

RECRUITMENT OF NEW EMPLOYEE USING SELECTION PROCESS FOR DETERMINING DECISIONS WITH THE PREFERENCE SELECTION INDEX METHOD

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Abstract

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The most important thing for companies is to hire new people who have the skills and qualities needed for the job or acceptance offered. The ability of a company to run well depends a lot on the quality of its employees. The issue of hiring people and getting the finest applicants can be overcome with the aid of decision-making procedures. In a recruitment process, there are many selection mechanisms in businesses with varying criteria. In this study, decision-makers are selecting candidates for employment based on specified criteria, including an intelligence test (C1), an interview test (C2), a test of skills and abilities (C3), an assessment of attitudes and behaviors (C4), and work experience (C5). The calculating approach employs the Preference Selection Index (PSI) method because it can be applied to situations with multiple criteria and attributes and does not require the decision maker to calculate the weights of the criterion. The 3 best option candidates for the employees with the greatest PSI value, which is $PSI = 0.88186$, are determined by the results of the final PSI method computation from 5 alternatives.

Keywords: New Employee Selection, Decision Making, Preference Selection Index, Value Scoring

1. INTRODUCTION

Human Resources (HR) are responsible for a variety of aspects that contribute to a company's operation and have a significant influence in determining how efficiently a business is able to function overall. Employees make up one of the most essential components of the business. The way in which a company handles its human resources has a significant impact on a variety of factors that contribute to the work that the organization achieves[1]. It is envisaged that the company will be able to improve its ability to carry out all of its business activities if HR can be well structured and if jobs can be provided to employees in accordance with their background talents[2]. As a result of the fact that businesses place a high level of importance on acquiring the most qualified individuals who are willing to work for them, the selection of personnel is typically handled in accordance with a variety of distinct corporate procedures and policies.

The most crucial thing for businesses to do in order to obtain new potential employees who are interested in taking a position is either to accept new employees or to recruit new workers[3]. According to Article 1 paragraph 3 of Rhode Island Law No. 13 of 2003 regulating Manpower[4], a worker or laborer is defined as any individual who works for the purpose of receiving wages or other kinds of recompense. As a consequence of this, it is indisputable that each and every organization has an absolute requirement for human resources to work for the company. Because it is not simple for businesses to select potential workers based on the criteria desired by the business, the process of

obtaining competent personnel can be rather lengthy. This is one of the reasons why the procedure can take so long[5].

The employee recruitment selection process is carried out at each period at the firm Global Xtreme Bali. The purpose of this process is to screen candidates to determine which ones have the most qualified human resources and therefore have the potential to be hired to work for the company. However, in practice, the selection procedure is carried out on a regular basis; however, the evaluation criteria that are used in carrying out the selection procedure are frequently altered in order to determine vacancies for certain jobs. Because the selection process is such a crucial aspect in order to acquire excellent human resources, it is necessary to have a consistent set of evaluation criteria in order to pick employees for recruitment. It is necessary to have an employee recruitment selection procedure that takes the form of a decision support system approach in order to eliminate the possibility of including an element of subjectivity in the evaluation of the acceptance of new employees and to produce a standard pattern with clear evaluation criteria.

It is a multi-criteria problem that has often been solved by the DSS method, various problems in decision making, for instance, several studies that apply the PSI method to various multi-criteria decision problems, specifically determining BOS recipients for underprivileged students. When making the decision to determine the best alternative from many criteria, it is a DSS problem that has often been solved by the DSS method[6]. followed by the selection of exceptional teachers in the city of Medan[7], the awarding of awards to employees[8], and the determination of who would be appointed as supervisors [9]. The DSS approach, such as the Selection Preference Index method, has been utilized throughout the research in order to provide assistance to decision makers. In this investigation, a technique known as the Preference Selection Index (PSI) method [10] is utilized to assist with the resolution of issues involving the usage of many criteria while making decisions. It is not necessary to establish the relative importance between the assessment criteria when using the PSI method [11][12]. Additionally, there is no requirement to calculate the weights of the criteria, and the PSI method is extremely helpful when there is a conflict in deciding the relative importance between the criteria[13]. The research is meant to select employee recruitment utilizing the approach in selecting decisions in order to make things easier for the Human Resource Manager, who is the one who is responsible for the selection of new employee recruitment.

2. METHOD

2.1 Definition of Employee

Employees are assets to the company. Without people, a company's production process cannot run well. An employee is any person who is able to generate goods and services to suit his own and the community's requirements, both within and outside of the workplace[14]. According to this definition, workers who perform work in an employment relationship are employees who perform work for any type of business (company) or persons in exchange for compensation, including workers who perform work outside of an employment connection[15].

2.2 Preference Selection Index (PSI) Method

Maniya and Bhatt (2010) created the Preference Selection Index (PSI) method to solve multi-criteria decision making (MCDM)[6]. In the proposed strategy, relative relevance between attributes is not required[16]. In this strategy, there is no requirement to compute attribute weights prior to making a decision [17]. This method is useful when establishing the relative value between attributes conflicts. The PSI technique yields findings with minimal and straightforward calculations, as they are based on statistical notions and do not require attribute weights[18]. The PSI method can be broken down as follows: Determine objectives and enumerate attributes and alternatives for decision-making challenges and Create a decision matrix[19].

This stage involves generating a matrix using all available data detailing the problem's characteristics. Each series decision matrix corresponds to a single alternative, and each column corresponds to an attribute; hence, the X_{ij} element of the decision matrix X assigns attribute values to

the original values. Therefore, if the number of possibilities is M and the number of qualities is N, the decision matrix may be represented as a N * M matrix:

$$X_{ij} = \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1n} \\ x_{21} & x_{22} & \dots & x_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ x_{m1} & x_{m2} & \dots & x_{mn} \end{bmatrix} \quad (1)$$

1. Normalizing the decision matrix

If the attribute has a benefit type, then normalization uses Equation(2).

$$N_{ij} = \frac{X_{ij}}{x_{j\max}} \quad (2)$$

If the attribute has a loss or cost type, then normalization uses Equation (3)

$$N_{ij} = \frac{x_{j\min}}{X_{ij}} \quad (3)$$

Information:

X_{ij} = attribute sizes ($i = 1, 2, \dots, n$ dan $j = 1, 2, \dots, m$)

2. Perform calculation of the mean value of the data that has been normalized, using Equation (4).

$$N = \frac{1}{n} \sum_{i=1}^n N_{ij} \quad (4)$$

3. Calculate the value of preference variations between the values of each attribute using Equation (5).

$$\phi_j = \frac{1}{n} \sum_{i=1}^n [N_{11} - N]^2 \quad (5)$$

4. Determine the deviation value from the preference value, using Equation (6).

$$\Omega_j = 1 - \phi \quad (6)$$

5. Determine the value of the weight of the criteria using Equation (7).

$$\omega_j = \frac{\Omega_j}{\sum_{j=1}^m \Omega_j} \quad (7)$$

6. Perform calculation of Preference Selection Index (θ_i) value using Equation (8).

$$\theta_i = \sum_{j=1}^m X_{ij} \omega_j \quad (8)$$

7. Sorting the final alternative value from the largest value to the smallest value to determine the best alternative according to the results

3. RESULTS AND DISCUSSION

3.1. Data Analysis

There are five assessment criteria that are used in the selection process for recruiting prospective employees. These criteria are an intelligence test (C1), an interview test (C2), skills (C3), attitudes and behaviors (C4), and work experience (C5). All of these criteria are based on interviews with the company (C5). A total of five potential employees are selected to participate in the selection process. The nature of the benefit or cost factors that are taken into consideration in the PSI method calculation procedure is decided by the person in charge of making the decision.

Table 1. Criteria Detail

Criteria	Information	Nature of Criteria
C1	Intelligence Test	Benefit
C2	Interview Test	Benefit
C3	Skills	Benefit
C4	Attitudes And Behaviors	Benefit
C5	Work Experience	Benefit

3.2. Identifying Criteria Attributes

Each criterion includes qualities that facilitate the scoring procedure. The purpose of attribute assessment is to determine the specifics of each criterion connected to the scoring process if the input criteria data are in text format, or to facilitate the assessment by decision makers if there are several characteristics in the criteria with a scale of 1 to 5 for evaluation. Because it is a test score, criteria C1 and C2 are expressed as a range of 0 to 100.

Table 2. Attribute Criteria C3

Criteria	Value	Information
C3	5	very good
	4	good
	3	enough
	2	bad
	1	very bad

Table 3. Attribute Criteria C4

Criteria	Value	Information
C4	5	very good
	4	good
	3	enough
	2	bad
	1	very bad

Table 4. Attribute Criteria C5

Criteria	Work Experience	Information
C5	>4 years	5
	3 – 4 years	4
	2 to 3 years	3
	< 2 years	2
	No work experience	1

3.3. Alternative Criteria Fit Rating

Alternate data on each assessment criterion for prospective employees is collected in order to calculate the PSI method.

Table 5. Alternative Values on Criteria

Alternative	Alternative Values on Each Criteria				
	C1	C2	C3	C4	C5
A1	92	84	4	4	2
A2	80	80	4	3	3
A3	75	82	4	4	4
A4	83	89	4	5	1
A5	90	78	4	4	4
Max Value	92	89	4	5	4

3.4. PSI Method Calculation

3.4.1. Decision Matrix

The X_{ij} decision matrix is obtained from the rating value of the alternative suitability criteria in Table 5.

$$X_{ij} = \begin{bmatrix} 92 & 84 & 4 & 4 & 2 \\ 80 & 80 & 4 & 3 & 3 \\ 75 & 82 & 4 & 4 & 4 \\ 83 & 89 & 4 & 5 & 1 \\ 90 & 78 & 4 & 4 & 4 \end{bmatrix}$$

3.4.2. Normalization Matrix

Normalizing of a matrix is based on the characteristics of the criterion in Table 1, where all criteria have beneficial attributes and the normalization calculation employs Equation (2), where each value in the criteria column is divided by its maximum value. The maximum value of each column is displayed in Table 2. From the calculation of normalization, the N_{ij} matrix is derived.

$$N_{ij} = \begin{bmatrix} 1 & 0.94382 & 1 & 0.8 & 0.5 \\ 0.869565 & 0.898876 & 1 & 0.6 & 0.75 \\ 0.815217 & 0.921348 & 1 & 0.8 & 1 \\ 0.902174 & 1 & 1 & 1 & 0.25 \\ 0.978261 & 0.876404 & 1 & 0.8 & 1 \end{bmatrix}$$

Summarizing the N_{ij} matrix for every criterion attribute:

$$\begin{aligned} \sum_{i=1}^n N_{j1} &= 1 + 0.869565 + 0.815217 + 0.902174 + 0.978261 = 4,565217 \\ \sum_{i=1}^n N_{j2} &= 0.94382 + 0.898876 + 0.921348 + 1 + 0.876404 = 4,640449 \\ \sum_{i=1}^n N_{j3} &= 1 + 1 + 1 + 1 + 1 = 5 \\ \sum_{i=1}^n N_{j4} &= 0.8 + 0.6 + 0.8 + 1 + 0.8 = 4 \\ \sum_{i=1}^n N_{j5} &= 0.5 + 0.75 + 1 + 1 + 0.25 + 1 = 3,5 \end{aligned}$$

The outcomes of the above calculations are:

$$\sum_{i=1}^n N_{ij} = [4,565217 \quad 4,640449 \quad 5 \quad 0,8 \quad 0,7]$$

3.4.3. Performing the Calculation of the Mean Value

Calculation of the mean value of the data that has been normalized to the N_{ij} matrix, using Equation (4), so that the mean value of N is obtained:

$$N = [0,91304 \quad 0,92809 \quad 1 \quad 0,8 \quad 0,7]$$

3.4.4. Calculation of Preference Variation Value

The calculation of the value of preference variation uses Equation (5), so that the results of the calculation of the power of the matrix ϕ_j are:

$$\phi_j = \begin{bmatrix} 0.007561 & 0.000247444 & 0 & 0 & 0.04 \\ 0.007561 & 0.000853428 & 0 & 0.04 & 0.0025 \\ 0.007561 & 0.005184 & 0 & 0 & 0.0025 \\ 0.000118 & 0.005171064 & 0 & 0.04 & 0.2025 \\ 0.004253 & 0.00267138 & 0 & 0 & 0.09 \end{bmatrix}$$

Using Equation (5), add the results of the power values on the ϕ_j matrix, resulting in the following:

$$\phi_j = [0.023393 \quad 0.008988764 \quad 0 \quad 0,08 \quad 0,425]$$

The results of the calculation of the preference matrix produce a matrix j using equation (6), so the result are:

$$\Omega_j = [0.976607 \quad 0.991011236 \quad 1 \quad 0.92 \quad 0.575]$$

Calculate the total value of the entire matrix Ω_j

$$\sum_{i=1}^n \Omega_j = 0.976607 + 0.991011236 + 1 + 0.92 + 0.575 = 4.462618$$

3.4.5. Weighting Value Criteria

Using equation (7), the value of the weight criterion ω_j is determined (7).

$$\begin{aligned}\omega_{j1} &= \frac{0.976607}{4.462618} = 0,218842 \\ \omega_{j2} &= \frac{0.991011236}{4.462618} = 0,222069473 \\ \omega_{j3} &= \frac{1}{4.462618} = 0,224084 \\ \omega_{j4} &= \frac{0.92}{4.462618} = 0,206157 \\ \omega_{j5} &= \frac{0.575}{4.462618} = 0,128848\end{aligned}$$

The results of the calculation of the weight value of the criteria ω_j are:

$$\omega_j = [0.218842 \ 0.222069473 \ 0.224084 \ 0.206157 \ 0.128848]$$

3.4.6. Calculation of PSI Value

The results of the calculation of the matrix multiplication θ_i using Equation(8).

$$\theta_i = \begin{bmatrix} 0.218842 & 0.20959366 & 0.224084 & 0.164926 & 0.064424 \\ 0.190297 & 0.199613009 & 0.224084 & 0.123694 & 0.096636 \\ 0.178404 & 0.204603335 & 0.224084 & 0.164926 & 0.128848 \\ 0.197433 & 0.222069473 & 0.224084 & 0.206157 & 0.032212 \\ 0.214084 & 0.194622684 & 0.224084 & 0.164926 & 0.128848 \end{bmatrix}$$

The final result of the matrix θ_i is:

$$\theta_i = \begin{bmatrix} 0.881869 \\ 0.834324 \\ 0.900864 \\ 0.881955 \\ 0.926564 \end{bmatrix}$$

3.4.7. Alternative Final Score Ranking

Table 6. Alternative Ranking Value

Alternative	Final Value	Rank
A5	0.881869	1
A3	0.834324	2
A4	0.900864	3
A1	0.881955	4
A2	0.926564	5

Based on the final results of the provincial alternative rankings in Table 6, the ranking results obtained from 5 alternative prospective employees, the 3 best alternatives were chosen as employees, namely the 1st best alternative, A5 with a PSI value of 0.881869; the 2nd best alternative, namely Alternative A3. with a PSI value of 0.834324; the third alternative is Alternative A4 with a PSI value of 0.900864.

4. CONCLUSION

The conclusions that can be drawn from the issue of employee recruitment selection can be applied to decision-making techniques, they can speed up the company's selection procedure, and they can help decision-makers choose the best candidates for employment based on the evaluation standards that were established during the selection period. The Preference Selection Index method, when used in decision-making, eliminates the need for decision-makers to calculate the weights of the criteria and allows them to make objective decisions based on multiple assessment criteria. It has been demonstrated through the selection of 5 employees using 5 criteria that this method can produce an additional 3 best employee candidates who pass the admissions selection.

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