Position Placement Dss Using Profile Matching And Analytical Hierarchy Process

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Abstract: Corporate Human Resource (CHR) Kompas Gramedia is a business unit of Kompas Gramedia which is in charge of managing and developing Human Resources (HR) of Kompas Gramedia company. Decision making on position placement in Kompas Gramedia is carried by CHR by using the manual technique. The time needed to reach the final decision of position placement takes approximately one to two months. Thus, the role of a decision support system in CHR Kompas Gramedia is really in need. In this study, the decision support system for position placement in CHR Kompas Gramedia uses the Profile Matching and Analytical Hierarchy Process (AHP) methods with competency aspects and weights set by the CHR Kompas Gramedia. The Profile Matching method is used to provide assessments, determine gaps, and weight criteria, while the AHP method is used to calculate the pairwise, eigenvalue, priority scale, total eigenvalue, consistency index (CI) matrix, and consistency ratio (CR). This decision support system has been successfully designed and built using the Profile Matching and AHP methods. This decision support system has been tested successfully and evaluated by distributing questionnaires to 31 respondents. The evaluation process was done using the Technology Acceptance Model and Likert scale which scored 84.51% for perceived ease of use and 83.98% for perceived usefulness.

Index Terms: AHP, CHR Kompas Gramedia, Decision Support System, Position Placement, Profile Matching.

1. INTRODUCTION

DECISION support system is a system that is able to provide problem-solving capabilities for semi-structured and unstructured problems by providing information or proposals towards certain decisions. The existence of a decision support system in a company or organization will produce output that calculates data as consideration of a decision-maker, thus facilitating decision making [1]. The decision for position placement was implemented manually by Kompas Gramedia. Kompas Gramedia is a leading mass media company in Indonesia, which has several subsidiaries or business units. Inside Kompas Gramedia there is a Corporate Human Resources (CHR) unit business that is in charge of managing and developing Human Resources (HR) starting from employee recruitment, managing work contracts, managing employee benefits and rights and reviewing employee development [2]. According to Indra [3] as Process Superintendent Business Analyst at CHR Kompas Gramedia, the position placement process at Kompas Gramedia still uses the manual method. If there is a vacant position, a position placement process will be held. First, by looking for the subordinates of the position, then judging the performance evaluation, competency results and performance. Performance evaluation can be seen through KG Impact or commonly called the balanced scorecard. Then the results of competencies can be seen through the assessment results of employees. After the employee's requirements and achievements are seen, the most suitable one will be determined, then ranking. After that the decision to occupy the vacant position will be given to the decision holder [3]. The time period for manual placement takes approximately one or two months and is considered inefficient, according to Indra. To overcome these problems, it can be solved by using a Decision Support System (DSS), which provides a choice to users [4]. The method used in the Decision Support System (SPK) is the Profile Matching method and the Analytical Hierarchy Process (AHP) method. The Profile Matching method is used to provide assessments, determine gaps, and weight criteria. While the AHP method is used to calculate the pairwise comparison, eigen matrix, priority scale, maximum eigenvalue, consistency index (CI), and consistency ratio (CR). AHP can solve very complex problems with a large number of criteria so that it can be used as a method of decision placement services with many criteria [5]. The design and construction of a placement system using the Profile Matching and AHP methods is only implemented in the Kompas Gramedia internal environment, namely CHR Kompas Gramedia, because the content and fields stored in the database such as criteria, position, and other data are in accordance with the Standard Operating Procedure (SOP) from CHR Kompas Gramedia [3]. The Profile Matching method has been done previously by Udyana [6] by building a system for supporting career planning decisions and selecting outstanding employees. This research was conducted because according to [6], in career planning and determining outstanding employees often have difficulties because the submission of prospective officeholders in accordance with the way of matching and position profile for career planning is less well defined [7]. From several studies that have been conducted, to assist the development process of employees in the CHR unit, save time, reduce subjectivity factors and reduce human error factors, a position placement decision support system will be designed using the Profile Matching and Analytical Hierarchy Process (AHP) methods. This position placement system using the Profile Matching and AHP methods at CHR Kompas Gramedia will work automatically to find prospective officeholders from specific units to fill positions that will be replaced as structural positions within the company that has been determined by Corporate Human Resources at Kompas Gramedia [3]. Evaluation of this system uses the Technology Acceptance Model (TAM) method to measure the level of acceptance of applications with the Perceived of Usefulness and Perceived Ease of Use. This placement system is designed using the PHP programming language and PHPMyAdmin database and visualization of the design has been made by adding the structure of HyperText Markup Language (HTML) which is equipped with styles in Cascading Style Sheets (CSS) documents and interaction generated by the addition of jQuery and asynchronous JavaScript and XML (AJAX).

2 PROFILE MATCHING

Decision support systems are part of computer-based systems, including knowledge-based systems that are used to support decision making within an organization or company. It can also be said as a computer system that processes data

into information to make decisions from specific semi-structured problems. Thus, one definition of a decision-making system can be drawn, namely an adaptive, flexible, and interactive computer-based system that is used to solve unstructured problems to increase the value of decisions taken [8]. The Profile Matching process in broad outline is the process of comparing individual competencies into job competencies so that competency differences can be known (also called gaps). The smaller the gap produced, the higher the weight of the value which means greater opportunities for employees to occupy these positions. Profile Matching assumes that there are three ideal predictor variables that a person must have [1]. The following steps according to the Matching Profile method [9, 10] are:

1. Determine the data variables needed.
2. Determine the aspects used for assessment.
3. Gap profile mapping.

$$Gap = Minimal\ Profile - Test\ data\ profile \quad (1)$$

4. After obtaining the Gap value, then weights are given for each Gap value.
5. Calculation and grouping of Core Factor and Secondary Factors. After determining the gap value weight, then grouped into two groups, namely [9]:

a). Core Factor, which is the most important or prominent criteria (competency) or most needed by an assessment that is expected to obtain optimal results [9].

$$NCF = \frac{\sum NC}{\sum IC} \quad (2)$$

b). Secondary Factors (supporting factors), which are items other than those that are on the core factor. Alternatively, is a supporting factor that is less needed by an assessment [9].

$$NSF = \frac{\sum NS}{\sum IS} \quad (3)$$

6. Calculation of Total Value. Total value is obtained from the percentage of core factors and secondary factors that are estimated to influence the results of each profile [9].

$$N = (x)\%\ NCF + (x)\%\ NSF \quad (4)$$

7. Calculation of ranking determination. The Final Result of the Profile Matching process is ranking. The ranking determines the results of certain calculations [9].

$$\boldsymbol{Ranking = NMA + NSA} \quad (5)$$

3 ANALYTICAL HIERARCHY PROCESS

The Analytical Hierarchy Process (AHP), developed by Thomas L. Saaty, is one of the multi-criteria decision-making models that can help the human framework in which logic, experience, knowledge, emotions, and feelings are optimized into a systematic process [11]. There are two kinds of hierarchies in the AHP method, namely, structural hierarchy and functional hierarchy. In the structural hierarchy, complex systems are arranged into principal components in descending order according to their structural properties, while the functional hierarchy describes a complex system into its basic elements according to its essential relationship [12, 13].

1. The first step is analyzing the problem and looking for the expected alternative solutions.
2. The next step is to set priority weights by making a paired comparison matrix that represents the correlation or relationship between one criterion and the other criteria.
3. Add the values of each row and divide them by the number of elements (average of each row) or called eigenvectors. The eigenvalue of a vector is the weight of each element
4. Test the consistency of the hierarchy. If the final result of the consistency test is not in accordance with CR <0.1, a reassessment must be made. Steps to calculate and check the consistency as follows.

a). Calculate the total lambda (Σλ); the final result is called λmax.

$$\lambda max = \sum \lambda \quad (6)$$

b). Calculate the Consistency Index (CI).

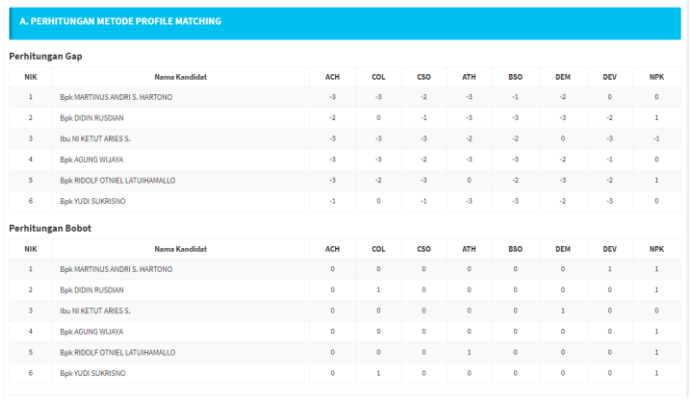
$$CI = \frac{\lambda max - n}{n-1} \quad (7)$$

c). Calculate the Consistency Ratio (CR).

$$CR = \frac{CI}{RC} \quad (8)$$

4 RESULTS AND DISCUSSION

This placement system is designed using the PHP programming language and PHPMyAdmin database and visualization of the design that has been made by adding the structure of HyperText Markup Language (HTML) which is equipped with style on CSS documents and interaction generated by the addition of jQuery and asynchronous JavaScript and XML (AJAX). Figure 1 to 5 show the Profile Matching and AHP methods calculation in detail. In the page view calculation, the Profile Matching method is a page that can be accessed by the user after pressing the 'ranking' button below the candidate list table.


A. PERHITUNGAN METODE PROFILE MATCHING

Perhitungan Gap

NIK	Nama Kandidat	ACH	COL	CSO	ATH	BSO	DEM	DEV	NPK
1	Bpk MARTINUS ANDRI S. HARTONO	-3	-3	-2	-3	-1	-2	0	0
2	Bpk DIDIN RUSDIAN	-2	0	-1	-3	-3	-3	-2	1
3	Ibu NI KETUT ARIES S.	-3	-3	-3	-2	-2	0	-3	-1
4	Bpk AGUNG WIJAYA	-3	-3	-2	-3	-3	-2	-1	0
5	Bpk RIDOLF OTNIEL LATUIHAMALLO	-3	-2	-3	0	-2	-3	-2	1
6	Bpk YUDI SUKRISNO	-1	0	-1	-3	-3	-2	-3	0

Perhitungan Bobot

NIK	Nama Kandidat	ACH	COL	CSO	ATH	BSO	DEM	DEV	NPK
1	Bpk MARTINUS ANDRI S. HARTONO	0	0	0	0	0	0	1	1
2	Bpk DIDIN RUSDIAN	0	1	0	0	0	0	0	1
3	Ibu NI KETUT ARIES S.	0	0	0	0	0	1	0	0
4	Bpk AGUNG WIJAYA	0	0	0	0	0	0	0	1
5	Bpk RIDOLF OTNIEL LATUIHAMALLO	0	0	0	1	0	0	0	1
6	Bpk YUDI SUKRISNO	0	1	0	0	0	0	0	1

***Fig. 1**. Gap and Weight calculations for Profile Matching*


Perhitungan dan Pengelompokan Core Factor dan Secondary Factor

1. Aspek Kompetensi

NIK	Nama Kandidat	CF	SF	N1
1	Bpk MARTINUS ANDRI S. HARTONO	0.14	0	0
2	Bpk DIDIN RUSDIAN	0.14	0	0
3	Ibu NI KETUT ARIES S.	0.14	0	0
4	Bpk AGUNG WIJAYA	0	0	0
5	Bpk RIDOLF OTNIEL LATUIHAMALLO	0.14	0	0
6	Bpk YUDI SUKRISNO	0.14	0	0

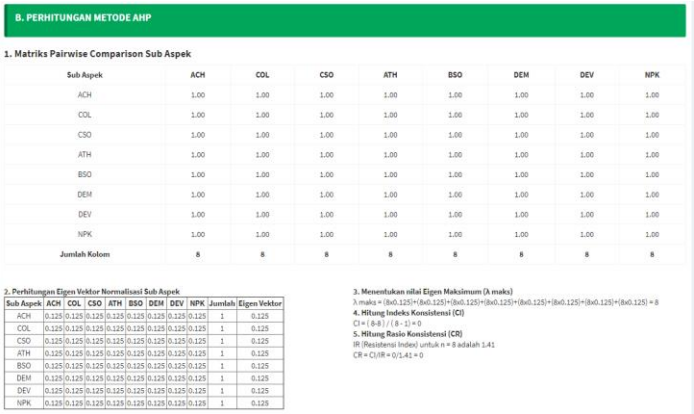
2. Aspek Nilai PK

NIK	Nama Kandidat	CF	SF	N2
1	Bpk MARTINUS ANDRI S. HARTONO	0	1	0
2	Bpk DIDIN RUSDIAN	0	1	0
3	Ibu NI KETUT ARIES S.	0	0	0
4	Bpk AGUNG WIJAYA	0	1	0
5	Bpk RIDOLF OTNIEL LATUIHAMALLO	0	1	0
6	Bpk YUDI SUKRISNO	0	1	0

Perhitungan Ranking Profile Matching

NIK	Nama Kandidat	N1	N2	Total Rata-rata	Ranking
1	Bpk MARTINUS ANDRI S. HARTONO	0	0	0	1
2	Bpk DIDIN RUSDIAN	0	0	0	2
3	Ibu NI KETUT ARIES S.	0	0	0	3
4	Bpk AGUNG WIJAYA	0	0	0	4
5	Bpk RIDOLF OTNIEL LATUIHAMALLO	0	0	0	5
6	Bpk YUDI SUKRISNO	0	0	0	6

***Fig. 2**. Core Factor, Secondary Factor, and Ranking Process*



B. PERHITUNGAN METODE AHP

1. Matriks Pairwise Comparison Sub Aspek

Sub Aspek	ACH	COL	CSO	ATH	BSO	DEM	DEV	NPK
ACH	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
COL	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
CSO	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
ATH	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
BSO	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DEM	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DEV	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NPK	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Jumlah Kolom	8	8	8	8	8	8	8	8

2. Perhitungan Eigen Vektor Normalisasi Sub Aspek

Sub Aspek	ACH	COL	CSO	ATH	BSO	DEM	DEV	NPK	Jumlah	Eigen Vektor
ACH	0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125	1	0.125
COL	0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125	1	0.125
CSO	0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125	1	0.125
ATH	0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125	1	0.125
BSO	0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125	1	0.125
DEM	0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125	1	0.125
DEV	0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125	1	0.125
NPK	0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125	1	0.125

3. Menentukan nilai Eigen Maksimum (λ maks)

λ maks = (8x0.125)+(8x0.125)+(8x0.125)+(8x0.125)+(8x0.125)+(8x0.125)+(8x0.125)+(8x0.125) = 8

4. Hitung Indeks Konsistensi (CI)

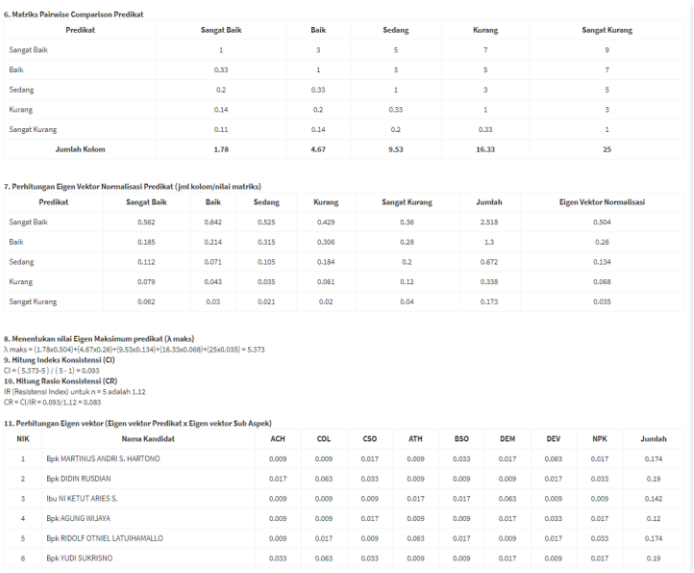
CI = (8-8) / (8 - 1) = 0

5. Hitung Rasio Konsistensi (CR)

IR (Resistensi Index) untuk n = 8 adalah 1.41

CR = CI/IR = 0/1.41 = 0

Fig. 3*. Pairwise comparison matrix for AHP*



6. Matriks Pairwise Comparison Predikat

Predikat	Sangat Baik	Baik	Sedang	Kurang	Sangat Kurang
Sangat Baik	1	3	5	7	9
Baik	0.33	1	3	5	7
Sedang	0.2	0.33	1	3	5
Kurang	0.14	0.2	0.33	1	3
Sangat Kurang	0.11	0.14	0.2	0.33	1
Jumlah Kolom	1.78	4.67	9.53	16.33	25

7. Perhitungan Eigen Vektor Normalisasi Predikat (jml kolom/nilai matriks)

Predikat	Sangat Baik	Baik	Sedang	Kurang	Sangat Kurang	Jumlah	Eigen Vektor Normalisasi
Sangat Baik	0.562	0.642	0.525	0.429	0.36	2.518	0.504
Baik	0.185	0.214	0.315	0.306	0.28	1.3	0.26
Sedang	0.112	0.071	0.105	0.184	0.2	0.672	0.134
Kurang	0.079	0.043	0.035	0.061	0.12	0.338	0.068
Sangat Kurang	0.062	0.03	0.021	0.02	0.04	0.173	0.035

8. Menentukan nilai Eigen Maksimum predikat (λ maks)

λ maks = (1.78x0.504)+(4.67x0.26)+(9.53x0.134)+(16.33x0.068)+(25x0.035) = 5.373

9. Hitung Indeks Konsistensi (CI)

CI = (5.373-5) / (5 - 1) = 0.093

10. Hitung Rasio Konsistensi (CR)

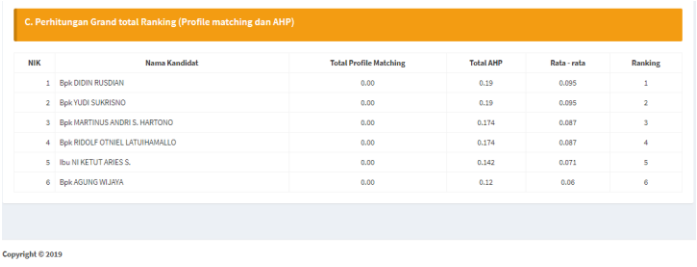
IR (Resistensi Index) untuk n = 5 adalah 1.12

CR = CI/IR = 0.093/1.12 = 0.083

11. Perhitungan Eigen vektor (Eigen vektor Predikat x Eigen vektor Sub Aspek)

NIK	Nama Kandidat	ACH	COL	CSO	ATH	BSO	DEM	DEV	NPK	Jumlah
1	Bpk MARTINUS ANDRI S. HARTONO	0.009	0.009	0.017	0.009	0.033	0.017	0.063	0.017	0.174
2	Bpk DIDIN RUSDIAN	0.017	0.063	0.033	0.009	0.009	0.009	0.017	0.033	0.19
3	Ibu NI KETUT ARIES S.	0.009	0.009	0.009	0.017	0.017	0.063	0.009	0.009	0.142
4	Bpk AGUNG WIJAYA	0.009	0.009	0.017	0.009	0.009	0.017	0.033	0.017	0.12
5	Bpk RIDOLF OTNIEL LATUIHAMALLO	0.009	0.017	0.009	0.063	0.017	0.009	0.017	0.033	0.174
6	Bpk YUDI SUKRISNO	0.033	0.063	0.033	0.009	0.009	0.017	0.009	0.017	0.19

Fig. 4*. Predicate comparison matrix and normalize eigen vector calculations*



C. Perhitungan Grand total Ranking (Profile matching dan AHP)

NIK	Nama Kandidat	Total Profile Matching	Total AHP	Rata - rata	Ranking
1	Bpk DIDIN RUSDIAN	0.00	0.19	0.095	1
2	Bpk YUDI SUKRISNO	0.00	0.19	0.095	2
3	Bpk MARTINUS ANDRI S. HARTONO	0.00	0.174	0.087	3
4	Bpk RIDOLF OTNIEL LATUIHAMALLO	0.00	0.174	0.087	4
5	Ibu NI KETUT ARIES S.	0.00	0.142	0.071	5
6	Bpk AGUNG WIJAYA	0.00	0.12	0.06	6

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Fig. 5*. Grand total ranking calculation using Profile Matching and AHP methods*

After the system implementation in CHR Kompas Gramedia, an evaluation for the built system has been done. The evaluation was done using questionnaires which were designed using Technology Acceptance Model (TAM) guidelines, with two main factors, i.e. Perceived Ease of Use and Perceived Usefulness. As much as 31 respondents from CHR Kompas Gramedia were taken into account for this system evaluation. Table 1 shows the result for Perceived Ease of Use factor, while Table 2 shows the result for Perceived Usefulness factor.

TABLE 1
PERCEIVED EASE OF USE

Questions	VD	D	N	A	VA
Easy to learn			3	7	11
Easy to operate			1	18	12
Clarity			3	20	8
Flexibility	1	3	3	13	11
Expertise			4	16	11
Overall this system is easy to use			2	15	14

TABLE 2
PERCEIVED USEFULNESS

Questions	VD	D	N	A	VA
Information seeking			4	15	12
Increase performance			4	14	13
Increase productivity			1	16	14
Effectiveness		5	7	7	12
Easy to find information			7	13	11
Overall this system is useful			4	15	12

Based on the calculation results on perceived ease of use factor, it can be concluded that 84.51% of users strongly agreed that the system is easy to use. In other words, by using this system, it is considered to provide convenience to find information.

4 CONCLUSIONS

Based on the research that has been done, the decision support system for position placement in CHR Kompas Gramedia has been successfully designed and built by implementing the Profile Matching and Analytical Hierarchy Process (AHP) methods. This system was designed and built to help Human Resource department from CHR Kompas Gramedia in choosing candidates for position placement more quickly and precisely. This system has been used to determine candidates in the position of director, general manager, and manager by comparing the competency aspects and employees' performance aspects.

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