

APPLICATION OF DECISION SUPPORT SYSTEM FOR EMPLOYEE'S BONUS USING ANALYTICAL HIERARCHY PROCESS METHOD

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ABSTRACT

Having the best employee selection decisions on the CV. Multi Citra Agung, the writers assisted the company employing a method by developing a waterfall system. The method was carried out through this research process by designing stages of the Unified Modeling Language (UML) system. The occurred problems found were decisions that were not as expected and the lack of an objective attitude in decision making, due to the absence of a special process for evaluating employees in awarding bonuses of Multi Citra Agung by still using conventional systems. The study was conducted to select employees who are entitled to bonuses using the Analytical Hierarchy Process (AHP) method. A multi-criteria decision making process is to determine the best choice of a number of alternatives for employee performance appraisal based on attendance, discipline, communication and employee performance. The results of this research give the best ranking of employees by displaying an assessment of 6 employees in the form of criteria, total value and information of employees who are entitled to a bonus. For employees who are entitled to get a bonus which is 1 employee who fulfills a very satisfactory level with a range of 0.28 - 0.50.

Keywords : *Analytical Hierarchy Process, Bonuses, Decisions Support System*

1. Introduction

In every company, agency, organization or business entity, employees are one of the most important components (Dirani et al., 2020). Basically, the survival of a company depends on the employees who work in the company. A large company is a company that has qualified employees. Various ways are carried out by company leaders to improve the quality of their employees. One of them is by giving bonuses with the aim of spurring the performance and work productivity of the company's employees (Emmanuel & Nwuzor, 2021). Problems occur if there is a decision given which is not as expected and there is a lack of objective attitude in making decisions.

CV. Multi Citra Agung is a company engaged in cleaning services with 85 employees assigned to various locations in Padang which is located at Jl. Intan XI No. 261, Pemambiran Lubuk Begalung District, Padang. The company currently does not yet have a special process for evaluating employees in giving bonuses and still using the conventional system. The method used is for selecting its employees directly done by the manager. Managers monitor the performance of the employees who are ranked based on the value for their attendance, discipline, communication, and performance. The assessments were grouped into 5 categories, namely scores > 95 very good, scores 86 to 95 good, 66 to 85 adequate, 65 to 51 less, and scores below 51 were categorized as very poor. After that, the manager calculates the value of each employee by adding up all the value of the assessment criteria and looking for the average value. Based on the average value, the manager makes a ranking report starting from the highest value to the lowest value and only the best employees get the bonus (Irawan, 2020).

The appraisal process monitored by the managers is considered to be ineffective and inefficient due to the difficulties met by the managers in making assessments resulting decisions that are often inappropriate and causing dissatisfaction for the employees with decisions made by the leaders in giving bonuses. Employees who have a fairly good performance often do not get bonuses as they should. On the other hand, employees who have poor performance get bonuses because they have a personal relationship or closeness with their manager. To overcome this, it is

time to implement a decision support system for giving bonuses to employees (Van der Stede et al., 2020).

Decision Support System (DSS) is a computer-based information system that produces various alternative decisions to assist management in dealing with either structured or unstructured problems using data and models. One of the most suitable SPK methods for giving employee bonuses is to apply the Analytical Hierarchy Process (AHP) method. AHP is a multi-criteria decision-making process that aims to determine the best choice from several alternatives taken. With the AHP managerial method, CV. Multi Citra Agung will be able to select the best employees to receive bonuses based on rankings (Dos Santos et al., 2019; Ho & Ma, 2018; Dewi & Putra, 2021).

Another researches similar to this current study, conducted by Rahim et al., (2018) giving employees annual bonuses, a decision support system was designed using the TOPSIS method. The research has passed black box testing and has worked well (Hamza & Hammad, 2019). Other research has also been carried out by Sandra Jamu Kuryanti in 2016. In this study, a decision support system was designed applying the AHP method for determining employee bonuses. The research has passed black box testing and has worked well as well (Kuryanti et al., 2016). In 2020 related research has also been carried out by Suratmi. In this study, a decision support system was designed for receiving employee bonuses. In this study using the Weighted Product (WP) method and black box testing has been carried out and it worked well as well as previous mentioned studies (Suratmi et al., 2020). The authors' current research is designing a support system by applying the Analytical Hierarchy Process (AHP) method for giving employee bonuses which produces a system that can be used as decision support by CV. Multi Citra Agung, so as to produce objective decisions that can be accepted by all employees.

2. Literature Review

Previous literature studies have become one of the authors' references in conducting research so that the authors are able to enrich the theory used in reviewing the research conducted.

2.1 Definition of System

According to Hamim Tohari (2014: 2), "a system is a collection or set of elements or variables that are interrelated, interact with each other, and depend on each other to achieve goals". According to I Putu Agus & Eka Pratama (2014:7), "the system is a set of procedures that are interrelated and interconnected to perform a task together". Meanwhile, according to George M. Marakas and James A. O'Brien (2006), "a system is a set of interrelated components, with clear boundaries, that work together to achieve certain goals by receiving inputs and producing outputs in an organized transformation process. "

2.2 Decision Support System

Decision is an end of the process of thinking about a problem or problem to answer the question of what should be done to overcome the problem, by choosing an alternative. Basically, decision making is a form of selecting from various alternative actions that may be chosen, the process of which is through a certain mechanism which is expected to produce the best decision (Li et al., 2021; Akbar et al., 2021; Valentino et al., 2021).

Decision support system applications consist of several subsystems, as shown in Figure 1.

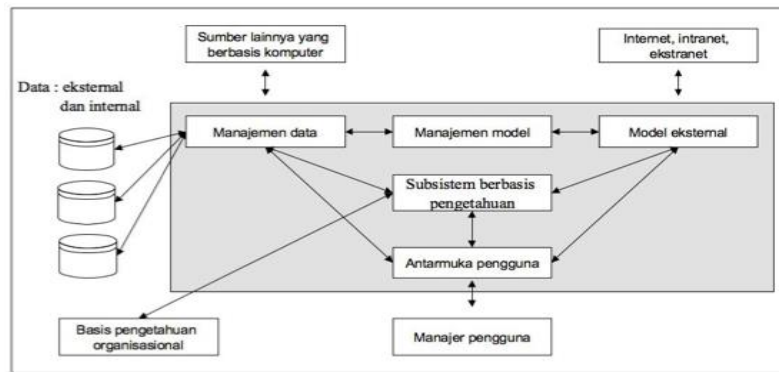


Fig. 1. Decision Support System Architecture

2.3 Analytical Hierarchy Process (AHP)

Analytical Hierarchy Process (AHP) Analytical Hierarchy Process (AHP) is a decision support model developed by Thomas L. Saaty. This decision support model will describe complex multi-factor or multi-criteria problems into a hierarchy. In the Analytical Hierarchy Process, problems are arranged into a hierarchical structure so that decision making involve all the factors as much as possible that need to be considered and the relationship between one factor and another will be clearly visible. To assess the relative importance of elements, Saaty (1987) assigned a quantitative scale of 1 to 9.

3. Research Methods

The research was conducted in a computer laboratory to directly practice the results of the analysis and development of problems and create programs that can solve and support the completion of the new system. The system development method uses the waterfall application model which is carried out in this research process through 5 stages, namely system analysis, system design using Unified Modeling Language (UML), system implementation, maintenance, documentation and reporting.

From the results of the analysis, the authors formulate the problems or constraints in determining the way of giving bonuses to the employees on CV. Great Multi Image. Based on the formulation of the existing problems, the authors found a solution to make a decision support system for giving bonuses to employees using the Analytical Hierarchy Process (AHP) method in order to assist in determining the awarding of bonuses to employees.

3.1 AHP Process Analysis

The AHP analysis consists of several stages, namely by determining the criteria and weights of the assessment. Create a pairwise comparison matrix that describes the relative contribution or influence of each element to the goals or criteria at the level above it. To start the pairwise comparison process, a criterion is chosen from the top level of the hierarchy, for example K and then from the lower level the elements to be compared, for example K1, K2, K3, K4. There are several elements of the criteria subsystem hierarchy as seen in Figure 2.

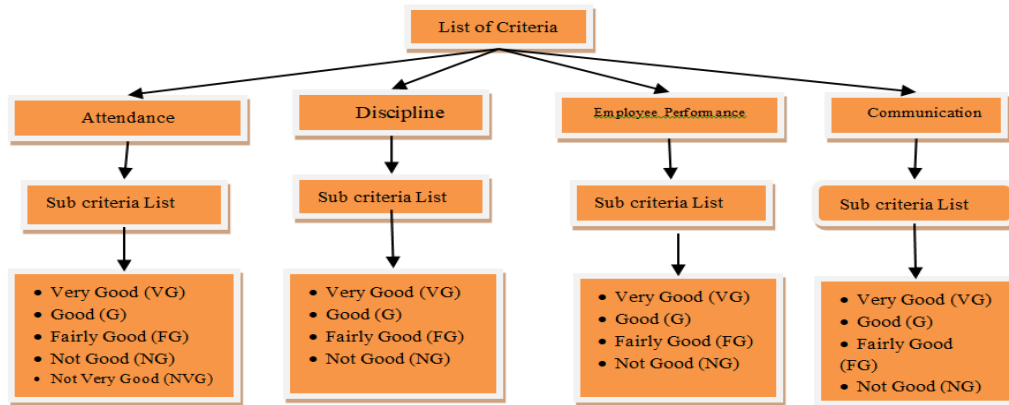


Fig. 2. Hierarchy of Subsystem Elements of Criteria and Subcriteria

After conducting further observations in the field, the authors summarize some detailed information from each of the assessment criteria. As shown in table 1.

Table1 - Criteria Assessment

No	Criteria	Sub Criteria	Weight
1	Attendance	Very Good (VG)	5
		Good (G)	4
		Fairly Good (FG)	3
		Not Good (NG)	2
		Not Very Good (NVG)	1
2	Discipline	Very Good (VG)	5
		Good (G)	4
		Fairly Good (FG)	3
		Not Good (NG)	2
		Not Very Good (NVG)	1
3	Employee Performance	Very Good (VG)	5
		Good (G)	4
		Fairly Good (FG)	3
		Not Good (NG)	2
		Not Very Good (NVG)	1
4	Communication	Very Good (VG)	5
		Good (G)	4
		Fairly Good (FG)	3
		Not Good (NG)	2
		Not Very Good (NVG)	1

3.2 Calculation of AHP

This study uses the AHP method in its calculations. The steps in the AHP calculation process consist of several stages, namely the process of determining criteria and alternatives, making pairwise comparison matrices, value matrices, matrix summing each row, priority weights, searching for lambda max, CI, and CR. After that, proceed with the same steps to determine alternative priorities for each criterion. From these results, multiplication between the priority criteria and alternative priorities per each criterion is carried out to get the highest priority.

3.3 Consistency Ratio Calculation

This calculation is used to ensure that the value of the consistency ratio $CR \leq 0.1$ if the value is greater than 0.1 then the pairwise comparison matrix needs to be improved. The calculation as in Table 2.

Table 2 - Calculation of CR Sub Criteria

Communication	Number per line	Priority	Result
Very Good (VG)	12.57	0.50	13.07
Good (G)	4.25	0.26	4.51
Fairly Good (FG)	1.28	0.13	1.42
Not Good (NG)	0.32	0.07	0.38
Not Very Good (NVG)	0.06	0.03	0.10

The total column per row is obtained from the sum column in the summing table of each row, while the priority column is obtained from the priority column of the criterion value matrix table. From the table above, the following values are obtained:

$$\text{Sum (sum of result values)} = 19.48 + 4.51 + 1.42 + 0.38 + 0.10 = 19.48$$

$$n \text{ (number of criteria)} = 5$$

$$\lambda maks = \frac{19,48}{5} = 3,90$$

$$CI = \frac{\lambda maks - n}{(n - 1)} = \frac{3,90 - 4}{5 - 1} = \frac{-1,10}{4} = -0,28$$

$$CR = \frac{CI}{IR} = \frac{-0,28}{0,9} = -0,31$$

(nilai IR matrik ordo 5)

CR < 0.1 then CR is consistent (accepted)

After weighting using the sub-criteria values, the final calculation is carried out by multiplying the criteria values by the sub-criteria values and then adding them up to get the best value as can be seen in Table 3.

Table 3 - Final Result of Calculation

Employee's Name	Attendance	Discipline	Employee Performance	Communication	Total	Description
Employee 1	0.15	0.07	0.01	0.0182	0.24	Not getting Bonus
Employee 2	0.27	0.07	0.01	0.0182	0.37	Getting Bonus
Employee 3	0.15	0.07	0.01	0.0182	0.24	Not getting Bonus
Employee 4	0.27	0.07	0.01	0.0182	0.37	Getting Bonus
Employee 5	0.15	0.07	0.01	0.0182	0.24	Not getting Bonus
Employee 6	0.15	0.07	0.01	0.0182	0.24	Not getting Bonus

3.4 Global System Design

The global design or what is often called the macro system design is a design that describes or gives a general picture to the user about the system to be built and what information will be generated from the new system being built. This global system design is carried out in preparation for building or designing a detailed system with the widest alternatives of a design, as shown in Figure 2.

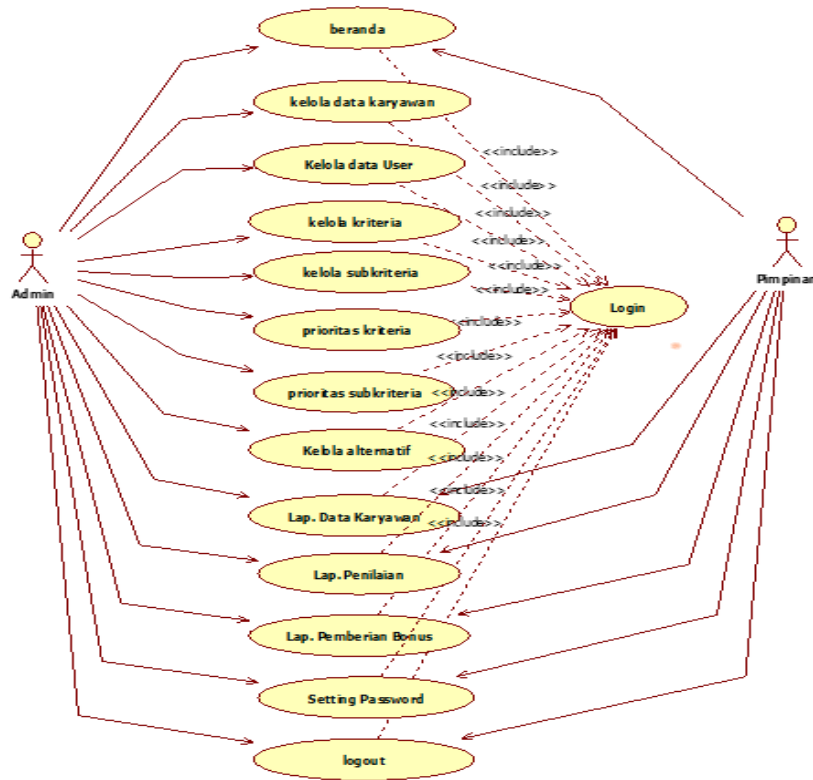


Fig. 2. Use Case Diagram Admin

4. Result and Discussion

Implementation is the stage where the system that has been designed in the previous stage is implemented or operated. In this application there are 5 input data that will later be used in the decision support system process for giving employee bonuses on CV. Great Multi Image.

a. Login Page

This page is a page used by admins and leaders to login. The login process page can be seen in Figure 3.

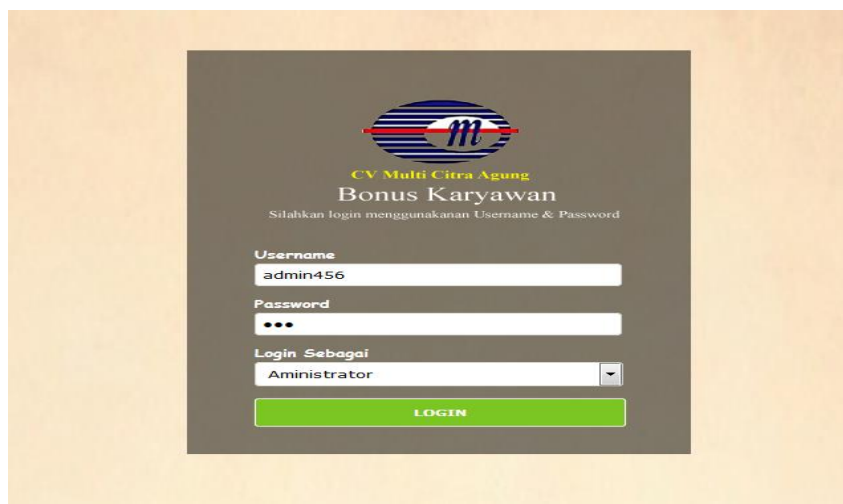


Fig. 3. Login Process Page

b. Data User Entry

Data User Entrance is a form to fill in user data in the CV. Great Multi Image. In this form there is a save button to save data to the database, as shown in Figure 4

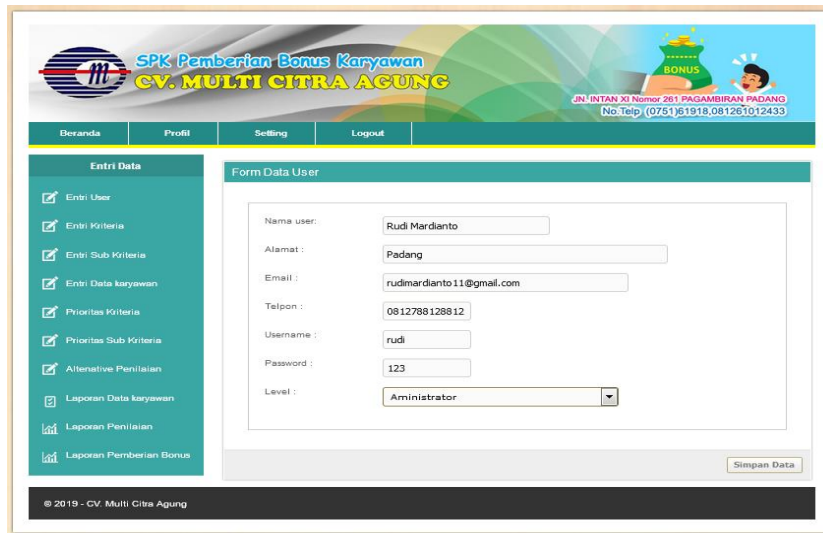


Fig 4. Data User Entry Page

a. Criteria Data Entry

Criteria data entry is a form to fill in the criteria data used for the evaluation process of employee bonus awards on the CV. Great Multi Image. In this form there is a save button to save data to the database, as shown in Figure 5

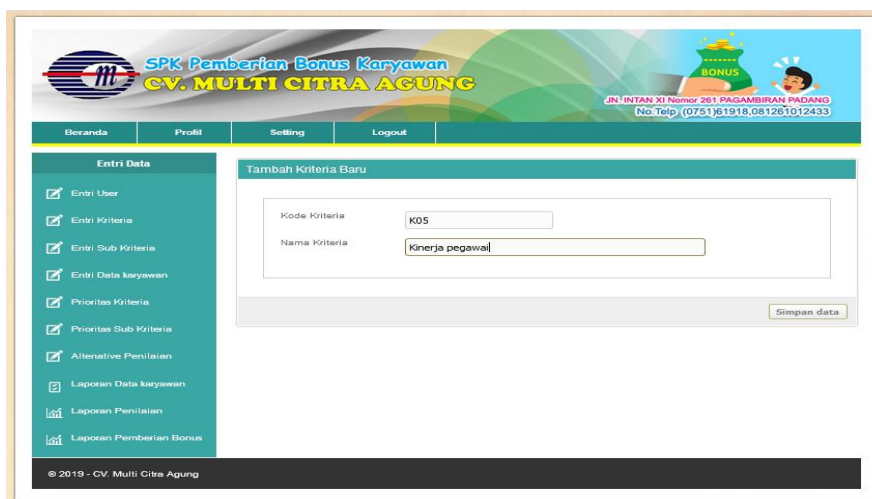


Fig. 5. Criteria Data Entry

b. Employee Data Entry

Employee data entry is a form to fill in Employee data on the CV. Great Multi Image. In this form there is a save button to save the data to the database. As shown in figure 6

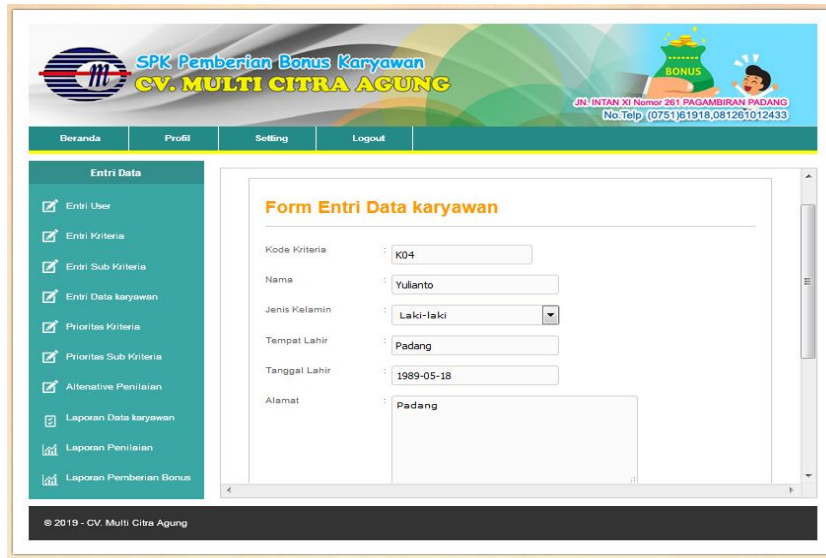


Fig. 6. Employee Data Entry

e. Appraisal Process

The assessment page is the page used by the admin to enter employee assessment data on the CV. Great Multi Image. On this page, the admin enters month, year, employee code and appraisal data as shown in Figure 7.

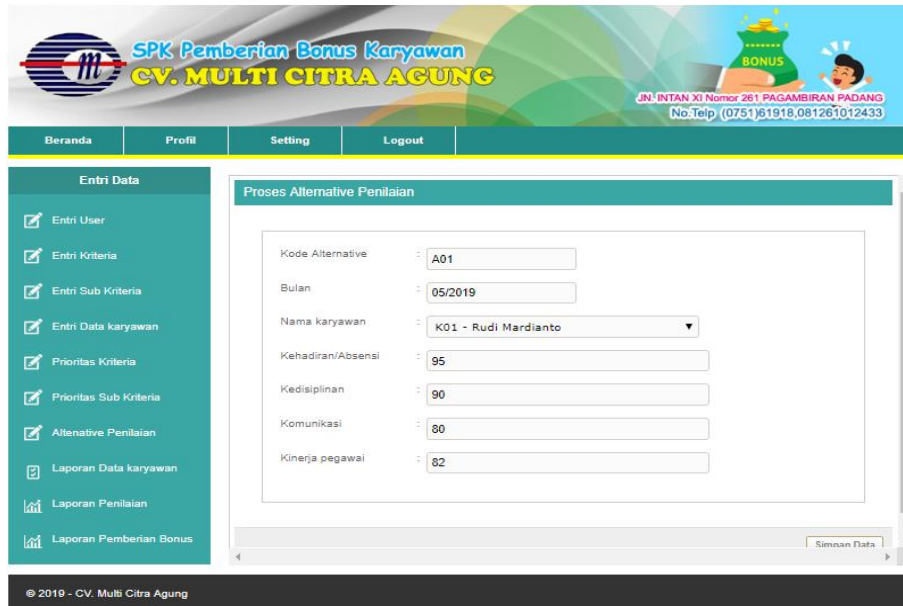


Fig. 7. Appraisal Process Page

f. Output Page / Employee Data Report

To be able to view the employee data report, the admin clicks the employee data report menu. Then the admin will be asked to enter the month and name of the Leader, then the Employee data report will appear as shown in Figure 7.

		CV. MULTI CITRA AGUNG						
Jl. Intan XI No. 261 Pengambiran Kecamatan Lubuk Begalung Padang No.Telp (0751)61918,081261012433								
LAPORAN DATA KARYAWAN								
TAHUN: 2019								
No	Kode	Nama karyawan	Jenis Kelamin	Tempat Lahir	Tanggal Lahir	Alamat	Pendidikan	Telpon
1.	K01	Rudi Mardianto	Laki-laki	Padang	1989-05-18	Padang	SMA	08127888123
2.	K02	Delvianto	Laki-laki	Padang	2019-05-07	Padang	SMA	08127888123
3.	K03	Nofrizanto	Laki-laki	Padang	2002-05-02	Padang	SMA	081217823772
4.	K04	Yulianto	Laki-laki	Padang	1989-05-18	Padang	SMA	08127881200
5.	K05	Deni Andika	Laki-laki	Pariaman	1989-05-26	Padang	SMA	085361277100
6.	K06	Firman	Laki-laki	Padang	1990-05-16	Padang	SMA	081356177210
Padang, 12-05-2019								
Pimpinan								
Yulfendris								

Fig. 8. Employee Data Report

5. Conclusion

Based on the results of research conducted, it can be concluded that: Decision support system for giving employee bonuses to CV. Multi Citra Agung assists the company's employee appraisal process which is distributed for the distribution of bonuses. Decision support system for giving employee bonuses to CV. Multi Citra Agung makes managers for assessing employee performance for the purpose of giving bonuses. With a decision support system for giving employee bonuses to CV. Multi Citra Agung employees are more satisfied with the decisions made by the leadership in giving bonuses. The results of this study provide a ranking of the best employees by displaying an assessment of 6 employees in the form of criteria values, total scores and information on employees who are entitled to bonuses. For employees who are entitled to a bonus, namely 1 employee who meets the very satisfactory level with a level range of 0.28 – 0.50.

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