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Combination of Weighted Product Method and Entropy Weighting in the Best Warehouse Employee Recommendation

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Abstract−The best warehouse employees are individuals who show exceptional dedication and precision in carrying out their duties. Not only do they ensure that every process, from receipt to delivery, is carried out with high accuracy, but they are also proactive in finding ways to improve operational efficiency. The main problem lies in the proper assessment of employees' technical skills and soft skills, such as rigor, time management ability, and teamwork. Additionally, the selection process can be complicated when it comes to balancing previous work experience and adaptability to new technologies. Without effective assessment methods, the risk of selecting the wrong employee can negatively impact the overall productivity and operational efficiency of the warehouse. The purpose of the study, which combines entropy weighting method with the WP method is an approach that can increase objectivity and accuracy in multi-criteria decision-making. In this combination, the Entropy method is used first to objectively determine the weight of the criteria based on the degree of variation or information contained in the data of each criterion. The weights generated by the Entropy method reflect the importance of criteria based on how much information is provided, assuming that criteria with more variety have more information. Once the weights are determined, the Weighted Product method is used to evaluate and rank alternatives. Based on the results of the recommendation for the selection of the best warehouse employee Hadi occupies the top position in the selection of the best warehouse employee with a score of 0.07194. His position was followed by Putri who got a score of 0.07082, showing a performance that was also very good and only slightly below Hadi. Budi is ranked third with a score of 0.06621, while Deni is ranked fourth and Kiki is fifth with a score of 0.06544 and 0.06524, respectively. The score obtained by each employee shows a relatively small difference, reflecting the fierce competition and high quality of performance among the employees.

Keywords: Best Employees; Entropy; Combination; Warehouse; Weighting Product;

1. INTRODUCTION

Warehouse employees hold a crucial role in a company's supply and distribution chain, responsible for the receipt, storage, and delivery of goods. They ensure that stock is neatly and efficiently organized, inspect incoming and outgoing goods to maintain appropriate quality and quantity, and accurately update inventory records. In addition, warehouse employees often coordinate with other departments to meet product requests in a timely manner. Skills such as rigor, physical ability, and knowledge of warehouse management systems become crucial in carrying out their daily tasks. In an environment that is often rapidly changing, they are also expected to be able to adapt to new technologies, such as the use of inventory management software or automated equipment, to improve operational efficiency. The best warehouse employees are individuals who show exceptional dedication and precision in carrying out their duties. Not only do they ensure that every process, from receipt to delivery, is carried out with high accuracy, but they are also proactive in finding ways to improve operational efficiency. Their ability to adapt to new technologies and inventory management systems makes them a valuable asset to the company. Additionally, they have good communication skills, allowing them to collaborate effectively with colleagues and other departments. Their reliability and commitment to maintaining the appropriate quality and quantity of goods make them an example to their peers, and their contributions often have a positive impact on the overall productivity of the warehouse. Choosing the best warehouse employees is often a challenge for companies, given the complexity and diversity of tasks that must be mastered. The main problem lies in the proper assessment of employees' technical skills and soft skills, such as rigor, time management ability, and teamwork. Additionally, the selection process can be complicated when it comes to balancing previous work experience and adaptability to new technologies. Without effective assessment methods, the risk of selecting the wrong employee can negatively impact the overall productivity and operational efficiency of the warehouse.

The Weighted Product (WP) method is a multi-criteria decision-making technique used to evaluate and rank alternatives based on a number of criteria that have different weights[1]–[3]. In this method, each criterion is given a weight that reflects its level of importance relative to the other criteria. The evaluation process involves calculating the aggregate score for each alternative by multiplying the value of the alternative performance on each normalized criterion by the corresponding weight, then combining it by multiplying. The end result is a composite value used to rank alternatives, where higher values indicate better preference. The WP method is effective in dealing with complex decision-making problems by considering the importance of each criterion proportionally, and is often used in areas that require objective and systematic evaluation[4]–[6]. The WP method has several advantages that make it a popular choice in multi-

criteria decision-making. One of its strengths is its ability to handle scale differences between criteria, as performance values are normalized before they are combined, thus ensuring that comparisons between criteria are fair and consistent. In addition, this method takes into account the importance of each criterion through weighting, allowing decision-makers to adjust the influence of each criterion according to strategic or operational priorities. The WP method is also relatively simple and easy to implement, making it suitable for use in a variety of contexts without requiring overly complex calculations. Due to its multiplication-based nature, this method can better capture interactions and trade-offs between criteria, providing results that are intuitive and easy to interpret. One of the drawbacks is the high reliance on the weighting of the criteria, which can significantly affect the final result. Improper or subjective weight determination can result in subjective decisions.

The entropy weighting method is an objective approach used to determine the weighting of criteria in a multi-criterion analysis, based on the concept of entropy from information theory[7],[8],[9]. This technique starts with normalizing the data to ensure that the values of each criterion are within the same range, so that the comparison becomes fair. Entropy is then calculated for each criterion, measuring the level of uncertainty or variation in the data[9]–[12]. Criteria with higher variation have lower entropy, signaling that they contribute more information in the context of decision-making. The weight of the criteria is determined based on the degree of diversification, which is the result of the reduction of the entropy value of 1. In this way, the entropy weighting method gives greater weight to more informative criteria, reducing subjectivity in judgment and allowing for a more data-driven and objective approach. The entropy weighting method helps in the determination of weights by using actual data to determine the relative importance of each criterion. This makes this method particularly useful in contexts where decision-makers want to use a more objective and data-driven approach.

Problems that arise related to the employee performance evaluation process are often influenced by subjective assessments, so a method that is able to combine performance assessment using the Weighted Product (WP) method which is strong in comparing criteria is needed, as well as Entropy Weighting which is able to give weight objectively based on existing information. This problem placement will focus the research on the solutions provided by the combination of the two methods in the context of the best employee recommendations. Combining the Entropy weighting method with the WP method is an approach that can increase objectivity and accuracy in multi-criteria decision-making. In this combination, the Entropy method is used first to objectively determine the weight of the criteria based on the degree of variation or information contained in the data of each criterion. The weights generated by the Entropy method reflect the importance of criteria based on how much information is provided, assuming that criteria with more variety have more information. Once the weights are determined, the Weighted Product method is used to evaluate and rank alternatives. In this process, the performance value of each alternative for each criterion is normalized and then ranked by the weights that have been determined by the Entropy method. These values are then combined in a multiplexed manner to produce a total score for each alternative. In this way, the combination of the two methods allows for more objective decision-making as it reduces subjectivity in weighting, while still taking advantage of the advantages of WP calculations in handling scale differences between criteria. This combination is particularly useful in situations where the criteria data are complex and varied, providing more balanced and reliable results.

Research conducted by Abdullah (2023) Recruitment is a process that must be passed by a person by following the stages that have been determined by the company to fill the position that is being opened, namely the warehouse head to supervise all work related to the warehouse to meet the wishes or targets of a company and be able to control and ensure the availability of goods in accordance with the market is called the warehouse head. The MAUT method with ROC weighting is the right decision to use because it calculates the final utility value in providing recommendations for the recruitment of warehouse heads[13]. Research from Hermawan (2021) the AHP method is used to assist company leaders in making decisions without having to side with anyone in the best employees in their company, this system can be done using a decision-making system and using the AHP method applied to the selection of the best employees in a company[14]. Research from Mesran (2021) the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) method is used in selecting the best employees who will produce outputs, namely providing support to management in recommendations for employee promotion, with the aim of providing motivation to employees[15]. Research from Mawinar (2023) The decision support system for the selection of the best employees uses the VIKOR method and recommends Honorary Employees 5 with a VIKOR index value of 0.045 and gets a rank of 1[16]. Research from Safii (2024) the application of a decision support system with the SMART Method in selecting outstanding employees will display the results of decisions in the form of employee rankings based on rankings[17]. The difference with the research conducted is that in this study the entropy method is used to determine the weight of the criteria and the WP method to determine the best employee assessment ranking.

The purpose of the study, which combines the weighting method of entropy and WP in the selection of the best warehouse employees, is to produce a more objective and accurate decision-making process in employee assessment. By using the entropy weighting method, it aims to set the weights of criteria in a data-driven manner, reducing subjectivity in assessment by measuring the level of information variation of each criterion. Furthermore, the WP method is applied to evaluate and rank employees based on predetermined weights, providing a clear and measurable ranking of the most qualified employees. This study aims to reduce subjectivity in the performance evaluation process by providing the weight generated from Entropy Weighting and using WP for the final calculation, so that the results of the recommendations are more accurate and reliable. Thus, a more specific goal is to build an effective and workable decision support system in a diverse warehouse environment. The combined methods aim to ensure that the final decision is not only transparent and

consistent but also accurately reflects the abilities and potential of each employee in the context of the warehouse's needs, thus supporting the selection of the best candidates who will contribute optimally to the warehouse's operations. This research makes a significant contribution to the development of a more objective and reliable decision support system in the performance evaluation of warehouse employees. By combining the Weighted Product (WP) and Entropy Weighting methods, this study not only offers a new approach to performance appraisal, but also provides a model that can be adapted by various companies to improve the effectiveness of their human resource management. This contribution is expected to strengthen the decision-making process in the logistics and warehouse sectors, as well as encourage the adoption of scientific methods in performance appraisal.

2. RESEARCH METHODOLOGY

2.1 Research Framework

The research framework is a conceptual structure that guides the research process, outlines the relationships between the variables studied, and provides methodological guidance for data collection and analysis[18]–[20]. The framework of this study is designed to investigate the relationship between the key factors that influence the successful implementation of technology in organizations. This research framework contributes to the literature by offering a new perspective on the dynamics of technology implementation in the context of modern organizations. Figure 1 is the framework of the research conducted in this study.

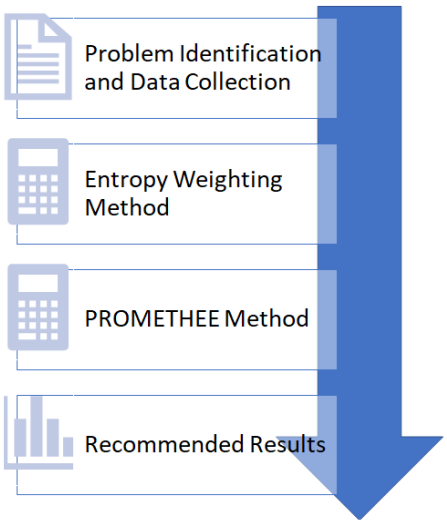

Figure 1. Research Framework

The research framework in figure 1 has 4 stages that are carried out, the first is problem identification and data collection. The problems that occur in this study are in the selection of the best warehouse employees, difficulties in identifying the performance of potential employees in the past, as well as subjectivity in the warehouse employee assessment process, which can have a negative impact on the productivity and efficiency of warehouse operations. The data collection process is obtained from the company in conducting a performance assessment of each existing warehouse employee. The second stage is to use the entropy method to determine the weight of the criteria used in the assessment of the best warehouse employees. The third stage is to use the WP method to evaluate employee performance which will result in employee ranking. The last stage is the recommendation of the results of the application of a combination of WP and entropy weighting methods in producing the best employees based on the company's early performance.

2.2 Entropy Weighting Method

The entropy weighting method is a technique used to determine the weights of various criteria in multi-criteria decision-making. This method measures the uncertainty of the information of each criterion and gives a higher weight to the criteria that have more diverse or more informative information.

a. A decision matrix is a tool used in the decision-making process to evaluate various alternatives based on a number of criteria. This matrix helps to compare alternatives to each other in a systematic and objective way. The Decision Matrix is created using equation (1).

$$X = \begin{bmatrix} x_{11} & x_{21} & x_{2n} \\ x_{12} & x_{22} & x_{2n} \\ x_{m1} & x_{m2} & x_{mn} \end{bmatrix} \quad (1)$$

b. Data Normalization: The performance data from each alternative is normalized so that each criterion is at the same scale. Normalization is typically done using the following formula for each k_{ij} element in the decision matrix:

$$k_{ij} = \frac{r_{ij}}{\sum_{i=1}^{m} r_{ij}} \quad (2)$$

where k_{ij} is the result of the normalized value that has been calculated.

c. Calculating Entropy: The Entropy E_j for each j criterion is calculated using the formula:

$$E_j = \left[\frac{-1}{\ln m}\right] \sum_{i=1}^{m} r_{ij} \ln r_{ij} \quad (3)$$

where m is the alternative number, and ln is the value of the natural logarithm.

d. Calculating Dispersion Degrees: The D_j dispersion degrees for each criterion are calculated as:

$$D_j = 1 - E_j \quad (4)$$

e. Determining the Weight of the Criteria: The weight of the w_j for each j criterion is calculated by formulating:

$$w_j = \frac{D_j}{\sum_{j=1}^{m} D_j} \quad (5)$$

The entropy weighting method is particularly useful in situations where decision-makers want to reduce subjectivity in the weighting of criteria and rely more on available data to determine more objective weights.

2.3 WP Method

The Weighted Product (WP) method is an effective and efficient multi-criteria decision-making technique, used to evaluate various alternatives based on several criteria that have been weighted. In this method, the value of each alternative for each criterion is normalized and then ranked by a predetermined weight, before being multiplied to produce a composite score. The result of this multiplication determines the final ranking of the alternatives, with higher scores indicating greater preference.

a. A decision matrix is a tool used in the decision-making process to evaluate various alternatives based on a number of criteria. This matrix helps to compare alternatives to each other in a systematic and objective way. The Decision Matrix is created using equation (1).
b. Calculating Vector: The stage of the WP method is to calculate the vector value with the following formula.

$$S_i = \Pi_j^n = 1 X_{ij}^{wj} \quad (6)$$

In determining the vector, if the attribute or criterion is cost, the power value will be negative, and vice versa, if the benefit is the power value, the power value will be positive.

c. Calculating the Final Value of the Vector: The stages of calculating the final value of the vector are carried out with the following formula.

$$V_i = \frac{n_j^n = 1\, x_{ij}^{wj}}{n_j^n = 1 (x_j^*)^{wi}} \quad (7)$$

The WP method provides a systematic and structured approach to multi-criteria decision-making. These principles allow decision-makers to include the preferences, weight of criteria, and relative contributions of each alternative in the evaluation process, making it easier to make more informed and objective decisions.

3. RESULT AND DISCUSSION

The combination of Weighted Product (WP) methods and entropy weighting offers a structured and objective approach to assessing the performance of warehouse employees. In this method, entropy weighting is used first to objectively determine the weight of the criteria based on the variation of the data, assuming that the criteria with greater variation contain more information. Once the criteria weights are determined, the WP method is applied to calculate the overall score of each employee. This process involves normalizing performance values, then multiplying these values after they have been upgraded by the weights obtained from entropy weighting. The end result is an employee rating based on a composite score, which reflects a more accurate and fair performance evaluation. This approach not only reduces subjectivity in assessment but also makes the most of the information from performance data, resulting in more reliable and transparent decisions.

3.1 Data Collection

Data collection in the process of recommending the best warehouse employees requires a structured and systematic approach. The first step is to identify relevant assessment criteria, such as productivity, discipline, work speed, accuracy, compliance with safety procedures, initiative, presence and teamwork ability. Data on this criterion can be obtained from the supervisor's assessment. Warehouse employee performance appraisal data collection requires a planned approach to ensure the data obtained is valid, relevant, and reliable. Warehouse employee performance assessment data is obtained

by using the WMS (Warehouse Management System) feature to automatically collect data related to productivity and work speed. The process of collecting warehouse employee performance appraisal data can be carried out effectively, providing the necessary information for better decision-making in the selection of the best employees. Criterion data is information or parameters that are used to assess and compare various alternatives in the decision-making process. This criterion reflects important aspects that must be considered in the decision. Each criterion provides a measure or indicator that allows us to evaluate how well an alternative meets the goals or requirements that have been set. The criteria data used are shown in Table 1.

Table 1. Data on warehouse employee selection criteriata

Criteria Name
Productivity
Discipline
Work Speed
Accuracy
Compliance with Safety Procedures
Initiative
Teamwork Ability

After determining the criteria data in table 1 is obtained, the next step in the decision-making process is to collect and analyze relevant information for each alternative, each alternative is assessed with a value range between 1-5 for each existing alternative. Selection and weighting for each criterion is crucial in decision-making, as the right and relevant criteria will help achieve better results. The weight of the existing criteria is determined by applying the entropy weighting method to determine the weight of each existing criterion. The performance appraisal data of warehouse employees is shown in table 2.

Table 2. Warehouse Employee Performance Assessment Data

Employee Name	Productivity	Discipline	Work Speed	Accuracy	Compliance with Safety Procedures	Initiative	Teamwork Ability
Ahmad	4	5	4	5	4	4	5
Budi	5	4	4	5	5	5	4
Cici	3	3	4	4	3	3	4
Deni	4	5	5	4	4	5	5
Evi	3	4	3	3	4	3	5
Fajar	4	4	5	4	5	4	5
Gita	2	3	2	3	3	2	3
Hadi	5	5	5	5	5	5	5
Indra	4	4	4	4	4	4	4
Joko	3	4	3	4	3	3	4
Kiki	4	4	5	5	4	5	5
Lala	3	3	3	3	3	3	4
Mita	4	5	4	4	5	4	5
Nani	2	3	2	3	2	2	3
Oki	4	5	4	5	4	4	4
Putri	5	5	5	5	5	5	4
Rudi	3	4	3	4	4	3	5
Sari	4	3	4	4	3	4	4

Warehouse employee performance assessment data in table 2 is obtained from the Warehouse management system that is stored automatically and computerized in the company. This assessment data will be used in assessing the performance of the best warehouse employees in the company.

3.2 Determining the Weight of Criteria Using the Entropy Method

The entropy method is a technique used to determine the weight of criteria in a multi-criteria decision-making problem. This method provides an objective way to assign weights based on variability or data distribution for each criterion. Here is a step-by-step guide to implementing the entropy method:

a. A decision matrix is a tool used in the decision-making process to evaluate various alternatives based on a number of criteria. This matrix helps to compare alternatives to each other in a systematic and objective way. The Decision Matrix is created using equation (1).

$$X = \begin{bmatrix} 4 & 5 & 4 & 5 & 4 & 4 & 5 \\ 5 & 4 & 4 & 5 & 5 & 5 & 4 \\ 3 & 3 & 4 & 4 & 3 & 3 & 4 \\ 4 & 5 & 5 & 4 & 4 & 5 & 5 \\ 3 & 4 & 3 & 3 & 4 & 3 & 5 \\ 4 & 4 & 5 & 4 & 5 & 4 & 5 \\ 2 & 3 & 2 & 3 & 3 & 2 & 3 \\ 5 & 4 & 5 & 5 & 5 & 5 & 5 \\ 4 & 4 & 4 & 4 & 4 & 4 & 4 \\ 3 & 4 & 3 & 4 & 3 & 3 & 4 \\ 4 & 4 & 5 & 5 & 4 & 5 & 5 \\ 3 & 3 & 3 & 3 & 3 & 3 & 4 \\ 2 & 5 & 4 & 4 & 5 & 4 & 5 \\ 4 & 3 & 2 & 3 & 2 & 2 & 3 \\ 4 & 5 & 4 & 5 & 4 & 4 & 4 \\ 5 & 5 & 5 & 5 & 5 & 5 & 4 \\ 3 & 4 & 3 & 4 & 4 & 3 & 5 \\ 4 & 3 & 4 & 4 & 3 & 4 & 4 \end{bmatrix}$$

b. Data Normalization: The performance data from each alternative is normalized so that each criterion is at the same scale. Normalization is typically done using the following formula for each k_{ij} element in the decision matrix using the equation (2):

$$k_{11} = \frac{r_{11}}{\sum_{i=1}^{m} r_{11;118}} = \frac{4}{4+5+3+4+3+4+2+5+4+3+4+3+4+2+4+5+3+4} = 0.061$$

The results of the overall calculation of the normalization value of each alternative candidate for the best Warehouse employee candidate for each existing criterion are shown in table 3.

Table 3. Data Normalization

Employee Name	Productivity	Discipline	Work Speed	Accuracy	Compliance with Safety Procedures	Initiative	Teamwork Ability
Ahmad	0.061	0.068	0.058	0.068	0.057	0.059	0.064
Budi	0.076	0.055	0.058	0.068	0.071	0.074	0.051
Cici	0.045	0.041	0.058	0.054	0.043	0.044	0.051
Deni	0.061	0.068	0.072	0.054	0.057	0.074	0.064
Evi	0.045	0.055	0.043	0.041	0.057	0.044	0.064
Fajar	0.061	0.055	0.072	0.054	0.071	0.059	0.064
Gita	0.030	0.041	0.029	0.041	0.043	0.029	0.038
Hadi	0.076	0.068	0.072	0.068	0.071	0.074	0.064
Indra	0.061	0.055	0.058	0.054	0.057	0.059	0.051
Joko	0.045	0.055	0.043	0.054	0.043	0.044	0.051
Kiki	0.061	0.055	0.072	0.068	0.057	0.074	0.064
Lala	0.045	0.041	0.043	0.041	0.043	0.044	0.051
Mita	0.061	0.068	0.058	0.054	0.071	0.059	0.064
Nani	0.030	0.041	0.029	0.041	0.029	0.029	0.038
Oki	0.061	0.068	0.058	0.068	0.057	0.059	0.051
Putri	0.076	0.068	0.072	0.068	0.071	0.074	0.051
Rudi	0.045	0.055	0.043	0.054	0.057	0.044	0.064
Sari	0.061	0.041	0.058	0.054	0.043	0.059	0.051

c. Calculating Entropy: The Entropy E_j for each j criterion is calculated using the equation (2):

$$E_1 = \left[\frac{-1}{\ln 5}\right] \sum_{i=1}^{m} k_{11,118} \ln k_{11,118} = \left[\frac{-1}{2.8904}\right] * (-2.86) = (-0.346) * (-2.86) = 0.989573$$

$$E_2 = \left[\frac{-1}{\ln 5}\right] \sum_{i=1}^{m} k_{21,218} \ln k_{21,218} = \left[\frac{-1}{2.8904}\right] * (-2.872) = (-0.346) * (-2.872) = 0.993565$$

$$E_3 = \left[\frac{-1}{\ln 5}\right] \sum_{i=1}^{m} k_{31,318} \ln k_{31,318} = \left[\frac{-1}{2.8904}\right] * (-2.857) = (-0.346) * (-2.857) = 0.988583$$

$$E_4 = \left[\frac{-1}{\ln 5}\right] \sum_{i=1}^{m} k_{41,418} \ln k_{41,418} = \left[\frac{-1}{2.8904}\right] * (-2.874) = (-0.346) * (-2.874) = 0.994390$$

$$E_5 = \left[\frac{-1}{\ln 5}\right] \sum_{i=1}^{m} k_{51,518} \ln k_{51,518} = \left[\frac{-1}{2.8904}\right] * (-2.864) = (-0.346) * (-2.864) = 0.990929$$

$$E_6 = \left[\frac{-1}{\ln 5}\right] \sum_{i=1}^{m} k_{61,618} \ln k_{61,618} = \left[\frac{-1}{2.8904}\right] * (-2.855) = (-0.346) * (-2.855) = 0.987971$$

$$E_7 = \left[\frac{-1}{\ln 5}\right] \sum_{i=1}^{m} k_{71,718} \ln k_{71,718} = \left[\frac{-1}{2.8904}\right] * (-2.878) = (-0.346) * (-2.878) = 0.995826$$

d. Calculating Dispersion Degrees: The D_j dispersion degrees for each criterion are calculated using the equation (3):

$D_1 = 1 - E_1 = 1 - 0.989573 = 0.010427$
$D_2 = 1 - E_2 = 1 - 0.993565 = 0.006435$
$D_3 = 1 - E_3 = 1 - 0.988583 = 0.011417$
$D_4 = 1 - E_4 = 1 - 0.994390 = 0.005610$
$D_5 = 1 - E_5 = 1 - 0.990929 = 0.009071$
$D_6 = 1 - E_6 = 1 - 0.987971 = 0.012029$
$D_7 = 1 - E_7 = 1 - 0.995826 = 0.004174$

e. Determining the Weight of the Criteria: The weight of the w_j for each j criterion is calculated using the equation (4):

$$w_1 = \frac{D_1}{\sum_{j=1}^{m} D_{1,7}} = \frac{0.010427}{0.010427 + 0.006435 + 0.011417 + 0.005610 + 0.009071 + 0.012029 + 0.004174}$$

$$w_1 = \frac{0.010427}{0.059163} = 0.1762$$

The results of the calculation of the overall final weight using the entropy weighting method of each existing criterion are shown in table 4.

Table 4. Final Weight Criteria

	Productivity	Discipline	Work Speed	Accuracy	Compliance with Safety Procedures	Initiative	Teamwork Ability
Weighting	0.1762	0.1088	0.1930	0.0948	0.1533	0.2033	0.0705

In the process of determining the weight of the criteria using the entropy method, the analysis is carried out by calculating the entropy of each criterion to measure the level of dispersion of the information it contains. The entropy method helps in assigning weight objectively based on the degree of variation of the data, ensuring that criteria with higher data variability get greater attention in evaluation.

3.3 WP Method in Warehouse Employee Performance Assessment

The Weighted Product (WP) method in warehouse employee performance assessment is a powerful tool to evaluate various alternatives based on predetermined criteria. In this application, each performance assessment criterion, such as efficiency, timeliness, and reliability, is weighted according to its level of importance. The WP method then combines the employee's individual performance values by means of normalization and multiplication, where each value is ranked by the weight of the relevant criteria. The result is a composite score that determines the overall rating of the employee. This method allows for a more objective and systematic evaluation, as it considers every aspect of performance based on the company's strategic priorities. Thus, the WP method assists warehouse managers in identifying high-performing employees and areas that need improvement, supporting more informative and targeted decisions.

a. Calculating Vector: The stage of the WP method is to calculate the vector value using the equation (5):

$$S_1 = ((x_{11})^{w_1}) * ((x_{21})^{w_2}) * ((x_{31})^{w_3}) * ((x_{41})^{w_4}) * ((x_{51})^{w_5}) * ((x_{61})^{w_6}) * ((x_{71})^{w_7})$$

$$S_1 = ((4)^{0.1762}) * ((5)^{0.1088}) * ((4)^{0.1930}) * ((5)^{0.0948}) * ((4)^{0.1533}) * ((4)^{0.2033}) * ((5)^{0.0705})$$

$$S_1 = 1.27676 * 1.19131 * 1.30671 * 1.16489 * 1.23682 * 1.32559 * 1.12023$$

$$S_1 = 4.25233$$

The overall result of the vector value of each alternative is calculated using the same equation of all existing criteria as shown in table 3.

Table 3. The Overall Result of the Vector Value of Each Alternative

Employee Name	Vector Value
Ahmad	4.25233
Budi	4.60142

Cici	3.32577
Deni	4.54822
Evi	3.35364
Fajar	4.38991
Gita	2.3785
Hadi	5
Indra	4
Joko	3.24618
Kiki	4.5341
Lala	3.0615
Mita	4.3082
Nani	2.23514
Oki	4.18592
Putri	4.92191
Rudi	3.44639
Sari	3.7095

b. Calculating the Final Value of the Vector: The stages of calculating the final value of the vector using the equation (6):

$$V_1 = \frac{S_1}{\sum_{i=1}^{n} S_{1,18}} = \frac{4.2523}{69.49862} = 0.06119$$

The overall result of the final value vector of each alternative is calculated using the same equation of all existing criteria as shown in table 4.

Table 4. The Overall Result of the Final Value Vector of Each Alternative

Employee Name	Vector Value
Ahmad	0.06119
Budi	0.06621
Cici	0.04785
Deni	0.06544
Evi	0.04825
Fajar	0.06317
Gita	0.03422
Hadi	0.07194
Indra	0.05756
Joko	0.04671
Kiki	0.06524
Lala	0.04405
Mita	0.06199
Nani	0.03216
Oki	0.06023
Putri	0.07082
Rudi	0.04959
Sari	0.05338

The results of the final value of the Weighted Product (WP) method in the performance assessment of warehouse employees provide a clear and quantitative picture of the rating of each employee based on various relevant criteria. By applying weights to each criterion according to their level of importance, the individual performance values of employees are normalized and aggregated through weighted multiplication calculations. The final score generated for each employee reflects their abilities and contributions comprehensively. Employees with the highest scores are considered to be top performers, providing management with a strong foundation for making strategic decisions, such as awards, promotions, or training assignments. This process not only helps in identifying high-performing employees but also reveals areas that need further attention, allowing the organization to design appropriate development interventions.

3.4 Recommended Results Selection of the Best Warehouse Employees

The selection of the best warehouse employees using the entropy weighting and Weighted Product (WP) methods produces objective and accurate recommendations. The entropy method is used to dynamically determine the weight of each criterion based on the variation of available data, so that criteria with more diverse information get higher weight. After the weight of the criteria is determined, the WP method is applied to calculate the final score of each candidate by multiplying their performance value on each weighted criterion. The results of the analysis show that the employees with the highest scores, after considering all criteria such as efficiency, precision, and speed of work, deserve to be named the

best warehouse employees. This method not only improves accuracy in assessment, but also provides a solid basis for management decisions in improving the quality of human resources. By using a combination of entropy and WP weighting methods, companies can transparently and systematically identify employees who make the most significant contributions to warehouse operations. This process helps minimize the subjective bias that may arise in traditional performance appraisals. In addition, with structured assessments, employees have a clearer understanding of areas that need to be improved to achieve the highest standards. The application of this method also encourages employees to improve their performance continuously, in line with the company's goal to achieve higher operational efficiency. Ultimately, this approach is not only beneficial for individual recognition, but also for the overall improvement of the work culture in the warehouse. The results of the ranking of the best warehouse employees are shown in Figure 2.

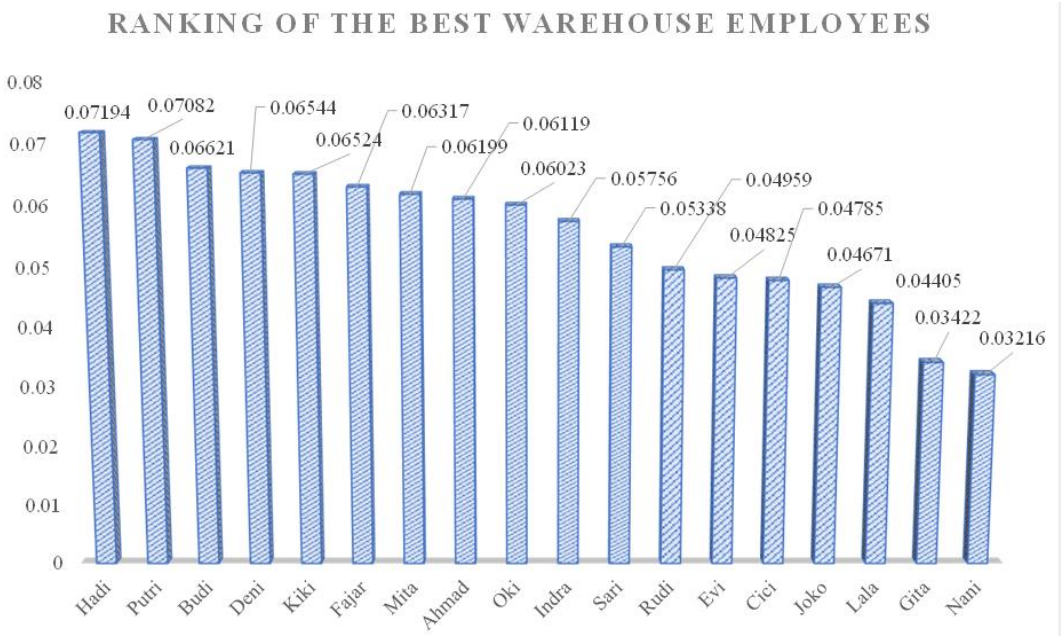

Figure 2. The Results of the Ranking of the Best Warehouse Employees

Based on the results of the recommendation for the selection of the best warehouse employee from figure 2, Hadi occupies the top position in the selection of the best warehouse employee with a score of 0.07194. His position was followed by Putri who got a score of 0.07082, showing a performance that was also very good and only slightly below Hadi. Budi is ranked third with a score of 0.06621, while Deni is ranked fourth and Kiki is fifth with a score of 0.06544 and 0.06524, respectively. The score obtained by each employee shows a relatively small difference, reflecting the fierce competition and high quality of performance among the employees.

4. CONCLUSION

This research makes a significant contribution to the development of a more objective and reliable decision support system in the performance evaluation of warehouse employees. By combining the Weighted Product (WP) and Entropy Weighting methods, this study not only offers a new approach to performance appraisal, but also provides a model that can be adapted by various companies to improve the effectiveness of their human resource management. This contribution is expected to strengthen the decision-making process in the logistics and warehouse sectors, as well as encourage the adoption of scientific methods in performance appraisal. The combined methods aim to ensure that the final decision is not only transparent and consistent but also accurately reflects the abilities and potential of each employee in the context of the warehouse's needs, thus supporting the selection of the best candidates who will contribute optimally to the warehouse's operations. Based on the results of the recommendation for the selection of the best warehouse employee Hadi occupies the top position in the selection of the best warehouse employee with a score of 0.07194. His position was followed by Putri who got a score of 0.07082, showing a performance that was also very good and only slightly below Hadi. Budi is ranked third with a score of 0.06621, while Deni is ranked fourth and Kiki is fifth with a score of 0.06544 and 0.06524, respectively. The score obtained by each employee shows a relatively small difference, reflecting the fierce competition and high quality of performance among the employees.

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