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Welder Recruitment Decision Support System Using the SMARTER Method

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Abstract. The high level of competition in the world of welding services business today makes the welding workshop entrepreneurs struggle hard to optimize the human resources as the welders own. The task is to recruit a skilled worker. This is due to the fact that the company is able to compete in the world of business services, the manufacturer of welding is very interested in the quality of the product so that the consumer is interested in improving the services offered by the business owner. In this study, to support the results of decision-making made in the recruitment process of welders, the SMARTER method is applied. On the final results of this study can be seen that the results of the application of the SMARTER method for comparison with 5 alternatives that are selected, that is, who obtained the first ranking is Joko with a value of 1.74. Then in the next ranking position is Tian (1.56) as the second ranking, Rian (1.06) third rank, Raden R (0.88) fourth ranking, and Budi Ramadhan (0.36) in the last ranking position.

Keywords: Decision Support System, Recruitment, Welder, SMARTER.

1 Introduction

The high level of competition in the business of welding services today makes the welding workshop entrepreneurs need to be more optimistic in providing the best service to all consumers. One of the things that can be done is to recruit a skilled worker. To obtain the results of the recruitment of good welders it is necessary to apply several stages of selection with the criteria of assessment of grinding ability, work experience, age, and communication. However, the decision-making process using some of these assessment stages if done subjectively is still less accurate. This is because the final outcome of the decision-making is still absolutely based on the personal judgment of the leader. This often leads to the inconsistency of the welders accepted with the vision of the company's mission.

In today's technological age, decision support systems have been widely used to help provide fast and accurate decision-making solutions [1–3]. A decision support system is a part of a computer information system to support the decision-making process. Decision support systems can be used to help solve structural and non-structural problems with data and models [4]. There are several methods that can be applied to a decision support system to support accurate decision making [5–8]. In this study, the authors applied SMARTER as a decision-making method to solve the recruitment problem of the welders being investigated in this study.

Based on the results of research Mawati Simarmata, SMARTER method can solve problems objectively for rubber determination processes quickly and accurately [9]. Siti Syahidatul Helma, et al. In her research, she concluded that the SMARTER method can provide a more optimal and effective final value for the decision-making process in determining prospective Predatech members [10]. In the research of Winda Suci Lestari Nasution and Patriot Nusa, it was concluded that the SMARTER method can help decision making for determining the student council chairman effectively [11]. Then in research conducted by Wiranwan Galeh Pradhana and Albert Yakobus Chandra on giving discounts with a decision support system (SPK) using the SMARTER method, it was concluded that the SMARTER method could provide faster and more efficient decision results [12].

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2 Research Method

2.1 Phase of research

Some of the stages of research that the author did in this study are as follows:

a. Field Study
The first phase that the author does is the field study. At this stage of research, the authors conducted direct interviews with decision-makers in the company aimed at obtaining alternative data samples and criteria in the recruitment process of welders that have already been conducted.
b. Literature review
The second stage of the study is the study of the library. At this stage of research, the authors cited a variety of literary information related to the theory of decision support systems, smarter methods, and research topics discussed in this study from various journals.
c. Method Implementation
The third phase that the author does is the implementation of the method. At this stage, the author applies the SMARTER method to solve the problem that will be solved in this research, namely the recruitment of welders. After applying the SMARTER method, the author describes the results and discussions that have been made.
d. Draw conclusions
The fourth stage describes the final conclusions of all the research results that the authors have done in this study.

2.2 SMARTER Method

In the SMARTER method there are several processes that must be carried out to obtain an objective decision-making result, namely [13–15]:

1. Identification of problems
2. Determine the criteria and sub-criteria
3. Determining the weight ranking of criteria and sub-criteria subjectively
4. Determining criteria weight and subcriteria weight objectively using ROC
$w = \left(\frac{1}{k}\right) \sum_{i=k}^{k} \left(\frac{1}{i}\right)$ .....(1)
Information :
a. w is the criterion weight value
b. k is the number of criteria data
c. i is the value of each alternative
5. Determine the utility value of each criterion using the following formula:
$u_i(a) = 100\% \times \left(\frac{c_i - c_{min}}{c_{max} - c_{min}}\right)$ .....(2)
Information :
a. $u_i(a)$ is the value of the utility criteria to - i in the criteria of - i
b. c_i is the value of the criteria - i
c. c_{min} is the smallest criterion value
d. c_{max} is the largest criterion value
6. Determine the final value of each criterion using the following formula:
$u_n = \sum_{k-1}^{K} w_k u_n(x_n)$ .....(3)
Information :
a. u_n is the final value of each criterion
b. w_k is the weight of the criterion to – k
c. $u_n(x_n)$ is the value of the utility criterion to -k on the alternative to -h

3 Result and Discussion

3.1 Research Data

Based on the field studies carried out by the author, it is possible to know the data of alternative samples of research related to the recruitment of welders shown in the following table:

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Table 1. Alternative Data

Code	Alternative	Criteria			
		C1	C2	C3	C4
A1	Joko	81	3	19	Good
A2	Raden R	80	4	23	Bad
A3	Tian	50	1	18	Good
A4	Budi Ramadhan	77	2	28	Enough
A5	Rian	90	2	24	Enough

3.2 SMARTER Application

The process of solving the problem of recruiting welders by applying the SMARTER method to research using several stages, namely:

a. Identification of problems
   Based on the results of the research that the author did in this study can be known the problem that occurs is the difficulty in the decision-making for the recruitment of welders to meet the needs of the company in order to the vision and mission in the competition of the business of welding workshops that is currently increasing.
b. Determine the criteria and sub-criteria
   At this stage, the process of determining data criteria and subcriteria for the recruitment of welders as shown in the following table is carried out:

Table 2. Data Criteria and Subcriteria

Code	Criteria	Subcriteria
C1	Welding Ability	81-100
		51-80
		0-50
C2	Work experience	4 Years to 5 Years
		2 Years to 3 Years
		0 Years to 1 Years
C3	Age	28 Years to 32 Years
		23 Years to 27 Years
		18 Years to 22 Years
C4	Communication	Good
		Enough
		Bad

c. Determining the weight ranking of criteria and sub-criteria subjectively
   At this stage the weighting rankings for each criterion and subcriteria can be known as shown in the following table:

Table 3. Ranking Criteria and Subcriteria

Code	Criteria	Rangking	Subcriteria	Rangking
C1	Welding Ability	1	81-100	1
			51-80	2
			0-50	3
C2	Work experience	2	4 Years to 5 Years	1
			2 Years to 3 Years	2
			0 Years to 1 Years	3
C3	Age	3	28 Years to 32 Years	1
			23 Years to 27 Years	2
			18 Years to 22 Years	3
C4	Communication	4	Good	1
			Enough	2
			Bad	3

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d. Determining criteria weight and subweight criteria objectively using ROC
At this stage, the author determines the weighting value for each criterion and sub-criterion obtained in Table 3 using ROC.

Table 4. Objective Criteria Weighting

No.	Criteria	Rangking	Formula ROC	Nilai Bobot
1	Welding Ability	1	$w=\frac{\left(1+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}\right)}{4}$	0.52
2	Work experience	2	$w=\frac{\left(0+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}\right)}{4}$	0.27
3	Age	3	$w=\frac{\left(0+0+\frac{1}{3}+\frac{1}{4}\right)}{4}$	0.15
4	Communication	4	$w=\frac{\left(0+0+0+\frac{1}{4}\right)}{4}$	0.06

Table 5. Objective Subcriteria Weighting

No	Criteria	Subcriteria	Rangking	ROC Formula	Weight Value
1	Welding Ability	81-100	1	$w=\frac{\left(1+\frac{1}{2}+\frac{1}{3}\right)}{3}$	0.61
		51-80	2	$w=\frac{\left(0+\frac{1}{2}+\frac{1}{3}\right)}{3}$	0.28
		0-50	3	$w=\frac{\left(0+0+\frac{1}{3}\right)}{3}$	0.11
2	Work experience	4 Years to 5 Years	1	$w=\frac{\left(1+\frac{1}{2}+\frac{1}{3}\right)}{3}$	0.61
		2 Years to 3 Years	2	$w=\frac{\left(0+\frac{1}{2}+\frac{1}{3}\right)}{3}$	0.28
		0 Years to 1 Years	3	$w=\frac{\left(0+0+\frac{1}{3}\right)}{3}$	0.11
3	Age	28 Years to 32 Years	1	$w=\frac{\left(1+\frac{1}{2}+\frac{1}{3}\right)}{3}$	0.61
		23 Years to 27 Years	2	$w=\frac{\left(0+\frac{1}{2}+\frac{1}{3}\right)}{3}$	0.28
		18 Years to 22 Years	3	$w=\frac{\left(0+0+\frac{1}{3}\right)}{3}$	0.11
4	Communication	Good	1	$w=\frac{\left(1+\frac{1}{2}+\frac{1}{3}\right)}{3}$	0.61
		Enough	2	$w=\frac{\left(0+\frac{1}{2}+\frac{1}{3}\right)}{3}$	0.28
		Bad	3	$w=\frac{\left(0+0+\frac{1}{3}\right)}{3}$	0.11

At the next stage, the author carries out the process of determining the result of normalization on the value of all alternative criteria based on the results of objectively weighing criteria and sub-criteria obtained previously.

Table 6. Normalization of All Alternative Criteria Values

Code	Alternative	Criteria			
		C1	C2	C3	C4
A1	Joko	0.61	0.28	0.61	0.61
A2	Raden R	0.28	0.61	0.28	0.11
A3	Tian	0.11	0.11	0.61	0.61
A4	Budi Ramadhan	0.28	0.28	0.11	0.28
A5	Rian	0.61	0.28	0.28	0.28

e. Determine the utility value of each criterion
At this stage, the author determines the utility value of each criterion using the formula (2).

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1) Utility Value of Weldability Criteria

A1=100% x $\left(\frac{0.61-0.11}{0.61-0.11}\right)$ = 1

A2=100% x $\left(\frac{0.28-0.11}{0.61-0.11}\right)$ = 0.34

A3=100% x $\left(\frac{0.11-0.11}{0.61-0.11}\right)$ = 0

A4=100% x $\left(\frac{0.28-0.11}{0.61-0.11}\right)$ = 0,34

A5=100% x $\left(\frac{0.1-0.11}{0.61-0.11}\right)$ = 1

To obtain utility values from the following criteria (Working Experience, Age, and Communication) the same process is carried out as the determination of utility value criteria Skill. So you can obtain the utility value of the entire keriteria as shown in the following table:

Table 7. Utility Value of all Criteria

Code	Alternative	Criteria			
		C1	C2	C3	C4
A1	Joko	1	0.34	1	1
A2	Raden R	0.34	1	0.34	0
A3	Tian	1	0	1	1
A4	Budi Ramadhan	0	0.34	0	0.34
A5	Rian	1	0.34	0.34	0.34

f. Determine the final value of each criterion using the formula (3)

At this stage the writer determines the final value of each criterion for all alternatives using formula (3).

1) Final Value of Weldability Criteria

A1=0.52 × 1 = 0.52

A2=0.52 × 0.34 = 0.18

A3=0.52 × 1 = 0.52

A4=0.52 × 0 = 0

A5=0.52 × 1= 0.52

To obtain the final value of each of the subsequent criteria (Working Experience, Age, and Communication) the same process is carried out as determining the end value on the above criteria of Classification Ability. Thus can be obtained the final value of all kereteria as shown in the following table:

Table 8. Final Value of Criteria on All Alternatives

code	Alternative	Criteria				Criteria Final Score
		C1	C2	C3	C4	
A1	Joko	0.52	0.18	0.52	0.52	1.74
A2	Raden R	0.18	0.52	0.18	0	0.88
A3	Tian	0.52	0	0.52	0.52	1.56
A4	Budi Ramadhan	0	0.18	0	0.18	0.36
A5	Rian	0.52	0.18	0.18	0.18	1.06

The next step carried out by the author after successfully determining the final value of the criteria on all the alternatives as seen in Table 8 above is to determine the result of the analysis. As for the results of the alternative compilation of the process of recruitment of welders by applying the SMARTER method to this study, you can see the table below.

Tabel 9. Ranking Results

Code	Alternative	Final score	Rangking
A1	Joko	1.74	1
A2	Raden R	0.88	4
A3	Tian	1.56	2
A4	Budi Ramadhan	0.36	5
A5	Rian	1.06	3

Table 9 above shows that the calculation result for each alternative in the process of recruiting welders by applying the SMARTER method to this study that obtained the first rank is an alternative called Joko with a value of 1.74. In the next ranking position held by Tian (1.56) as the second ranking, Rian (1.06) third rank, Raden R (0.88) fourth rank, and Budi Ramadhan (0.36) in the last ranking position.

4 Conclusion

a. The SMARTER method can resolve decision-making problems for the recruitment of welders objectively.
b. The alternative who got the first rank was Joko with a value of 1.74. In the next ranking position held by Tian (1.56) as the second ranking, Rian (1.06) third rank, Raden R (0.88) fourth rank, and Budi Ramadhan (0.36) in the last ranking position.

References

[1] Marbun N, Zarlis M, Sembiring RW. Analisis Kinerja SMARTER Pada Sistem Pendukung Keputusan Pemilihan Tukang Las Terbaik Untuk Menerima Penghargaan 2022;6:1282–1289. https://doi.org/10.30865/mib.v6i3.4095.

[2] Irfan M, Syaripudin U, Alam CN, Hamdani M. Decision Support System for Employee Recruitment Using El Chinix Traduisant La Realite (Electre) and Weighted Product (WP). Jurnal Online Informatika 2020;5(1):121–129. https://doi.org/10.15575/join.v5i1.606.

[3] Karyaningsih D, Wibowo A. The Support System Decision the Determination of Poor Community Welfare with the Methods Web-Based SMARTER: Case Studies Regency Lebak the Province of Banten. Journal of Physics: Conference Series 2019;1179(1). https://doi.org/10.1088/1742-6596/1179/1/012012.

[4] Suheri R, Mulyani A. Penerapan Metode Weighted Product Untuk Pemilihan Karyawan Terbaik Di Pt.Anugrah Abadi Baru. JISAMAR (Journal of Information System, Applied, Management, Accounting and Research) 2023;7(1):85–193. https://doi.org/10.52362/jisamar.v7i1.1033.

[5] Majid PM, Mansyur SH, L H. Penerapan Metode SMARTER Pada Penentuan Media Literasi Pembelajaran Anak Berkebutuhan Khusus. Jurnal Media Informatika Budidarma 2022;6(4):2316. https://doi.org/10.30865/mib.v6i4.4885.

[6] Sedihati Kayan Lumbangaol, Erna Budhiarti Nababan MSL. Sistem Pendukung Keputusan Penilaian Kinerja Guru Selama Pembelajaran Daring menggunakan Metode Viko. JURNAL MEDIA INFORMATIKA BUDIDARMA 2022;21(1):16. https://doi.org/10.53513/jis.v21i1.4773.

[7] Asbara NW. Penerapan Metode MFEP (Multifactor Evaluation Process) Dalam Seleksi Karyawan 2022;3:516–521. https://doi.org/10.30865/json.v3i4.4228.

[8] Eri Novitasari Situmeang, Yopi Hendro Syahputra A. Implementasi Metode MOORA (Multi Objective Optimization On The Basis Of Ratio Analysis) Dalam Sistem Pendukung Keputusan Menentukan Pengawas (Mandor) Yang Layak Mendapatkan 2020(April).

[9] Simarmata M. Penerapan Metode Smarter Dalam Sistem Pendukung Keputusan Menentukan Kualitas Getah Karet (Studi Kasus : Ptpn Iii Medan). Masyarakat Telematika Dan Informasi : Jurnal Penelitian Teknologi Informasi Dan Komunikasi 2019;10(1):13. https://doi.org/10.17933/mti.v10i1.146.

[10] Helma SS, Kamila I, Anglenia P, Islam U, Sultan N, Kasim S, et al. Penerapan Metode SMARTER untuk Penentuan Hasil Open Recruitment Anggota Puzzle Research Data Technology (Predatech). Sntiki 2019(November):277–285.

[11] NASUTION WSL, Patriot Nusa. Decision Support System for Election of OSIS Chair for Muhammadiyah Schools Using the Simple Multi Attribute Rating Technique Exploiting Rank (SMARTER) Method. Data Science: Journal of Computing and Applied Informatics 2022;6(2):96–110. https://doi.org/10.32734/jocai.v6.i2-9071.

[12] Wiranwan Galeh Pradhana AYC. Sistem Pendukung Keputusan Diskon Asuransi Dengan Metode Smarter. Jurnal Teknologi Dan Sistem Informasi Bisnis 2021;3(2):431–441. https://doi.org/10.47233/jteksis.v3i2.299.

[13] Silalahi N. Sistem Pendukung Keputusan Pemilihan Dosen Berprestasi Menggunakan Metode SMARTER Pada Universitas Budi Darma. Bulletin of Information Technology (BIT) 2020;1(1):50–57.

[14] Siti Monalisa AW. Implementasi Metode Smarter Untuk Sistem Pendukung Keputusan Pemilihan Lahan Kelapa Sawit Pada Pt. Eka Dura Indonesia 2021;7(2):133–138.

[15] Tangkesalu AA, Suseno JE. Information System of Performance Assesment on Startup Business using Simple Multi-Attribute Rating Technique Exploiting Ranks (SMARTER). E3S Web of Conferences 2018;73:2–6. https://doi.org/10.1051/e3sconf/20187313002.