

Decision Support System for The Acceptance of Medical Staff Using the Profile Matching Method at Mitra Sejati Hospital

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ABSTRACT

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The Hospital is one of the health care referral centers that consistently provides comprehensive health services. One crucial factor influencing healthcare services is the professional, high-quality, and competent nursing staff. However, the assessment process for the acceptance of nursing medical staff at Mitra Sejati Hospital still relies on manual calculations. It is evident that many hospitals assess candidates based on their proximity to the nursing medical staff. Therefore, there is a significant need for a decision support system in the recruitment of medical staff. The method used in the recruitment of medical staff is the Profile Matching Method. The criteria used in this research are: 1) Highest Education. 2) Professional License (STR). 3) Basic Trauma Cardiac Life Support (BTCLS) certification. 4) Age. 5) Work Experience. This system is built by implementing the web-based Profile Matching Method with MySQL as its database. With the application of the Profile Matching Method in determining the acceptance of nursing medical staff, out of the 7 predetermined candidates, 4 candidates were accepted. They are Rusli Sako with a score of 4.82, Yusniar Lubis with a score of 4.52, DRS Mandir Sagala with a score of 3.98, and Suryadani with a score of 3.96.

1. INTRODUCTION

Along with the development of computer technology today, more and more functions can be utilized from technology in all areas of life[1]. In everyday life sometimes humans are faced with a situation that requires to make a decision, be it a personal decision or a decision taken in an agency[2]. Currently, there are many systems developed to help humans make the best decisions called decision support systems (DSS) [3]. One of the benefits that can be felt from the development of computer technology is to assist in determining the acceptance of medical personnel at Mitra Sejati Hospital.

Mitra Sejati General Hospital is one of the health care referral centers that consistently provides comprehensive and precise health services. This includes a commitment to prioritize patient health and improve service quality in handling patients. One crucial factor in healthcare services is the professional, high-quality, and competent nursing medical staff in their respective fields. Therefore, there is a need for a system/application to assist in determining the acceptance of nursing medical staff at Mitra Sejati General Hospital, and one applicable method is the Profile Matching Method.

Profile Matching or profile matching is a method that is often used as a mechanism in decision-making by assuming that there is an ideal level of predictor variables that must be met by the subject being studied, rather than the minimum level that must be met or passed[4]. In the process *Profile matching* Broadly speaking, it is a process of comparing the

actual value of a *Profile* which will be assessed by the expected profile value, so that the difference in competence can be known [5].

2. LITERATURE REVIEW

Several previous studies related to decision support systems using the *Profile Matching* which is also a reference in this study "Research by [6] with the title Decision Support System for Determining Outstanding Students with the *Profile Matching*. With the application of the *Profile Matching* in determining outstanding students at SMK Karya Serdang Lubuk Pakam, with the following aspects: 1) Knowledge; 2) Skills; 3) Extracurricular; Of the 20 candidates that have been determined, the best student is Putri with a score of 2.16". then "Research by [7] with the title Accepting New Employees Using the *Profile Matching*. By applying the *Profile Matching* in accepting new employees with aspects: level of education, education major, GPA, expertise, work experience, age". And "Research by [8] With the title Implementation of the Decision Support System for the Selection of New Employees with the *Profile Matching*. By applying the *Profile Matching* in the acceptance of employees with aspects: cognitive/intellectual, personality and work attitude. From the calculation of the ranking results, the number shows 4.78 as the largest value ranked first".

3. RESEARCH METHOD

3.1 Profile Matching

Profile matching is a method commonly used as a mechanism in decision-making by assuming that there are ideal levels of predictor variables that must be met by the subjects under investigation, rather than just minimum levels that must be met or surpassed[9]. In the profile matching process, broadly speaking, it involves comparing the actual values of a profile being assessed with the expected profile values, allowing for the identification of competency differences [10].

Here are the stages and formulation of calculations using the Profile Matching method according to [11]:

3.1.1 Weighting

In this stage, the weight of each aspect will be determined using gap weights.

Table 1. Gap Weight

No	GAP	Value Weights	Information
1	0	5	No difference (competencies according to what is needed)
2	1	4.5	Competence is 1 level
3	-1	4	Competencies lack 1 level
4	2	3.5	Competency is 2 levels of excess
5	-2	3	Competency lacks 2 levels
6	3	2.5	Competency over 3 levels
7	-3	2	Competency lacks 3 levels
8	4	1.5	Competency of 4 levels
9	-4	1	Competency lacks 4 levels

3.1.2 Grouping of core and secondary factors.

After determining the weight of the gap value of the required criteria, each criterion is grouped into two groups, namely core factors and secondary factors [12].

a. Core factor

Core factors are aspects (competencies) that stand out/are most needed. To calculate the core factor, the formula is used[13]:

$$NCF = \frac{\sum NC}{\sum IC} \dots\dots\dots 1$$

Description:

- NCF = Average value of core factors
- NC = Total number of core factor values
- IC = Number of core factor items

b. Secondary Factor (Supporting factor)

Secondary Factor is items other than aspects in the core factor. To calculate the secondary factor, the formula is used[14]:

$$NSF = \frac{\sum NS}{\sum IS} \dots\dots\dots 2$$

Description:

- NSF = Average value of SF
- NS = Total number of SF values
- IS = Number of items SF

3.1.3 Total Value Calculation

From the calculation of core factors and secondary factors from each aspect, the total value of each aspect that is estimated to affect the performance of each profile is calculated.

To calculate the total value of each aspect, the formula is used[15]:

$$N = (X)\%NCF + (Y)\%NSF \dots\dots\dots 3$$

Description:

- N = Total score for each aspect
- NCF = Average core factor value
- NSF = Average value of secondary factor
- (X)% = Percentage value of the core factor
- (Y)% = Percentage value of SF

3.1.4 Ranking

The final result of the Profile matching process is a ranking that is sorted from the largest total value to the smallest.

4. RESULTS AND DISCUSSION

This research uses data taken from Mitra Sejati General Hospital, the knowledge obtained from interviews and analysis is converted into a table of criteria and sub-criteria to facilitate the process of recruiting medical personnel. Furthermore, researchers calculated the *Profile Matching* Method in order to make calculations in the selection of nursing employees.

Table 2. Rating the Suitability of Each Alternative Criteria

No	Code	Aspects	Percentage
1	A1	Experience	40%
2	A2	Achievements	60%

Table 3. Experience Aspect Data

Aspects	Scale	Criteria Code	GAP
Experience	Age	C1	5
	Work	C2	5
Experience			

Table 4. Achievement Aspect Data

Aspects	Scale	Criteria Code	GAP
Achievements	Last Education	C3	5
	STR	C4	5
	BTCLS Certificate	C5	5

Table 5. Weighting of Age Criteria

Aspects	Scale	Weight
Age	31-50	5
	26-30	4
	20-25	3

Table 6. Weighting of Last Education

Aspects	Scale	Weight
Last Education	Ners	5
	S1 Nursing	4
	D3 Nursing	3

Table 7. STR Weighting

Aspects	Scale	Weight
STR	Own	5
	Do not have	3

Table 8. Weighting of BTCLS Certificate

Aspects	Scale	Weight
BTCLS Certificate	Own	5
	Does not have	3

Table 9. Work Experience Assessment Data

Aspects	Scale	Weight
Work experience	6-10 years	5
	4-5 years	4
	2-3 years	3
	1 year	2
	Inexperienced	1
	-6 months	

Then converted into values according to predetermined weights. So that the results are obtained as follows.

Table 10. Nursing Employee Selection Data

No.	Candidate Name	C1	C2	C3	C4	C5
1	Suryadani	4	3	5	5	3
2	Yusniar lubis	4	5	5	5	3
3	Mariana BR Ginting	3	4	3	3	2
4	DRS Mandir sagala	3	5	5	3	3
5	Tumpun HS	4	4	5	5	1
6	Rusli Sako	5	5	5	5	4
7	Nurhaini BR Barus	3	5	5	3	1

Table 11. Calculation of Experience Aspect

No	Candidate Name	Criteria	
		C1	C2
1	Suryadani	4	3
2	Yusniar lubis	4	5
3	Mariana BR Ginting	3	4
4	DRS Mandir sagala	3	5
5	Tumpun HS	4	4
6	Rusli Sako	5	5
7	Nurhaini BR Barus	3	5
	GAP	5	5
1	Suryadani	-1	-2
2	Yusniar lubis	-1	0
3	Mariana BR Ginting	-2	-1
4	DRS Mandir sagala	-2	0
5	Tumpun HS	-1	-1
6	Rusli Sako	0	0
7	Nurhaini BR Barus	-2	0

Table 12. Calculation of Achievement Aspect

No	Candidate Name	Criteria		
		C3	C4	C5
1	Suryadani	5	5	3
2	Yusniar lubis	5	5	3
3	Mariana BR Ginting	3	3	2
4	DRS Mandir sagala	5	3	3
5	Tumpun HS	5	5	1
6	Rusli Sako	5	5	4
7	Nurhaini BR Barus	5	5	1
	GAP	5	5	5
1	Suryadani	0	0	-2
2	Yusniar lubis	0	0	-2
3	Mariana BR Ginting	-2	-2	-3
4	DRS Mandir sagala	0	-2	-2
5	Tumpun HS	0	0	-4
6	Rusli Sako	0	0	-1
7	Nurhaini BR Barus	0	-2	-4

After the GAP value is carried out, prospective employees are given a weighting value according to the formula from *Profile matching* by calculating the percentage of aspects with *core factors* and *secondary factors*.

Table 13. CF/SF Experience Aspect

Aspects	Scale	Type	Value
Experience	Age	Secondary Factor	30%
	Work Experience	Core Factor	70%

Table 14. CF/SF Achievement Aspect

Aspects	Scale	Type	Value
Achievements	Last Education	Core Factor	70%
	STR	Core Factor	70%
	BTCLS Certificate	Secondary Factor	30%

Then enter the *core factor* and *secondary factor* values into the assessment with the following formula:

$$N = (X)\%.N_{CF} + (Y)\%.N_{SF}$$

Weighting of Experience Aspects

$$N1 = (70\%) \times N_{cf} + (30\%) \times N_{sf}$$

$$N1 = (70\%) \times 3 + (30\%) \times 4$$

$$N1 = 2,1 + 1,2$$

$$N1 = 3,3$$

Table 15. Weighting of Experience Aspect Data

No	Candidate Name	Criteria		
		N _{cf}	N _{sf}	Total
1	Suryadani	3	4	3.3
2	Yusniar lubis	5	4	4.7
3	Mariana BR Ginting	4	3	3.7

4	DRS Mandir sagala	5	3	4.4
5	Tumpam HS	4	4	4
6	Rusli Sako	5	5	5
7	Nurhaini BR Barus	5	3	4.4

Achievement Aspect Weighting

For combining *core factor* values, the average value is taken.

$$N1 = (70\%) \times N_{cf} + (30\%) \times N_{sf}$$

$$N1 = (70\%) \times 5 + (30\%) \times 3$$

$$N1 = 3,5 + 0,9$$

$$N1 = 4,4$$

Table 16. Weighting of Achievement Aspect Data

No	Candidate Name	Criteria		
		N _{cf}	N _{sf}	Total
1	Suryadani	5	3	4.4
2	Yusniar lubis	5	3	4.4
3	Mariana BR Ginting	3	2	2.7
4	DRS Mandir sagala	4	3	3.7
5	Tumpam HS	5	1	3.8
6	Rusli Sako	5	4	4.7
7	Nurhaini BR Barus	4	1	3.1

The final result of the *profile matching* process is a ranking of candidates who can be used as nursing employees at true partner hospitals determined from the total assessment value sorted from the largest value to the smallest value selected as the final result with the following formula:

$$\text{Rank} = A1(\%)N1/A2(\%)N2/A3(\%)N3/A4(\%)N4/A5(\%)N5$$

The results can be seen in the following table:

$$\text{Total Score} = (40\% \times \text{Experience Score}) / (60\% \times \text{Achievement Score})$$

$$\text{Total Value} = (0.4 \times 3.3) + (0.6 \times 4.4)$$

$$\text{Total Value} = 1.32 + 2.64$$

$$\text{Total score} = 3.96$$

Table 17. Final assessment results

No	Name of candidate	Experience (40%)	Achievement (60%)	Total Value
1	Suryadani	3.3	4.4	3.96
2	Yusniar lubis	4.7	4.4	4.52
3	Mariana BR Ginting	3.7	2.7	3.1
4	DRS Mandir sagala	4.4	3.7	3.98
5	Tumpam HS	4	3.8	3.88
6	Rusli Sako	5	4.7	4.82
7	Nurhaini BR Barus	4.4	3.1	3.82

Table 18. Ranking Assessment Results

No	Name of candidate	Total Value	Ranking
1	Rusli Sako	4.82	1
2	Yusniar lubis	4.52	2
3	DRS Mandir sagala	3.98	3
4	Suryadani	3.96	4
5	Tumpam HS	3.88	5
6	Nurhaini BR Barus	3.62	6
7	Mariana BR Ginting	3.1	7

The following is a view of the application form that has been built. The page view consists of login, main menu, calculation, and results.

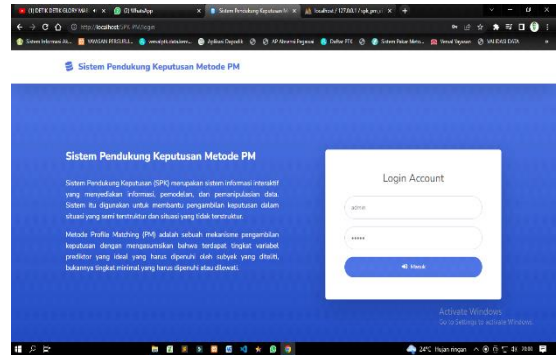


Figure 1. Login Form

Login is the entrance for admin to update data from the *Profile Matching* method assessment. If the login is successful it will display the main menu. Username is admin and password admin.

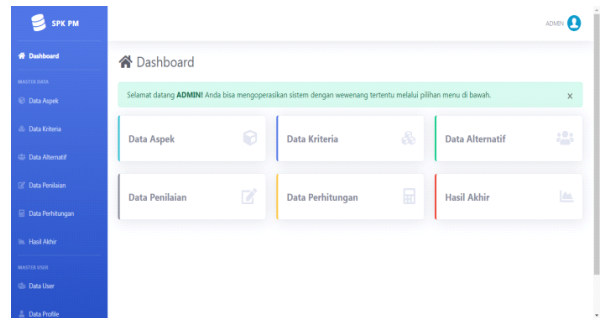


Figure 2. Main Menu Form

The main menu is a page with buttons for aspect data, criteria data, alternative data, assessment data, calculation data and final result data.

No	Alternatif	C1	C2
1	Suryadani	4	3
2	Yusniar lubis	4	5
3	Mariana BR Ginting	3	4
4	DRS Mandir sagala	3	5
5	Tumpam HS	4	4
6	Rusli Sako	5	5
7	Nurhaini BR Barus	3	5

Figure 3. Calculation form for experience aspect

No	Alternatif	C3	C4	C5
1	Suryadani	5	5	3
2	Yusniar lubis	5	5	3
3	Mariana BR Ginting	3	3	2
4	DRS Mandir sagala	5	3	3
5	Tumpam HS	5	5	1
6	Rusli Sako	5	5	4
7	Nurhaini BR Barus	5	3	1

Figure 4. Calculation of Achievement Aspects

No	Alternatif	C1	C2
1	Suryadani	-1	-2
2	Yusniar lubis	-1	0
3	Mariana BR Ginting	-2	-1
4	DRS Mandir sagala	-2	0
5	Tumpun HS	-1	-1
6	Rusli Sako	0	0
7	Nurhaini BR Barus	-2	0

Figure 5. Experience GAP Mapping

No	Alternatif	C3	C4	C5
1	Suryadani	0	0	-2
2	Yusniar lubis	0	0	-2
3	Mariana BR Ginting	-2	-2	-3
4	DRS Mandir sagala	0	-2	-2
5	Tumpun HS	0	0	-4
6	Rusli Sako	0	0	-1
7	Nurhaini BR Barus	0	-2	-4

Figure 6. Achievement aspect GAP mapping

No	Alternatif	C1	C2
1	Suryadani	4	3
2	Yusniar lubis	4	5
3	Mariana BR Ginting	3	4
4	DRS Mandir sagala	3	5
5	Tumpun HS	4	4
6	Rusli Sako	5	5
7	Nurhaini BR Barus	3	5

Figure 7. Weighting of experience aspects

No	Alternatif	C3	C4	C5
1	Suryadani	5	5	3
2	Yusniar lubis	5	5	3
3	Mariana BR Ginting	3	3	2
4	DRS Mandir sagala	5	3	3
5	Tumpun HS	5	5	1
6	Rusli Sako	5	5	4
7	Nurhaini BR Barus	5	3	1

Figure 8. Weighting of Achievement Aspects

No	Alternatif	Core Factor $N_{C1}(f)$	Secondary Factor $N_{C2}(f)$	Nilai Total $N(f)$
1	Suryadani	3	4	3.3
2	Yusniar lubis	5	4	4.7
3	Mariana BR Ginting	4	3	3.7
4	DRS Mandir sagala	5	3	4.4
5	Tumpun HS	4	4	4
6	Rusli Sako	5	5	5
7	Nurhaini BR Barus	5	3	4.4

Figure 9. Calculation of Core Factor and Secondary Factor Experience

No	Alternatif	Core Factor $N_{C1}(f)$	Secondary Factor $N_{C2}(f)$	Nilai Total $N(f)$
1	Suryadani	5	3	4.4
2	Yusniar lubis	5	3	4.4
3	Mariana BR Ginting	3	2	2.7
4	DRS Mandir sagala	4	3	3.7
5	Tumpun HS	5	1	3.8
6	Rusli Sako	5	4	4.7
7	Nurhaini BR Barus	4	1	3.1

Figure 10. Calculation of Core Factor and Secondary Factor Achievement

No	Alternatif	Pengalaman (40%)	Prestasi (60%)	Nilai Total
1	Suryadani	3.3	4.4	3.96
2	Yusniar lubis	4.7	4.4	4.52
3	Mariana BR Ginting	3.7	2.7	3.1
4	DRS Mandir sagala	4.4	3.7	3.98
5	Tumpun HS	4	3.8	3.88
6	Rusli Sako	5	4.7	4.82
7	Nurhaini BR Barus	4.4	3.1	3.62

Figure 11. Total calculation

On this page is to see the calculation data that has been inputted previously in the assessment data so that the value that appears is based on the previous assessment. The system will analyze and provide a value that has been calculated.

Alternatif	Nilai Total	Rank
Rusli Sako	4.82	1
Yusniar lubis	4.52	2
DRS Mandir sagala	3.98	3
Suryadani	3.96	4
Tumpun HS	3.88	5
Nurhaini BR Barus	3.62	6
Mariana BR Ginting	3.1	7

Figure 12. Result Form

On this page is to see the final result data where the previous calculation data has been converted into ranking values.

5. CONCLUSIONS

After completing the design and implementing the decision support system with the *Profile Matching* method in accepting medical personnel at Mitra Sejati General Hospital with 5 criteria, namely: 1) age; 2) Last Education; 3) STR; 4) BTCLS Certificate; 5) Work experience; and 7 alternatives, so that the accepted nurse candidates are 4 people, namely, Rusli Sako with a score of 4.82, Yusniar Lubis with a score of 4.52, DRS Mandir sagala with a score of 3.98, and Suryadani with a score of 3.96.

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