International Journal of Society Reviews (INJOSER) e-ISSN: 3030-802X
Vol. 2 No. 5, May 2024, pages: 1060~1067

SELECTION OF LABORATORY ASSISTANTS USING THE WEIGHTED PRODUCT METHOD TO SUPPORT DECISION MAKING

Rima Tamara Aldisa
Universitas Nasional, Jakarta, Indonesia
rimatamaraa@gmail.com

Abstract

This research aims to develop a decision support system (DSS) for selecting laboratory assistants using the Weighted Product (WP) method to support more effective decision making. The WP method was chosen because it is able to handle a number of different criteria and weights in the selection process. This study will identify the relevant criteria for the selection of laboratory assistants and assign weights to each criterion based on its importance. Next, the system will implement the WP method to calculate the total score for each assistant candidate based on the predetermined criteria and weights. The research results showed that K-6 with a score of 0.1284 got the highest ranking results and was followed by second place, namely K-8 with a score of 0.1269 and in third place with K-1 with a score of 0.1251. It is hoped that research can help and contribute to increasing efficiency and accuracy in decision making regarding the selection of laboratory assistants.

Keywords: Weighted Product, Lab Assistant, Decision Support System

INTRODUCTION

In a laboratory environment, the selection of qualified assistants is very important to maintain the smooth operation and success of the laboratory. The selection process often involves a number of criteria that must be considered, such as technical skills, reliability, personality and previous experience. However, in the face of these various criteria, decision making can become complicated and time consuming. To overcome this problem, an effective approach is to use a decision support system that can help screen and evaluate prospective laboratory assistants more systematically. One method that can be applied in a decision support system is to use the Weighted Product method which allows the user to determine the relative weight of each criterion and produce a total score for each prospective assistant based on the value of these criteria.

Researchers obtained several other journal references including: [1] Making it easier to select prospective assistants administratively so that the process of selecting assistants is faster and better systemized [2] Providing ranking results in the form of the best alternative values in selecting laboratory assistants. [3] Can help lecturers to quickly select computer laboratory assistants. [4] Assist in selecting prospective laboratory heads according to candidates who must have the required skills. [5] The method is very suitable to be implemented because the results are in accordance with the expected targets with objective assessment. And the last reference [6] These results quite good and can effectively help decision making in the best alternative as a candidate for a computer laboratory assistant.

In this context, this research aims to develop a decision support system to assist the selection of laboratory assistants using the Weighted Product method. Through the application of this method, it is hoped that the decision-making process regarding the selection of assistants can be carried out more efficiently and accurately.

RESEARCH METHODOLOGY

Research Framework

In this research, the author completed the research by carrying out several framework stages [7]. The stages can be seen in Figure 1 below:

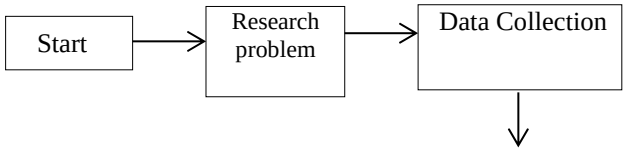
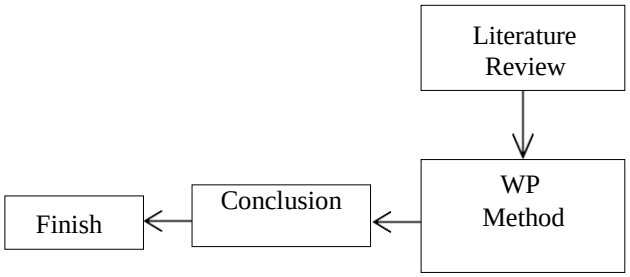


Figure 1. Framework



The following is an explanation of the research framework image:

a. Problem Overview

In the first stage, the author reviews or analyzes the problems that occurred in the research.

b. Data collection

After carrying out the first stage, the author then collected data related to the research

c. Study of literature

In this stage, the author carries out a literature study with the aim of looking for references related to the research topic through previous journals.

d. Application of the Method

At this stage, the author uses the Weight Product method to complete the research case study.

e. Conclusion

The next stage carried out by the author is to conclude or summarize all the results of the research carried out.

Decision Support Systems

Decision Support Systems are systems designed to assist decision making in complex or ambiguous situations [8]. The main goal is to provide information support, analysis and decision-making models to users so they can make better and more effective decisions. Decision Support Systems not only provide alternative choices, but also encourage users to think creatively in solving problems and finding the best solutions [9]. Decision Support Systems are computer systems designed to assist decision making in a structured or semi-structured context.

Laboratory

A laboratory is a place to carry out various research activities, observations, practicums, training and scientific testing as an approach between theory and practice from various scientific disciplines [10]. A computer laboratory assistant is a person who helps lecturers in the teaching process such as monitoring and paying attention to practical activities [6]. A laboratory is a special facility or room designed and equipped to carry out various types of experiments, measurements, practicums or scientific research.

Weight Product (WP) Method

The Weight Product (WP) method is a method used in Decision Support Systems (DSS) to assist in decision making [11]. Each criterion is given a weight that describes the relative level of importance of the criteria in decision making, each alternative is assessed based on the criteria. The total score is calculated for each alternative by multiplying the criterion value with the appropriate weight. The alternative with the highest total score is considered the best solution [12].

The steps for completing the Weight Product (WP) method are as follows:

Form a decision matrix

Calculating vector values (Si)

Calculating the preference value (Vi)

RESULTS AND DISCUSSION

Determination of Alternatives

Alternatives are options for various methods or solutions that can be taken to achieve a goal. Each alternative can have different characteristics or consequences. The alternatives used in this research are seen in table 1 below:

Table 1. Alternatives

Code	Name
K_1	Furqon
K_2	Euis
K_3	Zelpi
K_4	Dafa
K_5	Nopal
K_6	Ghina
K_7	Mulki
K_8	Puspa

Determination of Criteria

Criteria are measures used to evaluate and compare available options or alternatives. Criteria serve as a guide to measure the level of suitability of each option in achieving certain goals [7]. Criteria used in this research.

Table 2 : Criteria

Code	Criteria	Information
C_1	Experience	Benefit
C_2	Craft	Benefit
C_3	Score	Benefit
C_4	Skill	Benefit
C_5	Team	Benefit

Determine the importance weight value of each criterion.

Table 3. Importance Weight Values

Information	. Importance Weight Values
Not good	1
Enough	2
Good	3
Very good	4

Determine the value for weighting each criterion

Table 4. Criteria Weighting

Code	Name Criteria	Weight Value
C_1	Experience	0.456
C_2	Craft	0.256
C_3	Score	0.156
C_4	Skill	0.090
C_5	Team	0.040

Determined assessment data for alternatives.

Table 5. Data on alternative assessments

Alternative	C1	C2	C3	C4	C5
K_1	2.4 year	Very good	Good	Very good	Very good
K_2	2.2 year	Very good	Good	Very good	Very good
K_3	1,3 year	Good	Good	Good	Good
K_4	1 year	Good	Enough	Enough	Good
K_5	1,5 year	Good	Very good	Very good	Very good
K_6	2,5 year	Very good	Very good	Good	Very good
K_7	2 year	Good	Enough	Good	Very good
K_8	2,3 year	Very good	Very good	Good	Very good

Suitability Rating data according to the assessment of the alternative
Table 6. Suitability Rating Data

Alternative	C1	C2	C3	C4	C5
K1	2.4	4	3	4	4
K2	2.2	4	3	3	4
K3	1.3	3	3	3	3
K4	1	3	2	2	3
K5	1.5	3	4	4	4
K6	2.5	4	4	3	4
K7	2	3	2	3	4
K8	2.3	4	4	3	4

Steps in completing the WP method calculation :

2.4 4 3 4 4
2.2 4 3 3 4
1.3 3 3 3 3
1 3 2 2 3
1.5 3 4 4 4
2.5 4 3 2 4
2 3 2 3 4
2.3 4 4 3 4

Second step: determine the vector value using the formula:

$$S_i = \prod_{j=1}^{n} x_{ij}^{W_j} \quad (1)$$

To determine the value of the vector S, the value of each criterion is multiplied by the weight value of the criterion in question, then multiplied

$S_1 = (2.4^{0.456})(4^{0.256})(3^{0.156})(4^{0.090})(4^{0.040}) = 6.047$
$S_2 = (2.2^{0.456})(4^{0.256})(3^{0.156})(3^{0.090})(4^{0.040}) = 6.029$
$S_3 = (1.3^{0.456})(3^{0.256})(3^{0.156})(3^{0.090})(3^{0.040}) = 5.815$
$S_4 = (1^{0.456})(3^{0.256})(2^{0.156})(2^{0.090})(3^{0.040}) = 5.633$
$S_5 = (1.5^{0.456})(3^{0.256})(4^{0.156})(4^{0.090})(4^{0.040}) = 5.813$
$S_6 = (2.5^{0.456})(4^{0.256})(4^{0.156})(3^{0.090})(4^{0.040}) = 6.205$
$S_7 = (2^{0.456})(3^{0.256})(2^{0.156})(3^{0.090})(4^{0.040}) = 6.041$
$S_8 = (2,3^{0.456})(4^{0.256})(4^{0.156})(3^{0.090})(4^{0.040}) = 6.131$

Third step: determine the preference value (Vi) using the following formula:

$$V_i = \frac{\prod_{j=1}^{n} X_{ij}^{W_j}}{\prod_{j=1}^{n} (X_{ij}^{*})^{W_{ij}}} \quad (2)$$

Determine the preference value (Vi) by carrying out the process of dividing vector S,
The resulting vector S value is divided by the total value of Vector S.
The largest value of Vi is the chosen alternative.

$$V_1 = \frac{6.047}{6,968+6,580+5,183+4,237+6,771+5,913+5,547+7,102} = \frac{6,047}{48,302} = 0.1251$$

$$V_2 = \frac{6,029}{6,968+6,580+5,183+4,237+6,771+5,913+5,547+7,102} = \frac{6,029}{48,302} = 0.1248$$

$$V_3 = \frac{5,815}{6,968+6,580+5,183+4,237+6,771+5,913+5,547+7,102} = \frac{5,815}{48,302} = 0.12038$$

$$V_4 = \frac{5.633}{6,968+6,580+5,183+4,237+6,771+5,913+5,547+7,102} = \frac{5,633}{48,302} = 0.1166$$

$$V_5 = \frac{5.813}{6,968+6,580+5,183+4,237+6,771+5,913+5,547+7,102} = \frac{5,813}{48,302} = 0.12034$$

$$V_6 = \frac{6,205}{6,968+6,580+5,183+4,237+6,771+5,913+5,547+7,102} = \frac{6,205}{48,302} = 0.1284$$

$$V_7 = \frac{6,041}{6,968+6,580+5,183+4,237+6,771+5,913+5,547+7,102} = \frac{6,041}{48,302} = 0.1250$$

$$V_8 = \frac{6,131}{6,968+6,580+5,183+4,237+6,771+5,913+5,547+7,102} = \frac{6,131}{48,302} = 0.1269$$

Table 7. Alternative ranking of ranking results

K-01	0.1251	3
K-02	0.1248	5
K-03	0.12038	6
K-04	0.1166	8
K-05	0.12034	7
K-06	0.1284	1
K-07	0.1250	4
K-08	0.1269	2

CONCLUSION

Selection of Laboratory Assistants by applying the Weighted Product Method to Support Decision Making is research that aims to develop a system or procedure that uses the Weighted Product Method to assist in the process of selecting laboratory assistants. The Weighted Product method is a method of decision making that considers the weight of various criteria in choosing the best alternative. This research seeks to present a framework or tool that can assist decision makers in selecting the most suitable laboratory assistant based on the criteria that have been obtained, namely K-6 with a score of 0.1284 received the highest ranking results. And followed in second place by K-8 with a score of 0.1269 and in third place by K-1 with a score of 0.1251. It is hoped that this research can help and contribute to increasing efficiency and accuracy in decision making regarding the selection of laboratory assistants. Suggestions for future research include using several combinations of calculation methods.

REFERENCES

[1] Hayati, N., Rahayu, S., & Saputra, T. I. (2021). Sistem Informasi Pemilihan Asisten Laboratorium dengan Metode Weighted Product dan Weighted Sum Model. *STRING (Satuan Tulisan Riset dan Inovasi Teknologi)*, *6*(1), 1-8.

[2] Asmah, A., & Fadlan, M. (2022). Model Pendukung Keputusan Seleksi Penerimaan Asisten Laboratorium menggunakan Perpaduan Metode ROC dan WASPAS. JIKA (Jurnal Informatika), 6(1), 64-69.

[3] Siregar, R., Astrid, E., & Solihin, M. D. (2023). Perancangan Sistem Pendukung Keputusan Berbasis Web Untuk Menentukan Asisten Laboratorium Komputer Menggunakan Algoritma Simple Additive Weighting. *Bulletin of Computer Science Research*, *3*(3), 250-256.

[4] Jannah, M., & Putra, K. O. (2023). Implementasi Metode Weighted Product (WP) Dalam Pengambilan Keputusan Kepala Laboraturium Komputer: Sistem Informasi Pemilihan Kepala Labor Komputer Menggunakan Metode Weighted Product Berbasis Web. Jurnal PROCESSOR, 18(2).

[5] Wibowo, S., & Budirahardjo, S. (2019). Multi-Objective Optimization on The Basis by Ratio Analysis Method Sebagai Sistem Pendukung Keputusan Penerimaan Asisten Laboratorium (Studi Kasus Prodi Teknik Sipil Universitas PGRI Semarang). *Jurnal Transformatika*, *17*(1), 49-56.

[6] Aldisa, R. T., Sanwani, S., Simanjuntak, D. M., Laia, S., & Mesran, M. (2022). Penerapan Metode Metode Multy Attribute Utility Theory (MAUT) dalam Pemilihan Asisten Laboratorium Komputer.

JURNAL MEDIA INFORMATIKA BUDIDARMA, 6(3), 1782-1788.

[7] Rifqi, A., & Aldisa, R. T. (2023). Implementasi Sistem Pendukung Keputusan dalam Pemilihan Vendor IT Menerapkan Metode Weighted Product (WP). *Resolusi: Rekayasa Teknik Informatika dan Informasi*, *4*(1), 1-7.

[8] W. Wicaksono, A. Brastama Putra, and Agussalim, "Sistem Pendukung Keputusan Kelayakan Pinjaman Kredit Berbasis Web (Di PT. FIF Group Cabang Surabaya)," J. Inform. dan Sist. Inf., vol. 2, no. 3, pp. 503–510, 2021, doi: 10.33005/jifosi.v2i3.411.

[9] A. Iskandar, "Analisis Metode SAW dan WP dalam Pemilihan Costumer Service Berdasarkan Pembobotan ROC," JURIKOM (Jurnal Ris. Komputer), vol. 10, no. 3, pp. 686–696, 2023.

[10] Nurhadi, A. (2018). Manajemen laboratorium dalam upaya meningkatkan mutu pembelajaran. *Tarbawi: Jurnal Keilmuan Manajemen Pendidikan*, *4*(01), 1-12.

[11] N. K. Sukerti, "Analisis perbandingan penerima bantuan kemiskinan dengan metode Weighted Product (WP) dan TOPSIS," Data Manaj. dan Teknol. Inf., vol. 17, no. 3, pp. 1–7, 2016

[12] M. UTAMI, "SISTEM PENDUKUNG KEPUTUSAN PEMILIHAN OBAT BATUK MENGGUNAKAN METODE WEIGHTED PRODUCT (WP)." UNIVERSITAS MUHAMMADIYAH PURWOKERTO, 2015.