

# APPLICATION OF THE WEIGHTED PRODUCT METHOD IN THE DECISION SUPPORT SYSTEM OF THE SELECTION OF EMPLOYEE SALARY BONUS RECIPIENTS IN CV. WORKS OF JAYA FURNITURE

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## Abstract

*Besides the basic salary, every company often provides bonuses. The bonuses are given based on certain criteria determined by each company. For example, the criteria are product neatness, use of raw materials, speed of work, creativity, and discipline. A decision support system is a system aimed at supporting decision-making management. Weighted Product (WP) is a popular multi-Criteria analysis decision and is a multi-criteria decision making method. Weighted Product (WP) requires a normalization process because this method multiplies the assessment results of each attribute. From the tests carried out, the beta test results show that the respondents strongly agree on the usefulness of the application system, while the results of testing the accuracy of the Weighted Product algorithm with an accuracy of 100% based on the recovery test.*

**Keywords:** *support decision system, weighted product*

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## 1. INTRODUCTION

Every agency, company, organization and other business entity will compete to recruit the best human resources. Selection of good human resources greatly affects the improvement of a company's operations. Human resources or also called employees, strive to produce good work progress every month. As compensation for the work that has been done by an employee, the company provides wages or basic salary. Provision of basic salary to employees is carried out by the company in accordance with the employment contract. In addition to the basic salary, every company often provides bonuses. Bonuses can be in the form of money or goods according to the policies of each company. The bonus award is based on certain criteria determined by each company. For example, the criteria are performance, productivity, and discipline. Through the criteria that have been determined by the company, the next stage is the selection of employees who are entitled to get bonuses. One selection that can be used is to use a decision support system. A decision support system is a model-based system consisting of procedures in data processing and considerations to assist in decision making. With a selection decision support system in the selection of employee bonus recipients, it will be better and more valid.

The decision support system for selecting employee bonus recipients is completed by using the Weighted Product (WP) method. The method chosen is the Wighted Product method because the selection of employee bonus recipients is classified into problems that are multiobjective (there are many goals to be achieved) and multicriteria (there are many criteria to achieve goals). Through the Weighted Product (WP) method, the company can determine the weight of the importance of each criterion. The decision support system for the selection of employee bonus recipients is not intended to replace the function of a manager or leader in making decisions but only to assist managers or leaders in making decisions more quickly and precisely, according to criteria that have been determined by the company. Alternative choices are expected to provide a list of references to decision makers before actually taking a final decision.

In accordance with these problems, the authors are interested in choosing the title of the thesis "Implementation of the Weighted Product Method in a Decision Support System for the Selection of Employee Salary Bonus Recipients at CV. Karya Jaya Furniture". With this system, it is able to help business owners to determine which employees best meet the criteria for getting a monthly bonus.

## **1. BASIC THEORY**

### **2.1 WEIGHTED PRODUCT METHOD**

Weighted Product (WP) is a popular multi-criteria analysis decision and is a multi-criteria decision-making method. Weighted Product (WP) requires a normalization process because this method multiplies the results of the assessment of each attribute. The multiplication result is not meaningful if it has not been compared (divided) with the standard value. The weight for the benefit attribute functions as a positive power in the multiplication process, while the cost weight functions as a negative power. The Weighted Product method uses multiplication as a link to attribute ratings, where the rating of each attribute must first be raised to the power of the corresponding weight. This process is the same as the normalization process.

The preference for alternative  $S_i$  is given as follows:

1. Determination of the value of the weight  $W$
2. Determination of the value of the Vector  $S$
3. Determination of the value of the Vector  $V$

The following are the characteristics of the calculation of the WP method:

1. The weighted product (WP) method uses multiplication to connect attribute ratings, where the rating of each attribute must be raised to the first power with the weight of the attribute in question.
2. This process is the same as the normalization process.

3. The preference for alternative  $A_i$  is given as follows:

a. Determination of the value of the weight  $W$

$W_j$  is a positive rank for the profit attribute, and a negative rank for the cost attribute.

Determination of the weight value of  $S$

$$W_j = \frac{W_{Initj}}{\sum_{j=1}^n W_{Initj}}$$

.

$$S_i = \prod_{j=1}^n x_{ij}^{w_j}$$

b. Determination of The Value of The weight

Where  $S_i$  is the result of normalization of decisions on the  $i$ -th alternative, and is the multiplication of alternative ratings per attribute from  $j=1$ – $n$

c. Determination of the value of the weight  $V$

$$V_i = \frac{S_i}{\sum_{j=1}^m S_i}$$

Where,  $i$  is the result of the 1st alternative preference and  $\sum_{j=1}^m S_i$  is the sum of the results of the multiplication of alternative ratings per attribute.

$$S_i = \prod_{j=1}^n x_{ij}^{w_j}$$

$$V_i = S_i / (\sum_{j=1}^m S_i)$$

## **2.2 DECISION OF SUPPORT SYSTEM**

Decision support system is a system that is intended to support management decision making. A model-based decision support system consisting of procedures in data processing and also as a consideration. The decision support system must be simple, robust, easy to control, adaptable, complete in important matters.

The advantages of a decision support system are as follows:

1. Able to support finding solutions to complex problems.
2. Quick response to unexpected situations in changing conditions.
3. Able to apply different strategies in different configurations quickly and precisely.
4. New views and learnings.
5. Facilitate communication.
6. Improve management control and performance.
7. Save costs.
8. The decision is more correct.
9. Improve managerial effectiveness, allowing managers to work shorter hours and with less effort
10. Increase analysis productivity

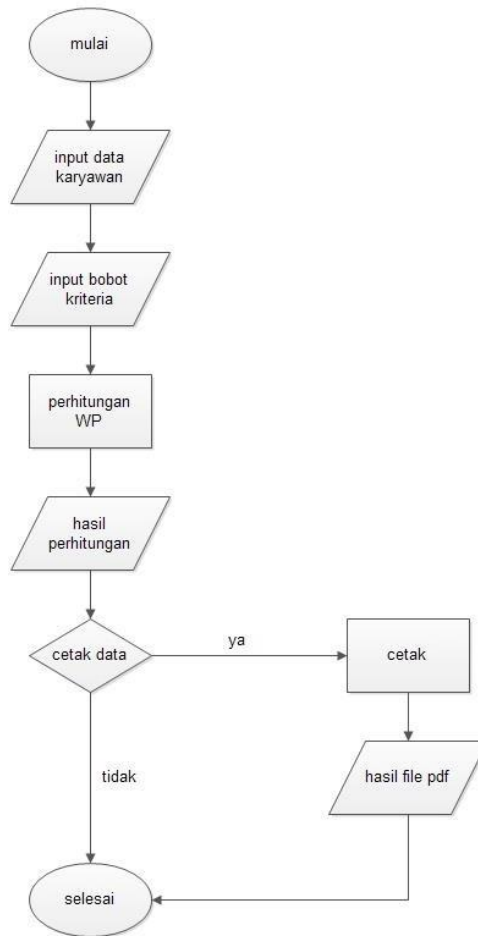
## **2. RESEARCH METHODS**

### **2.1 FLOWCHART**

Flowchart or flow chart is a chart that shows the flow in a program or system procedure logically. A flow chart is a description of the running process of a system. Jogiyanto (2015)

argues that a flow chart is a chart that shows the flow or flow in a program or system procedure logically.

a. System Flowchart

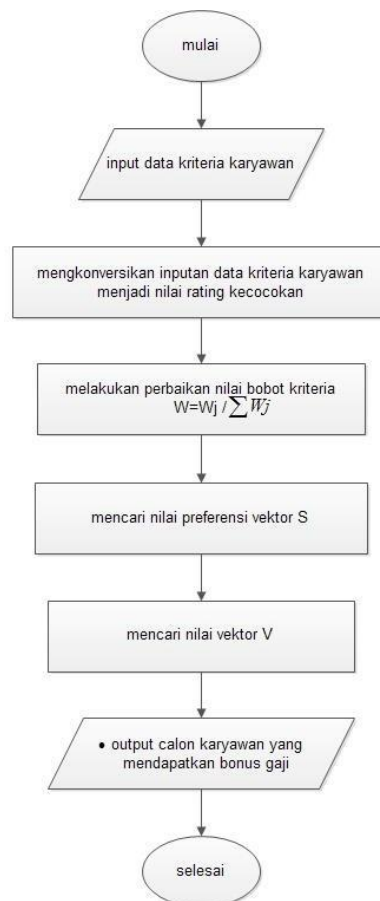


**Picture 1 Flowchart System**

In Figure 1 the flowchart of this system starts from the admin inputting employee data, after that inputting the weight of the criteria to be processed by calculating the Weighted Product. After that, the calculation results will be obtained in the form of the best employee data. Then the admin can print the calculation results, if yes, the system will process the calculation data into a PDF file, if not, then it's done.

b. Weighted Product Calculation Flowchart

In the flowchart, this method will first input the employee criteria data, then the employee criteria data will be converted into a match rating value. After that, repair the value of the criteria weight, then look for the preference value of the vector S, then look for the value of the vector V. After all that process is done, the output of prospective employees who get salary bonuses will be obtained.



*Picture 2 Flowchart Metode Weighted Product*

a. DFD level 0

DFD level 0 bisa juga disebut diagram konteks merupakan gambaran bagaimana sistem berinteraksi dengan external entity.

1.2 DFD (Data Flow Diagram)

Data Flow Diagram is one way to model the process in software design and analysis, especially with a structured approach. In conducting process modeling, it takes several levels of DFD so that the modeled process is in accordance with the desired system. The higher the DFD level, the more detailed the modeling is.

a. DFD level 0

DFD level 0 can also be called a context diagram is a description of how the system interacts with external entities.

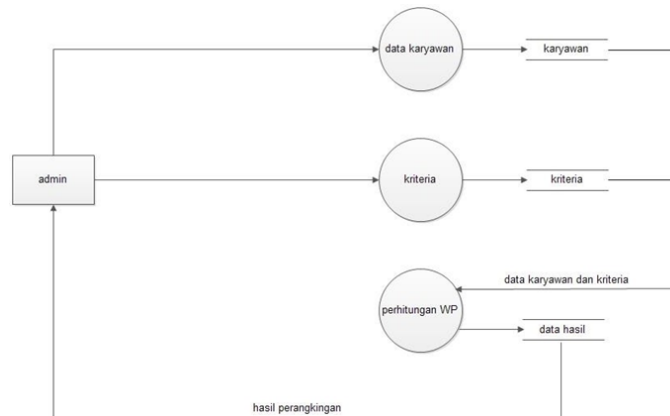


**Figure 3 DFD level 0**



b. DFD level 1

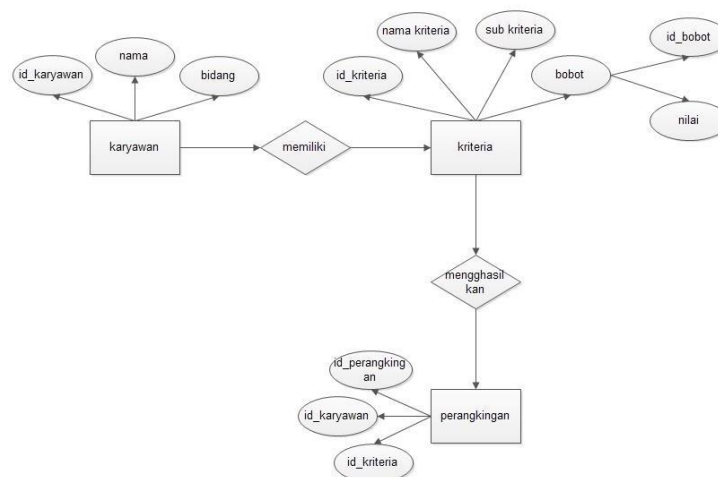
DFD level 1 shows the main processes that occur in the system being built.



**Figure 4 DFD level 1**

1.3 ERD (Entity Relationship Diagram)

Entity Relationship Diagram is one form of database modeling that is often used in the development of information systems. The entity relationship diagram (ERD) shows the relationships of the entity sets stored in the database.

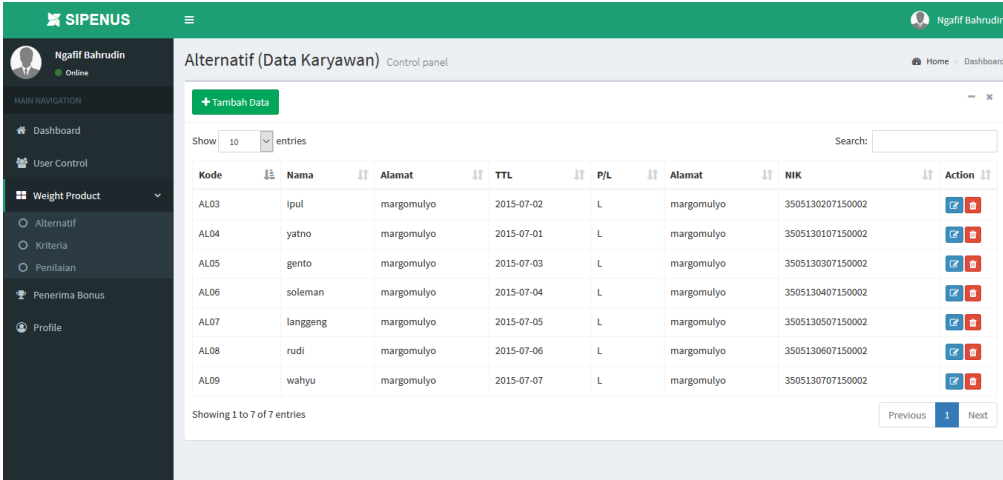


**Figure 5 ERD (Entity Relationship Diagram)**

### 3. RESULTS AND DISCUSSION

#### 2.1 SYSTEM IMPLEMENTATION

In this chapter, implementation and discussion is carried out, where this stage is carried out after the system design and implementation into the programming language is complete. In this chapter, system testing is also carried out which will later conclude that the system is in accordance with its objectives or not



The screenshot displays a web application interface for 'SIPENUS'. The main content area is titled 'Alternatif (Data Karyawan)' and is a 'Control panel'. It features a '+ Tambah Data' button, a search bar, and a table with 7 rows of employee data. The table columns are Kode, Nama, Alamat, TTL, P/L, Alamat, NIK, and Action. The data rows are as follows:

Kode	Nama	Alamat	TTL	P/L	Alamat	NIK	Action
AL03	ipul	margomulyo	2015-07-02	L	margomulyo	3505130207150002	[Edit] [Delete]
AL04	yatno	margomulyo	2015-07-01	L	margomulyo	3505130107150002	[Edit] [Delete]
AL05	gento	margomulyo	2015-07-03	L	margomulyo	3505130307150002	[Edit] [Delete]
AL06	soleman	margomulyo	2015-07-04	L	margomulyo	3505130407150002	[Edit] [Delete]
AL07	langgeng	margomulyo	2015-07-05	L	margomulyo	3505130507150002	[Edit] [Delete]
AL08	rudi	margomulyo	2015-07-06	L	margomulyo	3505130607150002	[Edit] [Delete]
AL09	wahyu	margomulyo	2015-07-07	L	margomulyo	3505130707150002	[Edit] [Delete]

Showing 1 to 7 of 7 entries. Navigation: Previous 1 Next

*Figure 6 Alternative Page*

This page is a page that contains all employee data working in the company. Here users can add, delete and also change employee data

Kode	Title	Bobot	Jenis	Action
KR03	kerapian produk	2	Benefit	[Edit] [Delete]
KR04	penggunaan bahan baku	2	Benefit	[Edit] [Delete]
KR05	kecepatan mengerjakan	3	Benefit	[Edit] [Delete]
KR06	kreativitas	4	Benefit	[Edit] [Delete]
KR07	kedisiplinan	1	Benefit	[Edit] [Delete]

*Image 7 criteria page*

This page is a page that contains criteria determined by stakeholders. Each criterion has its own code, weight and type. Users can also add, modify and delete criteria

Nama	Status	Tanggal	Action
dian	✓ Sukses	2020-08-16	[Delete]
gento	✓ Sukses	2020-08-16	[Delete]
ipul	✓ Sukses	2020-08-16	[Delete]
langgeng	✓ Sukses	2020-08-16	[Delete]
rudi	✓ Sukses	2020-08-16	[Delete]
soleman	✓ Sukses	2020-08-16	[Delete]
yalno	✓ Sukses	2020-08-16	[Delete]

*Figure 8 assesmentpage*

On this page stakeholders add a list of employees to be selected, after which they are given an assessment of the employee. If all employees have been entered, then click the selection button.

Nama	Nilai	Tanggal	Action
ipul	0.1477	2020-08-17	[Action]
langgeng	0.1458	2020-08-17	[Action]
yatno	0.146	2020-08-17	[Action]

*Figure 9 bonus recipient pages*

This page displays employees who will receive bonuses, the employees displayed are employees who have been selected according to the input entered by the stakeholders earlier.

### 3.2 CALCULATION RESULT

Calculate the value of the vector  $V_i$  by dividing the result of each  $S_i$  vector by the sum of all  $S_i$ . How to calculate the vector  $V_i$  as follows:

$$V_i = \frac{S_i}{\sum_{j=1}^m S_i}$$

$$\sum V_i = 0,802 + 0,607 + 0,679 + 0,638 + 0,767 + 0,529 + 0,537$$

$$\sum V_i = 19,97$$

$$\begin{aligned}V1(Yatno) &= \frac{3,06}{19,97} = 0,153 \\V1(Ipul) &= \frac{3,15}{19,97} = 0,157 \\V1(Gento) &= \frac{2,87}{19,97} = 0,143 \\V1(Soleman) &= \frac{2,48}{3,02} = 0,124 \\V1(Langgeng) &= \frac{3,02}{19,97} = 0,151 \\V1(Rudi) &= \frac{2,75}{19,97} = 0,137 \\V1(Dian) &= \frac{2,64}{19,97} = 0,132\end{aligned}$$

#### 4.3 ACCURACY TESTING OF WEIGHTED PRODUCT ALGORITHM

Accuracy is a measure that shows the closeness of the analysis results to the actual value. Accuracy is determined through a recovery test. The recovery test is carried out by spike (adding) the target analyte at a certain concentration to the sample. In order for the test to have high accuracy, it must have 100% efficiency. Accuracy is assessed using at least 9 determinations with at least 3 concentration levels within the test range of the analytical method (eg 3 concentrations/3 replications for each complete analytical procedure). The accuracy of the analytical method is calculated from the average value (mean,  $\bar{x}$ ) of the levels obtained from a series of measurements compared to the actual levels. (Hadi, 2017)

$$\begin{aligned}Recovery &= \frac{\text{Analysis Result}}{\text{Actual Value}} \times 100\% \\&= \frac{7}{7} \times 100 \\&= 100\%\end{aligned}$$

Note:

- Analysis results: the results of the analysis (match) are obtained from the match between manual calculations and programmed calculations.
- Actual value: number of respondents

#### **4. CONCLUSION**

From the results of the research that has been done, it can be concluded as follows:

1. How to apply the Weighted Product method is to use the Sipenus application, the application uses the CI (Codeigniter) framework. By testing the accuracy of the Weighted Product algorithm through the recovery test, it is obtained that the accurate value is 100% so that it can decide the recipient of the employee salary bonus.
2. From the test results to the furniture business owner, 5 respondents consisted of 3 aspects including the system design aspect, which obtained the highest score of 0.55% (Very Good), then from the system suitability aspect, the highest score was 0.55% (Very Good). . Finally, from the aspect of ease of operation of the system, the highest score was 0.51% (Very Good).

#### **5. SUGGESTION .**

Based on the conclusions described above, there are suggestions to readers or developers that:

1. Add and develop a feature for calculating the total bonus in rupiah or dollars into the Sipenus application so that business owners and employees can see the details of the total bonus.
2. Adding more data about 100 data, so that the resulting data is even more accurate.
3. The display menu on this system is still very simple so that in the future it can be made better, more attractive, and of course more complex to improve the quality of the program.

#### **ACKNOWLEDGMENTS**

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## REFERENCES

- [1] Cicik Sulasti, Sri Siswanti, Andriani KKW. 2017. Sistem Pendukung Keputusan Penilaian Dosen Berprestasi Menggunakan Weighted Product (WP) Di Stikes Almata Yogyakarta.
- [2] Nuriadi Manurug. 2017. Sistem Pendukung keputusan Pemberian Bonus Karyawan Menggunakan Metode Analytic Hierarchy Process (AHP).
- [3] Ahmadi, A., dan Wiyanti, D. T. 2014. Implementasi Weighted Product (WP) dalam Penentuan Penerima Bantuan Langsung Masyarakat PNPM Mandiri Perdesaan. Seminar Nasional Aplikasi Teknologi Informasi (SNATI) 1(1).
- [4] Jogiyanto, H. (2005). Analisa dan Desain Sistem Informasi: Pendekatan Terstruktur Teori dan Praktik Aplikasi Bisnis. Yogyakarta: ANDI.
- [5] Ningrum, 2012. Metode Weighted product (WP). Andi: Yogyakarta.