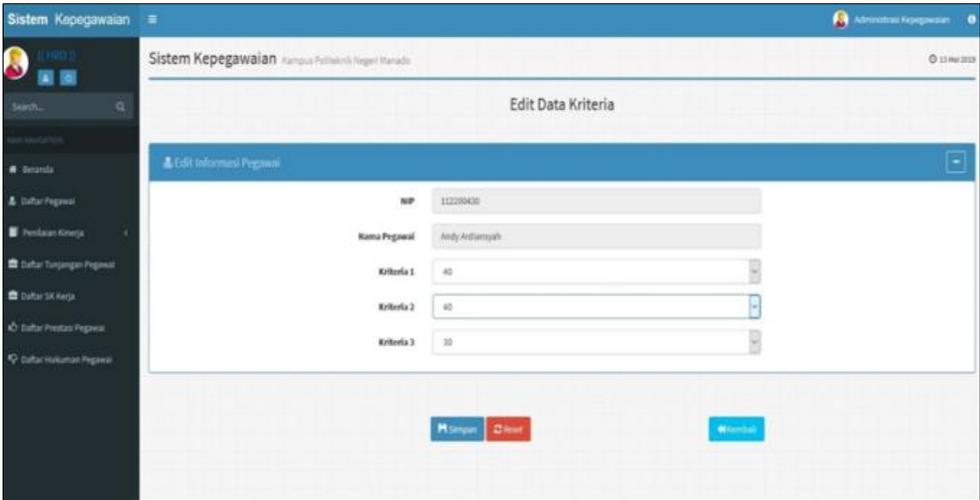
The ability of the application made is that it can process employee data related to each employee's personal data information, educational data and work experience data, in addition there is also an analysis of employee assessment criteria where each employee will be assessed and the value is inputted 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.



The screenshot shows a web application interface for 'Sistem Kepegawaian' (Employee Management System) at 'Kampus Politeknik Negeri Manado'. The main content area is titled 'Edit Data Kriteria' and contains a form for editing employee criteria. The form includes the following fields:

Field	Value
NIP	112200430
Nama Pegawai	Andy Andiansyah
Kriteria 1	40
Kriteria 2	40
Kriteria 3	30

At the bottom of the form, there are three buttons: 'Simpan' (Save), 'Reset', and 'Batal' (Cancel).

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.

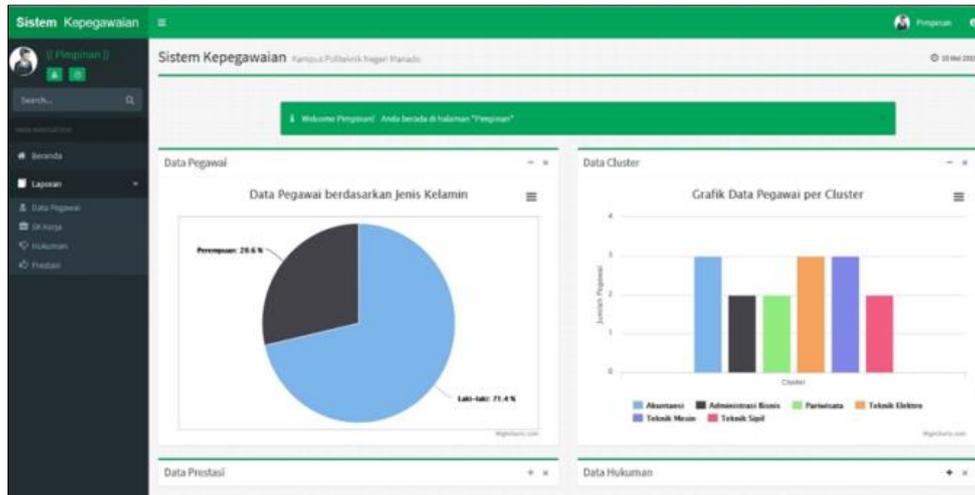


Figure 4. Home page layout (employee and cluster).

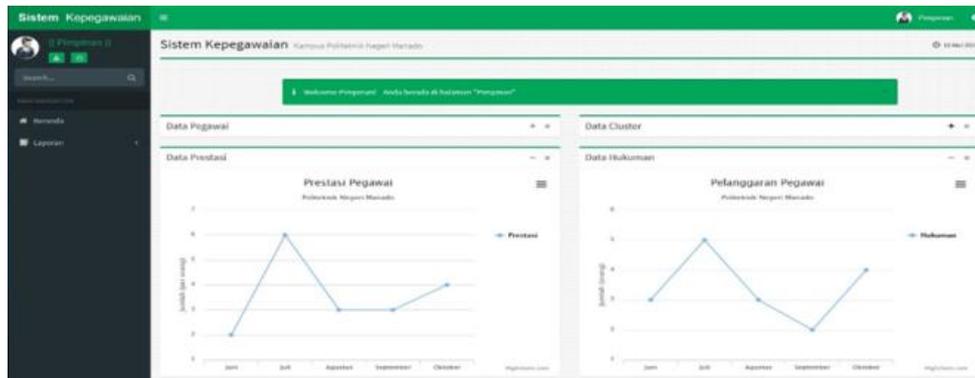


Figure 5. Home page layout (achievements and violations).

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.

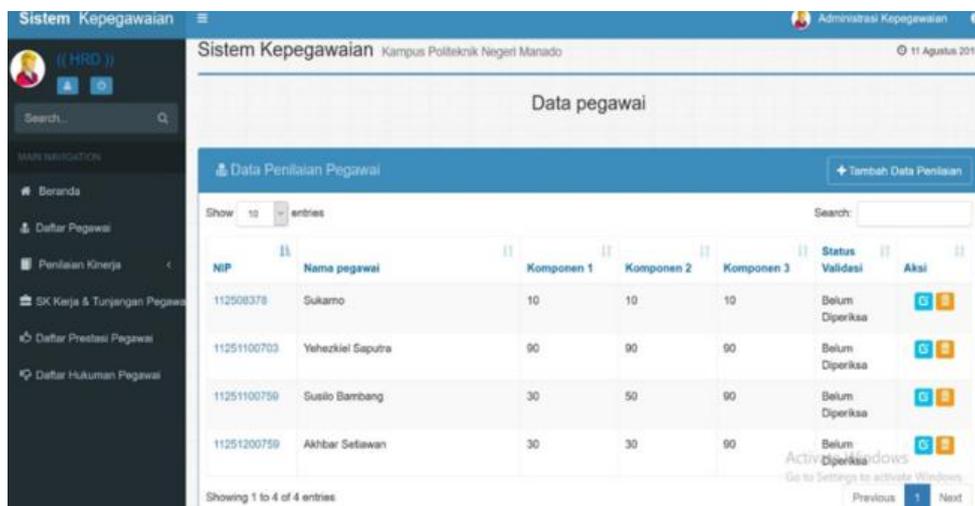


Figure 6. Employee assessment page.

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.

The screenshot shows a web form titled "Tambah Data" for "Informasi Penilaian Pegawai". It contains the following fields and values:

- NIP: -- Pilih Pegawai --
- NAMA: -- NAMA --
- Komponen 1: 45
- Komponen 2: 46
- Komponen 3: 67

Buttons at the bottom include "Simpan", "Reset", and "Kembali".

Figure 7. Input form data assessment.

The screenshot shows a web application interface for "Sistem Kepegawaian" at "Kampus Politeknik Negeri Manado". The main content is a table titled "Data pegawai" showing performance appraisal results. The table has the following columns: No, NIP, Nama pegawai, Pangkat, Komponen 1, Komponen 2, Komponen 3, Bobot Nilai Akhir, Rekomendasi Tunjangan Kinerja, and Status Validasi.

No	NIP	Nama pegawai	Pangkat	Komponen 1	Komponen 2	Komponen 3	Bobot Nilai Akhir	Rekomendasi Tunjangan Kinerja	Status Validasi
1	11251100704	Minggus Awit Pangestu	010	30.00	40.00	30.00	100.00	4551000	Terima
2	11251100704	Minggus Awit Pangestu	006	30.00	40.00	30.00	100.00	2702000	Terima
3	11251100703	Yehezkiel Saputra	007	27.00	36.00	27.00	90.00	2928000	Belum Diperiksa
4	112200430	Johely Sonie Rorona S. Sca.	012	24.00	32.00	24.00	80.00	7271000	Terima

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.

6. References

- [1] Dharmastuti D 2013 *Jurnal Sistem dan Teknologi Informasi JustIN* **2**
- [2] Frieyadie 2016 *Jurnal Pilar Nusa Mandiri* **7** 37-45
- [3] Nugroho I 2015 *Sistem Informasi Penerimaan Siswa Baru Berbasis Web dengan PHP dan SQL*
Yogyakarta: Lumbung Pustaka Universitas Negeri Yogyakarta
- [4] Kusriani 2007 *Konsep dan Aplikasi Sistem Pendukung Keputusan* Yogyakarta: ANDI
- [5] Elistri M, Wahyudi J and Supardi R *Jurnal Media Infotama* **10** 105-109
- [6] Utomo M S D 2014 *Penerapan Metode SAW (Simple Additive Weight) pada sistem pendukung keputusan pemberian beasiswa pada SMA Negeri 1 Cepu Jawa Tengah* Semarang: Universitas Dian Nuswantoro
- [7] Saifulloh and Kusriani 2016 *Cogito Smart Journal* **2** 120-134