**APPLICATION OF THE PROFILE MATCHING METHOD IN RECOMMENDING**

**DOCTORAL CANDIDATES FOR LECTURER**

**(CASE STUDY AT STMIK ROYAL)**

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**Abstract:** Advances in information technology and science have presented major challenges in managing information in the era of modern society. This research focuses on STMIK Royal Kisaran which is facing obstacles in increasing the number of lecturers with doctoral education. To overcome this limitation, this research considers the use of a Decision Support System (DSS) with the Profile Matching method. Lecturers in higher education have a key role in providing education, conducting research, and making contributions to society. In an effort to improve lecturer qualifications, this research designs a Decision Support System using the Profile Matching method. This method is expected to be able to identify lecturers who have the potential to pursue a doctoral degree, by considering aspects such as educational background, teaching experience, and lecturer achievements. Through structured analysis, SPK can recommend lecturer candidates who are most suitable to continue their studies at doctoral level. Data from 82 STMIK Royal Kisaran lecturers was used to test the validity and effectiveness of the Decision Support System (SPK). The results of the analysis show that the Profile Matching method can provide recommendations for lecturer candidates who are worthy of being recommended to continue studying at the doctoral level. In this study, results were obtained with an 81% level of accuracy and suitability.

**Keywords :** information Technology; decision support systems; profile matching; lecturer qualifications; higher education

**Abstrak:** Kemajuan teknologi informasi dan ilmu pengetahuan telah menghadirkan tantangan besar dalam mengelola informasi di era masyarakat modern. Penelitian ini fokus pada STMIK Royal Kisaran yang menghadapi kendala dalam meningkatkan jumlah dosen berpendidikan doktor. Untuk mengatasi keterbatasan ini, penelitian ini mempertimbangkan penggunaan Sistem Pendukung Keputusan (SPK) dengan metode *Profile Matching*. Dosen di perguruan tinggi memiliki peran kunci dalam memberikan pendidikan, melakukan penelitian, dan memberikan kontribusi kepada masyarakat. Upaya untuk meningkatkan kualifikasi dosen, penelitian ini merancang Sistem Pendukung Keputusan dengan metode *Profile Matching*. Metode ini diharapkan dapat mengidentifikasi dosen yang memiliki potensi untuk mengejar gelar doktor, dengan mempertimbangkan aspek-aspek seperti latar belakang pendidikan, pengalaman mengajar, dan prestasi dosen. Melalui analisis yang terstruktur, SPK dapat merekomendasikan kandidat dosen yang paling cocok untuk melanjutkan studi ke jenjang doktor. Data dari 82 dosen STMIK Royal Kisaran dengan 10 sampel dosen yang digunakan untuk menguji validitas dan efektivitas Sistem Pendukung Keputusan (SPK). Hasil analisis menunjukkan bahwa metode *Profile Matching* dapat memberikan rekomendasi kandidat dosen yang layak untuk direkomendasikan melanjutkan kuliah ke jenjang doktor. Pada penelitian ini didapatkan hasil sebesar 70% tingkat akurasi ketepatan dan kesesuaian.

**Kata kunci** : teknologi informasi; sistem pendukung keputusan; profile matching; kualifikasi dosen; pendidikan tinggi

**INTRODUCTION**

Higher education is one of the formal educational institutions according to the law, both academic, vocational and professional, which has a major role in producing competent human resources in their fields [1] . Most organizations in all sectors of industry, commerce and government services depend primarily on information technology. It is known that information systems and information technology (IS/IT) play an important role [2] .

The provision of education in higher education cannot be separated from the role of lecturers. Lecturers are academic staff who are tasked with planning and implementing the learning process, assessing learning outcomes, providing guidance and training, as well as conducting research and community service. Based on Law of the Republic of Indonesia No. 14 of 2005 concerning Teachers and Lecturers, article 51 Paragraph (1) Point b, that lecturers have the right to receive awards according to their academic performance.

The doctoral program is the highest level at the higher education level. Lecturers with doctoral degrees are often considered the most qualified and competent human resources . Human resources are the main assets of an organization which are planners and active actors of every organizational activity [3] .

Royal College of Informatics and Computer Management (STMIK) is an educational institution that carries out education at the higher education level, namely the level of education after secondary education. In order to develop universities to become healthy universities in education, and create superior and intelligent Human Resources (HR). Based on BAN-PT regulations, to fulfill the current requirements for the number of lecturers to teach, it is best to have a doctoral degree or doctoral degree for each study program. STMIK Royal Kisaran faces significant challenges in increasing the number of lecturers with doctoral degrees. As a step in overcoming these limitations, a strategic initiative can be taken by exploring the potential of existing lecturers at STMIK Royal Kisaran. Lecturers who already have a higher education background can be identified as potential candidates to pursue a doctoral degree.

 Decision Support Systems are computer-based decision-making systems that utilize data and knowledge models to discover and analyze problems in certain areas of information and management systems [4] . Decision Support Systems are designed to assist humans or groups in formulating problems, collecting data, analyzing information, and presenting alternative solutions or decision options [5] , [6] .

*Profile Matching* is a simple method in Decision Support Systems by comparing the GAP between alternative values and criteria . *Profile Matching* is a very important process in HR management where the competition (skills) required by a position is first determined. *Profile Matching* is a decision making mechanism that assumes that there is an ideal level of predictor variables that must be met by the subject under study, not a minimum level that must be met or exceeded [7] , [8] .

Previous research using the *Profile Matching method for selecting high achieving students* [9] stated that selecting high achieving students using the *Profile Matching method* helped determine choices in determining high achieving students more quickly and accurately compared to the manual method. Other research [10] stated that a decision support system using the *Profile Matching method* in determining the feasibility of accepting Quranic tilawatil teachers really helped the foundation in increasing the effectiveness and objectivity in recruiting Quranic tilawatil teachers at Baitul Quran Al-Haq Aek Songsongan.

Other research [11] on the Decision Support System for graphic designer professional selection using the *Profile Matching method* states that *Profile Matching* provides accurate and fast results. Other research [12] on Decision Support Systems using the *Profile Matching method* to identify early symptoms of Covid-19 sufferers obtained good results and as expected.

Based on the problems and several previous studies above, this research will implement the *Profile Matching method* in the Decision Support System in providing recommendations for lecturer candidates who are worthy of being recommended to continue studying at the doctoral level.

**METHOD**

As for efforts to achieve the desired results in this research, it is necessary to carry out research stages. The research stages for implementing the *Profile Matching method* include several steps in accordance with the stages of the *Profile Matching* method as follows:

Figure 1. *Profile Matching Method*

Based on Figure 1, several stages of the *Profile Matching method are shown* . These stages include:

Determining Criteria

*Profile Matching* method begin by determining the evaluation criteria, which consist of length of work, age, functional position, research value, service value, and recognition value, then the system calculates the weight value for each criterion.

GAP Mapping Calculation

After the weight values are determined for the criteria, the system then performs a GAP mapping calculation to determine how big the difference is between the candidate profile and the desired standard for each criterion. GAP mapping is a comparison between candidate values and the desired standards. GAP is the difference between the value possessed by alternative candidates and the specified target value. This can be calculated using the following formula:

GAP = Attribute Value – Target Value (2.1)

Doing Weighting

After obtaining the GAP for each criterion, it is then given a weight. The weights in table 1 are determined by the *Profile Matching method.*

Table 1. GAP Value Weights for *Profile Matching Method*

|  |  |  |  |
| --- | --- | --- | --- |
| No | Difference | Value Weight | Information |
| 1 | 0 | 5 | Competencies according to requirements |
| 2 | 1 | 4.5 | Location competency is 1 level excess |
| 3 | -1 | 4 | Location competency is 1 level/level short |
| 4 | 2 | 3.5 | Location competency is superior to 2 levels/levels |
| 5 | -2 | 3 | Location competency is 2 levels/level short |
| 6 | 3 | 2.5 | Location competency is superior to 3 levels/levels |
| 7 | -3 | 2 | Location competency is lacking at 3 levels/levels |
| 8 | 4 | 1.5 | Location competency is superior to 4 levels/levels |
| 9 | -4 | 1 | Location competency is 4 levels short |

Calculation of *Core Factor* and *Secondary Factor*

After the GAP weight value is obtained, the next step is to calculate *the Core Factor* and *Secondary Factor,* the calculation is shown in the equation:

*Core Factor* (Main Factor)

*Core Factor* is the aspect that stands out/most needed. To calculate *the Core Factor,* use the formula:

 NCF =$\frac{\sum\_{}^{}NC}{\sum\_{}^{}IC}$ (2.2)

Where:

NCF = Average *core factor value*

NC = Total number of *core factor values*

IC = Number of *core factor items*

*Secondary Factor* (Supporting Factor)

*Secondary Factors* are items other than the aspects in the core factor. To calculate the secondary factor, use the formula:

 NSF =$\frac{\sum\_{}^{}NS}{\sum\_{}^{}IS}$ (2.3)

Where:

NSF = Average secondary factor value

NS = Total secondary factor value

IS = Number of secondary factor items

Calculation of Total Value and Ranking

Calculation of the total value can be done after obtaining the *Core Factor* and *Secondary Factor values* . To calculate the total value of each aspect, the formula is used:

N = (X)%.NCF + (Y)% NSF (2.4)

Where :

*N* = Total value of each aspect

*NCF*  = Average *core factor value*

*NSF* = Average value of *secondary factors*

( *X* )% = Percentage value of *core factor*

( *Y* )% = Percentage value of SF

Meanwhile, to get the ranking, use the formula:

Ranking = (x )% .Na1+(x)%.Na2+(x)%.Na3

Where :

Na1 = Aspect value 1

Na2 = Aspect value 2

Na3 = Aspect value 3

(X) = Percent value entered

**RESULTS AND DISCUSSION**

These results and discussion include analysis of the results that have been obtained from data that has been processed using the *Profile Matching method* where at the research stage there is a framework that includes several important stages. So, to simplify system analysis and design, this research includes the flow chart in Figure 2.



Figure 2. Design Flow Chart

Determining Criteria

In this study the author used 6 criteria as listed in Table 2.

Table 2. Determining Criteria

|  |  |  |
| --- | --- | --- |
| **No** | **Criteria** | **Criteria Code** |
| 1 | Length of working | C1 |
| 2 | Functional | C2 |
| 3 | Research Value | C3 |
| 4 | Value of Devotion | C4 |
| 5 | Age | C5 |
| 6 | Recognition Value | C6 |

Table 3. Criteria Data and Target Values

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Code** | **Criterion Name** | ***Cores*** | **%** | **Target Value** |
| C1 | Length of working | *Factor* | 60 | 3 |
| C2 | Functional | *Factor* | 2 |
| C3 | Research Value | *Factor* | 3 |
| C4 | Value of Devotion | *Factor* | 3 |
| C5 | Age | *Secondary* | 40 | 3 |
| C6 | Recognition Value | *Secondary* | 3 |

Table 3 displays the *core type criteria* and target values.

Table 4. Sub-Criteria Weight Values

|  |  |  |
| --- | --- | --- |
| **Criteria** | **Sub****Criteria** | **Mark** |
| Length of working | 6 – 8 Years | 1 |
| 9 – 11 Years | 2 |
| 12 – 20 Years | 3 |
| Functional | Lecturer 200 | 1 |
| Lecturer 300 | 2 |
| Research Value | 0 - 2.5 | 1 |
| 2.6 - 6 | 2 |
| 6.1 - 20 | 3 |
| Value of Devotion | 0 - 3 | 1 |
| 3.1 - 6 | 2 |
| 6.1 - 11 | 3 |
| Age | 30 - 35 Years | 1 |
| 36 - 40 Years | 2 |
| 41 - 53 Years | 3 |
| Recognition Value | 0 - 0.3 | 1 |
| 0.4 - 1 | 2 |
| 1.1 - 3 | 3 |

GAP Mapping Calculation

The next stage is to carry out GAP mapping calculations.

Table 5. Sub-Criteria Weight Values

| No | Alternative | Criteria |
| --- | --- | --- |
| C1 | C2 | C3 | C4 | C5 | C6 |
| 1 | E.R | 1 | 1 | 2 | 3 | 3 | 2 |
| 2 | E.S | 3 | 2 | 3 | 1 | 3 | 1 |
| 3 | F.D | 1 | 2 | 3 | 3 | 2 | 2 |
| 4 | GM P | 2 | 2 | 3 | 2 | 2 | 1 |
| 5 | H.S | 3 | 2 | 3 | 1 | 2 | 1 |
| 6 | JE H | 3 | 1 | 2 | 2 | 3 | 1 |
| 7 | R | 3 | 1 | 2 | 3 | 3 | 2 |
| 8 | R.Y | 3 | 2 | 1 | 2 | 2 | 3 |
| 9 | WM K | 3 | 2 | 3 | 2 | 3 | 2 |
| 10 | Y.S | 3 | 1 | 1 | 1 | 3 | 3 |

 Table 5 displays the weights of the sub-criteria values in table 4, where the data in table 5 is initial data obtained from the agency.

Doing Weighting

After The weight value of the criteria is known, then calculations are then carried out to find the GAP where to find the GAP refers to formula (2.1).

Table 6. Calculation of GAP Values

| No | Alternative | Criteria |  |
| --- | --- | --- | --- |
| C1 | C2 | C3 | C4 | C5 | C6 | Criterion Value |
| 1 | A1 | 1 | 1 | 2 | 3 | 3 | 2 |
| 2 | A2 | 3 | 2 | 3 | 1 | 3 | 1 |
| 3 | A3 | 1 | 2 | 3 | 3 | 2 | 2 |
| 4 | A4 | 2 | 2 | 3 | 2 | 2 | 1 |
| 5 | A5 | 3 | 2 | 3 | 1 | 2 | 1 |
| 6 | A6 | 3 | 1 | 2 | 2 | 3 | 1 |
| 7 | A7 | 3 | 1 | 2 | 3 | 3 | 2 |
| 8 | A8 | 3 | 2 | 1 | 2 | 2 | 3 |
| 9 | A9 | 3 | 2 | 3 | 2 | 3 | 2 |
| 10 | A10 | 3 | 1 | 1 | 1 | 3 | 3 |
| Target Value | 3 | 2 | 3 | 3 | 3 | 3 |  |
| 1 | A1 | -2 | -1 | -1 | 0 | 0 | -1 | GAP VALUE |
| 2 | A2 | 0 | 0 | 0 | -2 | 0 | -2 |
| 3 | A3 | -2 | 0 | 0 | 0 | -1 | -1 |
| 4 | A4 | -1 | 0 | 0 | -1 | -1 | -2 |
| 5 | A5 | 0 | 0 | 0 | -2 | -1 | -2 |
| 6 | A6 | 0 | -1 | -1 | -1 | 0 | -2 |
| 7 | A7 | 0 | -1 | -1 | 0 | 0 | -1 |
| 8 | A8 | 0 | 0 | -2 | -1 | -1 | 0 |
| 9 | A9 | 0 | 0 | 0 | -1 | 0 | -1 |
| 10 | A10 | 0 | -1 | -2 | -2 | 0 | 0 |

After obtaining the GAP value for each alternative, each alternative GAP value is given a weight value referring to Table 1. From the conversion results of the GAP value into a weighted value, a value will be obtained for each alternative. So that each alternative has a weighted value as shown in Table 7.

Table 7. GAP Criteria Weight Values

|  |  |  |
| --- | --- | --- |
| No. | Code | Criteria |
| C1 | C2 | C3 | C4 | C5 | C6 |  |
| 1 | A1 | -2 | -1 | -1 | 0 | 0 | -1 | GAP Value |
| 2 | A2 | 0 | 0 | 0 | -2 | 0 | -2 |
| 3 | A3 | -2 | 0 | 0 | 0 | -1 | -1 |
| 4 | A4 | -1 | 0 | 0 | -1 | -1 | -2 |
| 5 | A5 | 0 | 0 | 0 | -2 | -1 | -2 |
| 6 | A6 | 0 | -1 | -1 | -1 | 0 | -2 |
| 7 | A7 | 0 | -1 | -1 | 0 | 0 | -1 |
| 8 | A8 | 0 | 0 | -2 | -1 | -1 | 0 |
| 9 | A9 | 0 | 0 | 0 | -1 | 0 | -1 |
| 10 | A10 | 0 | -1 | -2 | -2 | 0 | 0 |
| Value Weight |
| 1 | A1 | 3 | 4 | 4 | 5 | 5 | 4 | GAP Value Weighting |
| 2 | A2 | 5 | 5 | 5 | 3 | 5 | 3 |
| 3 | A3 | 3 | 5 | 5 | 5 | 4 | 4 |
| 4 | A4 | 4 | 5 | 5 | 4 | 4 | 3 |
| 5 | A5 | 5 | 5 | 5 | 3 | 4 | 3 |
| 6 | A6 | 5 | 4 | 4 | 4 | 5 | 3 |
| 7 | A7 | 5 | 4 | 4 | 5 | 5 | 4 |
| 8 | A8 | 5 | 5 | 3 | 4 | 4 | 5 |
| 9 | A9 | 5 | 5 | 5 | 4 | 5 | 4 |
| 10 | A10 | 5 | 4 | 3 | 3 | 5 | 5 |

Based on Table 7, the weights of the GAP values obtained are shown, where the weights of the GAP values in Table 7 refer to Table 1 where each GAP value has its own weight which has been determined in the *Profile Matching method.* So it can be seen in Table 7 where each alternative, namely the 10 data samples used, has a different GAP weight value.

Calculation of *Core Factor* and *Secondary Factor*

After all the GAP value weights are obtained, the *Core Factor* and *Secondary Factor calculations are then carried out* . The process of finding the *Core Factor value* refers to formula (2.2)

$$\left(A1\right) NCF= \frac{3+4+4+5}{4}=4 $$

$$\left(A2\right) NCF= \frac{5+5+5+3}{4}=4,5 $$

$$\left(A3\right) NCF= \frac{3+5+5+5}{4}=4,5 $$

$$\left(A4\right) NCF= \frac{4+5+5+4}{4}=4,5 $$

$$\left(A5\right) NCF= \frac{5+5+5+3}{4}=4,5 $$

$$ \left(A6\right) NCF= \frac{5+4+4+4}{4}=4,25 $$

$$\left(A7\right) NCF= \frac{5+4+4+5}{4}=4,5 $$

$$\left(A8\right) NCF= \frac{5+5+3+4}{4}=4,25 $$

$$\left(A9\right) NCF= \frac{5+5+5+4}{4}=4,75 $$

$$\left(A10\right) NCF= \frac{5+4+3+3}{4}=3,75 $$

Meanwhile, to find the *Secondary Factor value* , refer to formula (2.3).

$$\left(A1\right) NSF= \frac{5+4}{2}=4,5$$

$$\left(A2\right) NSF= \frac{5+3}{2}=4$$

$$\left(A3\right) NSF= \frac{4+4}{2}=4$$

$$\left(A4\right) NSF= \frac{4+3}{2}=3,5$$

$$\left(A5\right) NSF= \frac{4+3}{2}=3,5$$

$$\left(A6\right) NSF= \frac{5+3}{2}=4$$

$$\left(A7\right) NSF= \frac{5+4}{2}=4,5$$

$$\left(A8\right) NSF= \frac{4+5}{2}=4,5$$

$$\left(A9\right) NSF= \frac{5+4}{2}=4,5$$

$$\left(A10\right) NSF= \frac{5+5}{2}=5$$

After calculating the *Core Factor value* and *Secondary Factor value* , the resulting value is obtained as in Table 4.19

Table 8. *Core Factor* and *Secondary Factor* Calculation Results

|  |  |  |  |
| --- | --- | --- | --- |
| NO | CODE | NCF | NCF |
| 1 | A1 | 4 | 4.5 |
| 2 | A2 | 4.5 | 4 |
| 3 | A3 | 4.5 | 4 |
| 4 | A4 | 4.5 | 3.5 |
| 5 | A5 | 4.5 | 3.5 |
| 6 | A6 | 4.25 | 4 |
| 7 | A7 | 4.5 | 4.5 |
| 8 | A8 | 4.25 | 4.5 |
| 9 | A9 | 4.75 | 4.5 |
| 10 | A10 | 3.75 | 5 |

After obtaining the *Core Factor* and *Secondary Factor values* , the total value and ranking are then calculated.

Calculation of Total Value and Ranking

 The next step is to find the total value and ranking. To find the total value use formula (2.4)

$$NT\left(A1\right)=\left(60 \% x 4\right)+\left(40 \% x 4,5\right)=4,2$$

$$NT\left(A2\right)=\left(60 \% x 4,5\right)+\left(40 \% x 4\right)=4,3$$

$$NT\left(A3\right)=\left(60 \% x 4,5\right)+\left(40 \% x 4\right)=4,3$$

$$NT\left(A4\right)=\left(60 \% x 4,5\right)+\left(40 \% x 3,5\right)=4,1$$

$$NT\left(A5\right)=\left(60 \% x 4,5\right)+\left(40 \% x 3,5\right)=4,1$$

$$NT\left(A6\right)=\left(60 \% x 4,25\right)+\left(40 \% x 4\right)=4,15$$

$$NT\left(A7\right)=\left(60 \% x 4,5\right)+\left(40 \% x 4,5\right)=4,5$$

$$NT\left(A8\right)=\left(60 \% x 4,25\right)+\left(40 \% x 4,5\right)=4,35$$

$$NT\left(A9\right)=\left(60 \% x 4,75\right)+\left(40 \% x 4,5\right)=4,65$$

$$NT\left(A10\right)=\left(60 \% x 3,75\right)+\left(40 \% x 5\right)=4,25$$

 The total value obtained from the calculation above is then sorted based on the highest total value to obtain a ranking order and to find out who is in the top ranking. To find out the top ranking and highest total score, see Table 9.

Table 9. Results of Highest Total Score and Ranking

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No | Code | Lecturer Name | Total Value | Ranking |
| 1 | A9 | WM K | 4.65 | 1 |
| 2 | A7 | R | 4.5 | 2 |
| 3 | A8 | R.Y | 4.35 | 3 |
| 4 | A2 | ICE | 4.3 | 4 |
| 5 | A3 | F.D | 4.3 | 5 |
| 6 | A10 | Y.S | 4.25 | 6 |
| 7 | A1 | E.R | 4.2 | 7 |
| 8 | A6 | JE H | 4.15 | 8 |
| 9 | A5 | H.S | 4.1 | 9 |
| 10 | A4 | GM P | 4.1 | 10 |

Based on Table 9, it is known that the highest final result value is alternative code A9 with the highest value, namely 4.65.

TESTING

 This testing was carried out using a system created using the PHP MySQL programming language. The aim of this test is to prove the correctness of a decision making process using the *Profile Matching method* and calculated manually then compared with testing using the system so that the results are the same between manual calculations and the system.

*Login* Page



Figure 3. *Login page*

 This page displays the *login page* where the admin enters *the username* and *password* .

*Administrator* Page



Figure 4. *Administrator page*

 *administrator* page is the front page display, displays the master data menu which consists of the criteria menu display as criteria input, the alternative menu display as alternative input, and the *Factor menu display* as input % (percent) *Core Factor* and *Secondary Factor* .

Start Calculation Menu



Figure 5. Start Calculation Menu

 The start calculation menu display functions to display the results of the calculation of the criteria weight values, the results of the GAP value calculations, and the results of *the Core Factor* and *Secondary Factor calculations.*

Results Menu



Figure 6. Results Menu

This page will display the results of calculations using the *Profile Matching method* and display the final results in the form of rankings from the test. Next, in the results menu there is *a form* for printing the calculation results. In this *form* the admin will be able to see the final score along with the top ranking.

CONCLUSION

Based on research, the *Profile Matching method* can be used to assist decision making in providing recommendations for prospective lecturers who are worthy of studying at doctoral level. In this study, from a sample of 10 lecturers, results were obtained where alternative A9 was ranked 1st with the highest score reaching 4.65 and alternative A4 was the lowest with a score of 4.1 with a level of accuracy and suitability reaching 70%.

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