

Application of Preference Selection Index in Recruitment of Search Engine Optimization Specialist

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Abstract. Search Engine Optimization Specialist is one of the important factors that can help digital agencies improve services to all their customers. This research aims to develop a decision-making system in the recruitment process of Search Engine Optimization Specialists by applying the Preference Selection Index method. The Search Engine Optimization Specialist recruitment decision-making system in this study uses 5 (five) criteria, namely educational background, ability to use SEO tools, work experience as a Search Engine Optimization Specialist, digital marketing skills, and age. The research sample data collection technique related to the recruitment of Search Engine Optimization Specialists used in this research is Literature Study. After the author succeeds in collecting research sample data, at the next stage the author analyzes the application of the Preference Selection Index method in the recruitment of Search Engine Optimization Specialists. The results of this study show that alternative A02 (0.855641604) has the highest value and gets the first ranking position. Meanwhile, the alternatives that get the second to fifth ranking positions are A05 (0,834620739), A03 (0,741086734), A04 (0,716537597), and A01 (0,708920064). So that the most recommended alternative based on the calculation of the Preference Selection Index on the recruitment of Search Engine Optimization Specialists in this study is alternative A02 (0,855641604).

Keywords: Preference Selection Index, Recruitment, Search Engine Optimization Specialist

1 Introduction

Search Engine Optimization is an activity carried out to make the content and structure of a website more optimal in order to increase its ranking on search engine results pages, bring in more visitors, increase brand awareness, increase business credibility, create better user friendliness, and help improve business development for a long period of time in the future [1–3].

Someone who is able to work individually or work with a team in carrying out search engine optimization activities is called a Search Engine Optimization Specialist [4–6]. Search Engine Optimization Specialist services are needed by digital agencies, this aims to make it easier for digital agencies to improve their services to all consumers.

In this research, the author offers a decision support system to make it easier for digital agencies to recruit Search Engine Optimization Specialists who are on target based on education level, ability to use SEO tools, work experience as a Search Engine Optimization Specialist, digital marketing skills, and age. The decision support method that the author applies is the Preference Selection Index.

Preference Selection Index is a method that can be used to solve multi-criteria decision-making problems [7–9]. Previous research by Depa Supitri, et al. [10], Nguyen Huu Phan, et al. [11], Aditya Alfiansyah Saragih, et al. [12], Usanto S [13], and Agung Sutrisno & Vikas Kumar [14], concluded that the Preference Selection Index method can provide solutions as support in solving multi-criteria decision-making problems objectively through alternative ranking results.

2 Research Method

2.1 Research Stages

This research uses 5 (five) stages in solving multi-criteria decision making problems for determining the results of recruitment of Search Engine Optimization Specialists using the Preference Selection Index method, namely:

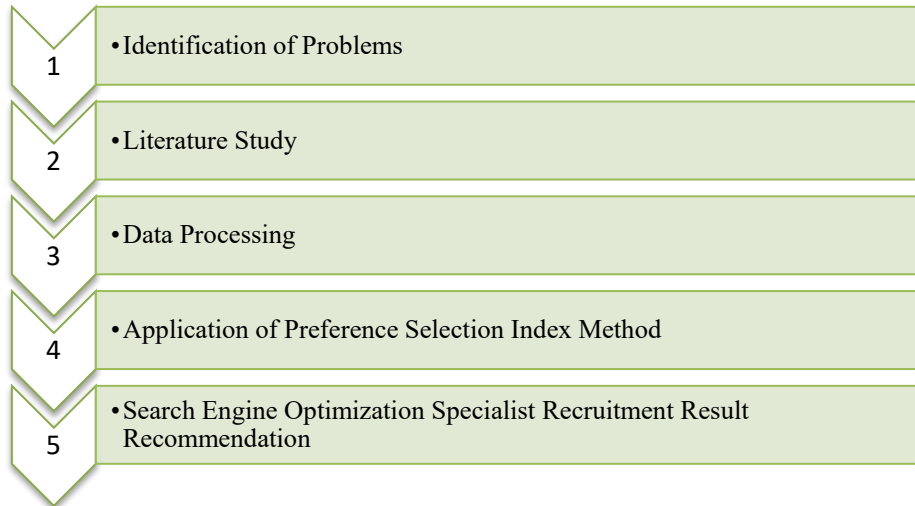


Figure 1. Research Stages

2.2 Sample Data

Based on the results of data collection that has been carried out using the literature study process, the Search Engine Optimization Specialist recruitment sample data is obtained as shown in the following table:

Table 1. Search Engine Optimization Specialist Recruitment Criteria

Code	Criteria	Category	Sub Criteria	Weight
C01	Educational background	Benefit	Masters	70
			Bachelor	60
			Associate Degree	50
C02	Ability to use search engine optimization tools	Benefit	Good	60
			Enough	50
			Bad	40
C03	Work experience as a search engine optimization specialist	Benefit	5 to 6 Years	50
			3 to 4 Years	40
			1 to 2 Years	30
C04	Digital marketing skills	Benefit	Good	40
			Enough	30
			Bad	20
C05	Age	Cost	19 to 23 Years	30
			24 to 28 Years	20
			29 to 33 Years	10

Table 2. Search Engine Optimization Specialist Recruitment Data Sample

Alternative	Criteria				
	C1	C2	C3	C4	C5
A01	Associate Degree	Enough	6	Bad	27
A02	Bachelor	Bad	3	Good	33
A03	Masters	Enough	2	Enough	23
A04	Associate Degree	Good	4	Bad	26
A05	Bachelor	Bad	5	Enough	30

2.3 Preference Selection Index Method

Preference Selection Index is one of the multi-criteria decision support methods [15–17]. Preference Selection Index can be used in determining the relative relationship between attributes if there is a conflict of interest between all attributes [18,19]. The stages of solving multi-criteria decision support problems using the Preference Selection Index, namely [8,9,11]:

1. Determination of the Decision Matrix

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

2. Determination of the Normalisation Value of the Decision Matrix

Benefit:

$$X_{ij} = \frac{X_{ij}}{X_{ij}^{max}}, i = 1, \dots, m \quad (2)$$

Cost:

$$X_{ij} = \frac{X_{ij}^{min}}{X_{ij}}, i = 1, \dots, m \quad (3)$$

3. Determination of the Average Value of the Normalisation Matrix

$$N = \frac{1}{n} \sum_{i=1}^m \bar{X}_{ij} \quad (4)$$

4. Determination of Preference Variation Value

$$\phi_j = \sum_{i=1}^n (\bar{X}_{ij} - N)^2 \quad (5)$$

5. Determination of Deviation of Preference Value

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

6. Determination of Criteria Weight Value

$$W_j = \frac{\Omega_j}{\sum_{i=1}^n \Omega_j} \quad (7)$$

7. Determination of Preference Selection Index Value

$$\theta_i = \sum_{j=1}^n \bar{X}_{ij} W_j \quad (8)$$

3 Result and Discussion

The results of the recruitment of Search Engine Optimization Specialists using the Preference Selection Index method in this study can be seen in the following description:

- a. Determination of the Decision Matrix

$$X_{ij} = \begin{bmatrix} 50 & 50 & 50 & 20 & 20 \\ 60 & 40 & 40 & 40 & 10 \\ 70 & 50 & 30 & 30 & 30 \\ 50 & 60 & 40 & 20 & 20 \\ 60 & 40 & 50 & 30 & 10 \end{bmatrix}$$

- b. Determination of the Normalisation Value of the Decision Matrix

C01

$$R_{11} = \frac{50}{70} = 0,714285714$$

$$R_{21} = \frac{60}{70} = 0,857142857$$

$$R_{31} = \frac{70}{70} = 1$$

$$R_{41} = \frac{50}{70} = 0,714285714$$

$$R_{51} = \frac{60}{70} = 0,857142857$$

C02

$$R_{12} = \frac{50}{60} = 0,833333333$$

$$R_{22} = \frac{40}{60} = 0,666666667$$

$$R_{32} = \frac{50}{60} = 0,833333333$$

$$R_{42} = \frac{60}{60} = 1$$

$$R_{52} = \frac{40}{60} = 0,666666667$$

C03

$$R_{13} = \frac{50}{50} = 1$$

$$R_{23} = \frac{40}{50} = 0,8$$

$$R_{33} = \frac{30}{50} = 0,6$$

$$R_{43} = \frac{40}{50} = 0,8$$

$$R_{53} = \frac{50}{50} = 1$$

C04

$$R_{14} = \frac{20}{40} = 0,5$$

$$R_{24} = \frac{40}{40} = 1$$

$$R_{34} = \frac{30}{40} = 0,75$$

$$R_{44} = \frac{20}{40} = 0,5$$

$$R_{54} = \frac{30}{40} = 0,75$$

C05

$$R_{15} = \frac{10}{20} = 0,5$$

$$R_{25} = \frac{10}{10} = 1$$

$$R_{35} = \frac{10}{30} = 0,333333333$$

$$R_{45} = \frac{10}{20} = 0,5$$

$$R_{55} = \frac{10}{10} = 1$$

Table 3. Normalization Value of Decision Matrix

Alternative	Criteria				
	C01	C02	C03	C04	C05
A01	0,714285714	0,833333333	1	0,5	0,5
A02	0,857142857	0,666666667	0,8	1	1
A03	1	0,833333333	0,6	0,75	0,333333333
A04	0,714285714	1	0,8	0,5	0,5
A05	0,857142857	0,666666667	1	0,75	1
Total Value	4,142857142	4	4,2	3,5	3,333333333

c. Determination of the Average Value of the Normalisation Matrix

$$N_1 = \frac{1}{5} * 4,142857142 = 0,828571428$$

$$N_2 = \frac{1}{5} * 4 = 0,8$$

$$N_3 = \frac{1}{5} * 4,2 = 0,84$$

$$N_4 = \frac{1}{5} * 3,5 = 0,7$$

$$N_5 = \frac{1}{5} * 3,333333333 = 0,666666667$$

d. Determination of Preference Variation Value

$$\emptyset_{j1}$$

$$\emptyset_{j11} = \sum_i^n (0,714285714 - 0,828571428)^2 = 0,013061224$$

$$\emptyset_{j21} = \sum_i^n (0,857142857 - 0,828571428)^2 = 0,000816327$$

$$\emptyset_{j31} = \sum_i^n (1 - 0,828571428)^2 = 0,029387755$$

$$\emptyset_{j41} = \sum_i^n (0,714285714 - 0,828571428)^2 = 0,013061224$$

$$\emptyset_{j51} = \sum_i^n (0,857142857 - 0,828571428)^2 = 0,000816327$$

$$\text{Total Value } \emptyset_{j1} = 0,013061224 + 0,000816327 + 0,029387755 + 0,013061224 + 0,000816327 \\ = 0,057142857$$

$$\emptyset_{j2}$$

$$\emptyset_{j12} = \sum_i^n (0,833333333 - 0,8)^2 = 0,001111111$$

$$\emptyset_{j22} = \sum_i^n (0,666666667 - 0,8)^2 = 0,017777778$$

$$\emptyset_{j32} = \sum_i^n (0,833333333 - 0,8)^2 = 0,001111111$$

$$\emptyset_{j42} = \sum_i^n (1 - 0,8)^2 = 0,04$$

$$\emptyset_{j52} = \sum_i^n (0,666666667 - 0,8)^2 = 0,017777778$$

$$\text{Total Value } \emptyset_{j1} = 0,001111111 + 0,017777778 + 0,001111111 + 0,04 + 0,017777778 \\ = 0,077777778$$

$$\emptyset_{j3}$$

$$\emptyset_{j13} = \sum_i^n (1 - 0,84)^2 = 0,16$$

$$\emptyset_{j23} = \sum_i^n (0,8 - 0,84)^2 = 0,0016$$

$$\emptyset_{j33} = \sum_i^n (0,6 - 0,84)^2 = 0,0576$$

$$\emptyset_{j43} = \sum_i^n (0,8 - 0,84)^2 = 0,0016$$

$$\emptyset_{j53} = \sum_i^n (1 - 0,84)^2 = 0,16$$

$$\text{Total Value } \emptyset_{j1} = 0,16 + 0,0016 + 0,0576 + 0,0016 + 0,16 \\ = 0,3808$$

$$\emptyset_{j4}$$

$$\emptyset_{j14} = \sum_i^n (0,5 - 0,7)^2 = 0,04$$

$$\emptyset_{j24} = \sum_i^n (1 - 0,7)^2 = 0,09$$

$$\emptyset_{j34} = \sum_i^n (0,75 - 0,7)^2 = 0,0025$$

$$\emptyset_{j44} = \sum_i^n (0,5 - 0,7)^2 = 0,04$$

$$\emptyset_{j54} = \sum_i^n (0,75 - 0,7)^2 = 0,0025$$

$$\text{Total Value } \emptyset_{j1} = 0,04 + 0,09 + 0,0025 + 0,04 + 0,0025 \\ = 0,175$$

$$\emptyset_{j5}$$

$$\emptyset_{j15} = \sum_i^n (0,5 - 0,666666667)^2 = 0,027777778$$

$$\emptyset_{j25} = \sum_i^n (1 - 0,666666667)^2 = 0,111111111$$

$$\emptyset_{j35} = \sum_i^n (0,333333333 - 0,666666667)^2 = 0,111111112$$

$$\emptyset_{j45} = \sum_i^n (0,5 - 0,666666667)^2 = 0,027777778$$

$$\emptyset_{j55} = \sum_i^n (1 - 0,666666667)^2 = 0,111111111$$

$$\text{Total Value } \emptyset_{j1} = 0,027777778 + 0,111111111 + 0,111111112 + 0,027777778 + 0,111111111 \\ = 0,38888889$$

$$\emptyset_j = [0,057142857 \quad 0,077777778 \quad 0,3808 \quad 0,175 \quad 0,38888889]$$

e. Determination of Preference Variation Value

$$\Omega_1 = 1 - 0,057142857 = 0,942857143$$

$$\Omega_2 = 1 - 0,077777778 = 0,922222222$$

$$\Omega_3 = 1 - 0,3808 = 0,6192$$

$$\Omega_4 = 1 - 0,175 = 0,825$$

$$\Omega_5 = 1 - 0,38888889 = 0,611111111$$

$$\Omega_j = 0,942857143 + 0,922222222 + 0,6192 + 0,825 + 0,611111111 \\ = 3,920390475$$

f. Determination of Criteria Weight Value

$$W_1 = \frac{0,942857143}{3,920390475} = 0,240500825$$

$$W_2 = \frac{0,922222222}{3,920390475} = 0,235237339$$

$$W_3 = \frac{0,6192}{3,920390475} = 0,157943451$$

$$W_4 = \frac{0,825}{3,920390475} = 0,210438222$$

$$W_5 = \frac{0,611111111}{3,920390475} = 0,155880164$$

g. Determination of Preference Selection Index Value

$$\theta_{i1}$$

$$\theta_{11} = 0,714285714 * 0,240500825 = 0,171786304$$

$$\theta_{21} = 0,857142857 * 0,240500825 = 0,206143564$$

$$\theta_{31} = 1 * 0,240500825 = 0,240500825$$

$$\theta_{41} = 0,714285714 * 0,240500825 = 0,171786304$$

$$\theta_{51} = 0,857142857 * 0,240500825 = 0,206143564$$

$$\theta_{i2}$$

$$\theta_{12} = 0,833333333 * 0,235237339 = 0,196031116$$

$$\theta_{22} = 0,666666667 * 0,235237339 = 0,156824893$$

$$\theta_{32} = 0,833333333 * 0,235237339 = 0,196031116$$

$$\theta_{42} = 1 * 0,235237339 = 0,235237339$$

$$\theta_{52} = 0,666666667 * 0,235237339 = 0,156824893$$

$$\theta_{i3}$$

$$\theta_{13} = 1 * 0,157943451 = 0,157943451$$

$$\theta_{23} = 0,8 * 0,157943451 = 0,126354761$$

$$\theta_{33} = 0,6 * 0,157943451 = 0,094766071$$

$$\theta_{43} = 0,8 * 0,157943451 = 0,126354761$$

$$\theta_{53} = 1 * 0,157943451 = 0,157943451$$

$$\theta_{i4}$$

$$\theta_{14} = 0,5 * 0,210438222 = 0,105219111$$

$$\theta_{24} = 1 * 0,210438222 = 0,210438222$$

$$\theta_{34} = 0,75 * 0,210438222 = 0,157828667$$

$$\theta_{44} = 0,5 * 0,210438222 = 0,105219111$$

$$\theta_{54} = 0,75 * 0,210438222 = 0,157828667$$

$$\theta_{i5}$$

$$\theta_{15} = 0,5 * 0,155880164 = 0,077940082$$

$$\theta_{25} = 1 * 0,155880164 = 0,155880164$$

$$\theta_{35} = 0,333333333 * 0,155880164 = 0,051960055$$

$$\theta_{45} = 0,5 * 0,155880164 = 0,077940082$$

$$\theta_{55} = 1 * 0,155880164 = 0,155880164$$

Table 4. Preference Selection Index

Alternative	Criteria					Total Nilai
	C01	C02	C03	C04	C05	
A01	0,171786304	0,196031116	0,157943451	0,105219111	0,077940082	0,708920064
A02	0,206143564	0,156824893	0,126354761	0,210438222	0,155880164	0,855641604
A03	0,240500825	0,196031116	0,094766071	0,157828667	0,051960055	0,741086734
A04	0,171786304	0,235237339	0,126354761	0,105219111	0,077940082	0,716537597
A05	0,206143564	0,156824893	0,157943451	0,157828667	0,155880164	0,834620739

Table 5. Alternative Ranking

Alternative	Value	Ranking
A02	0,855641604	1
A05	0,834620739	2
A03	0,741086734	3
A04	0,716537597	4
A01	0,708920064	5

Table 5 above shows that alternative A02 (0.855641604) has the highest value and gets the first ranking position. Meanwhile, the alternatives that get the second to fifth ranking positions are A05 (0,834620739), A03 (0,741086734), A04 (0,716537597), and A01 (0,708920064). So that the most recommended alternative based

on the calculation of the Preference Selection Index on the recruitment of Search Engine Optimization Specialists in this study is alternative A02 (0,855641604).

4 Conclusion

- a. The Preference Selection Index method can be applied as decision support in determining the recruitment results of Search Engine Optimization Specialists.
- b. The results of ranking alternatives based on the calculation of the Preference Selection Index method for recruitment of Search Engine Optimization Specialists show that A02 (0,855641604) gets the first rank. Meanwhile, alternatives A05 (0,834620739), A03 (0,741086734), A04 (0,716537597), and A01 (0,708920064) are ranked second to fifth respectively.
- c. The most recommended alternative based on the calculation of Preference Selection Index on the recruitment of Search Engine Optimization Specialist in this study is A02 (0,855641604).

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