

New Employee Recruitment Decision Support System using the AHP Method and Profile Matching at PT Digikidz Indonesia

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Abstract:

Human Resources (HR) are an important asset and driving force in running the Company. In order to obtain quality human resources according to needs, the company requires a fairly long process. Starting from determining the right criteria to providing a series of tests as a reference in decision making. PT Digikidz Indonesia is a company operating in the education sector with the Children Creative Learning Center concept. The increasing development of PT Digikidz Indonesia is necessary to find the best candidates to join and be placed according to their position. However, there are obstacles that occur in the process of recruiting new employees, namely that there is still subjectivity and there is no weighting of recruitment criteria. Therefore, this research aims to produce a decision support system (DSS) for new employee recruitment using the Analytical Hierarchy Process (AHP) and Profile Matching method. AHP is used to determine the weight of criteria and Profile Matching is used to determine priority ranking which makes it easier for users to see the most suitable applicants. in accordance with company criteria. The results of this research can facilitate and help companies in the process of recruiting employees according to the position or position required by calculating each criterion for each prospective employee at PT Digikidz Indonesia.

Keywords — Decision Support System, AHP, Profile Matching

I. INTRODUCTION

PT Digikidz Indonesia is a company operating in the education sector with the Children Creative Learning Center concept which teaches Multimedia Computers, Robots, iPads, Modern Electronics and Art which combines creativity and technology to children and teenagers aged 5 to 18 years in a "Fun Learning" atmosphere." and "Multiple Intelligence". Currently PT Digikidz Indonesia has 13 branches, namely in BSD City, Lippo Karawaci, Bintaro, Puri Indah, Gading Serpong, Alam Sutera, Pondok Indah, Pamulang, Central Park, Bogor, Bandung, Solo and Bali. PT Digikidz Indonesia certainly needs competent and qualified human resources according to the fields and positions required by the company.

Obstacles that occur at PT Digikidz Indonesia in the process of recruiting new employees include if there are several employees who have abilities that are not much different, then the Human Resource Development (HRD) Manager only chooses based on subjectivity, namely by just estimating. Apart from that, PT Digikidz Indonesia does not yet have weighting criteria for

accepting new employees, therefore objectivity and determining the right weighting is very necessary in assessing and making decisions on employee recruitment in order to get employees who are qualified and meet their needs.

Based on the obstacles faced, a system is needed that can provide assistance in the decision making process. The methods used in this decision support system are the Analytical Hierarchy Process (AHP) and Profile Matching methods. The AHP method is used to determine the weight of the criteria, because the HRD section of PT Digikidz Indonesia has not yet defined the weight to determine which applicants are accepted from each existing criterion and the Profile Matching method is used to determine priority ranking which makes it easier for users to see the applicants who best match the company's criteria so that It is hoped that this will make it easier for decision makers to determine successful applicants. Recruitment of new employees is still determined entirely by the HRD Manager of PT Digikidz Indonesia, but with this decision support

system it is hoped that it will facilitate and assist in decision making and can reduce existing obstacles.

II. METHODOLOGY

2.1 Data Collection Methods

In this research, to collect data, the author carried out observation, interviews, document analysis and literature study.

a. Observation

This activity was carried out to collect data by direct observation of matters relating to the new employee recruitment process at PT Digikidz Indonesia as input for this final assignment.

b. Interview

An interview is a process of collecting data face to face by asking questions related to the recruitment of new employees which is carried out to the Human Resource Development (HRD) Manager as the party given the authority to carry out employee recruitment and determine which applicants pass. From these interviews, the author also obtained documents that will be used in developing a decision support system for recruiting new employees.

c. Document and data analysis

Document analysis is carried out to analyze current documents in order to obtain information that is appropriate to the system to be created.

d. Literature review

This activity is carried out by reading journals, e-books or other references related to employee recruitment and selection theory, Decision Support Systems, Analytical Hierarchy Process (AHP), and Profile Matching.

e. Questionnaire

A questionnaire was conducted on the HRD Manager of PT Digikidz Indonesia to determine the comparison of predetermined criteria that will be used to develop a decision support system for employee recruitment

2.2 Research Methods

This research is about selecting new employee recruits using the Analytical Hierarchy Process (AHP) method and the Profile Matching Method. AHP is used to determine the weight of criteria obtained from the questionnaire and Profile Matching is used to determine the ranking of applicants from highest to lowest score based on administrative criteria, temperament test,

interview 1, skills test, interview 2. Both methods are instruments for determining who the applicants are. priority to be accepted to work at PT Digikidz Indonesia. In this research, the research method used is a quantitative method where a calculation process is carried out according to an existing formula based on the method used to obtain a decision. Calculations were carried out on job applicant data in February 2023 at PT Digikidz Indonesia.

III. RESULTS AND DISCUSSION

3.1 Calculation of AHP

Based on the questionnaire that was submitted to expert respondents (HRD Managers), a comparison matrix table per criteria was obtained which is presented in table 1.

Table 1. Importance comparison matrix per criterion

Pelamar dengan kriteria terbaik	Administrasi	Temperament Test	Interview 1	Skill Test	Interview 2
Administrasi	1	1/2	1/7	1/5	1/6
Temperament Test	2	1	1/7	1/4	1/6
Interview 1	7	7	1	6	4
Skill Test	5	4	1/6	1	1/2
Interview 2	6	6	1/4	2	1

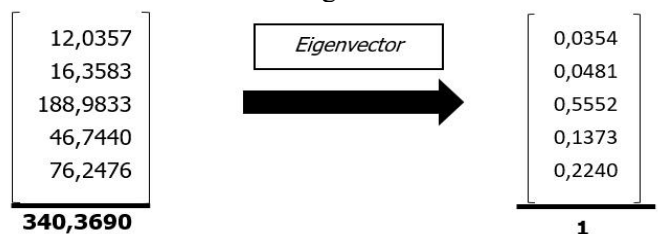
After the importance comparison matrix per criterion is created, it is translated into decimal form, then multiplied the matrix by itself, to get the matrix multiplication result and the number of each row of the matrix multiplication results as in table 2.

Table 2. Results of matrix multiplication

5,0000	3,8000	0,4321	1,7155	1,0881	12,0357
7,2500	5,0000	0,6548	2,0905	1,3631	16,3583
82,0000	65,5000	5,0000	23,1500	13,3333	188,9833
22,1667	14,6667	1,7440	5,0000	3,1667	46,7440
35,7500	24,7500	2,5476	8,2000	5,0000	76,2476

The results above need to be normalized by dividing each number of rows in the matrix by the total rows which will produce an eigenvector as in table 3

Table 3. Eigenvector results



After getting the Eigenvector results, it is necessary to test the AHP model by calculating the Consistency Index (CI) and Consistency Ratio (CR) values. First, multiply the decimal value of each criterion matrix by the eigenvector, second, calculate the Consistency Vector by determining the average value of the Weighted Sum Vector, calculate the average value of the Consistency Vector as in table 4.

Table 4. Calculating CI Values

Kriteria	Administrasi	Tempra Ment Test	Interview 1	Skill Test	Interview 2	Eigenvector	Hasil	Consistency Vector
Administrasi	1,0000	0,5000	0,1429	0,2000	0,1667	0,0354	0,2036	5,7502
Tempra Ment Test	2,0000	1,0000	0,1429	0,2500	0,1667	0,0481	0,2699	5,6107
Interview 1	7,0000	7,0000	1,0000	6,0000	4,0000	0,5552	2,8595	5,1504
Skill Test	5,0000	4,0000	0,1667	1,0000	0,5000	0,1373	0,7112	5,1801
Interview 2	6,0000	6,0000	0,2500	2,0000	1,0000	0,2240	1,1384	5,0821

Calculating the average value of the Consistency Vector is:

$$\pi = \frac{(5,7502 + 5,6107 + 5,1504 + 5,1801 + 5,0821)}{5} = 5,3547$$

Calculating the Consistency Index Value using the formula

$$CI = \frac{(\pi - n)}{n - 1} \quad n : \text{many criteria}$$

$$CI = \frac{(5,3547 - 5)}{5 - 1} = 0,0887$$

To calculate the Consistency Ratio, the RI value is needed, namely the Random Index obtained from the Oarkridge table.

$$CR = \frac{CI}{RI} \quad \text{for } n = 5, \text{ then value } RI = 1,12.$$

$$CR = \frac{0,0887}{1,12} = 0,070176$$

The comparative assessment is said to be consistent if the CR is no more than 0.10, so the comparative assessment of the criteria for recruiting new employees at PT Digikidz Indonesia is considered consistent.

3.1 Calculation of Profile Matching

Based on applicants who registered in February 2023, there are three potential applicants for implementing decision making using the profile matching method and their respective test scores are as shown in table 5.

Based on the questionnaire that was submitted to expert respondents (HRD Managers), a comparison matrix table per criteria was obtained which is presented in table 5.

Table 5. Scores for each applicant's test

No	Kode Pelamar	Administrasi			Tempra ment test				Interview 1			Skill test			Interview 2	
		Umur	Jurusan	Pendidikan	Kolerik	Sanguine	Melankolik	Flegmatik	Sikap	Pengalaman	Kesiapan Bekerja	Microsoft Office Skill	Other Skill	Presentation Skill	Gaji	Pemempatan Bekerja
1	FP/00001	4	2	4	4	5	4	2	4	3	3	5	4	3	2	2
2	FP/00002	3	2	3	3	2	5	1	4	4	4	4	3	4	2	1
3	FP/00003	3	1	2	4	1	2	3	3	2	1	4	1	3	2	2

Then a gap calculation table can be produced for each aspect of the test based on their respective profiles. Can be seen in table 6.

Table 6. Calculation of gaps for all aspects

No	Kode Pelamar	Administrasi			Tempra ment test				Interview 1			Skill test			Interview 2	
		Umur	Jurusan	Pendidikan	Kolerik	Sanguine	Melankolik	Flegmatik	Sikap	Pengalaman	Kesiapan Bekerja	Microsoft Office Skill	Other Skill	Presentation Skill	Gaji	Pemempatan Bekerja
	Profile Nilai	4	1	5	5	5	5	1	5	3	3	5	4	3	2	2
1	FP/00001	0	4,5	-1	-1	0	-1	1	-1	0	0	0	0	0	0	0
2	FP/00002	-1	4,5	-3	-2	-3	0	0	-1	1	1	-1	-1	1	0	-1
3	FP/00003	-1	5	-2	-1	-4	-3	1	-2	-1	-2	-1	-3	0	0	0

After obtaining gaps in each applicant's data, each applicant's profile is given a weighted value using the gap value weighting table as a benchmark. Thus, each applicant will be matched based on a predetermined weight table, as seen in tables 7 and 8.

Table 7. Weight of gap values

Selisih	Bobot Nilai	Keterangan
0	5	Tidak ada selisih (Kompetensi sesuai yang dibutuhkan)
1	4,5	Kompetensi individu kelebihan 1 tingkat/level
-1	4	Kompetensi individu kekurangan 1 tingkat/level
2	3,5	Kompetensi individu kelebihan 2 tingkat/level
-2	3	Kompetensi individu kekurangan 2 tingkat/level
3	2,5	Kompetensi individu kelebihan 3 tingkat/level
-3	2	Kompetensi individu kekurangan 3 tingkat/level
4	1,5	Kompetensi individu kelebihan 4 tingkat/level
-4	1	Kompetensi individu kekurangan 4 tingkat/level

Table 8. Mapping of gap values with weighted values for all aspects

No	Kode Pelamar	Administrasi			Tempra ment test				Interview 1			Skill test			Interview 2	
		Umur	Jurusan	Pendidikan	Kolerik	Sanguine	Melankolik	Flegmatik	Sikap	Pengalaman	Kesiapan Bekerja	Microsoft Office Skill	Other Skill	Presentation Skill	Gaji	Pemempatan Bekerja
1	FP/00001	5	4,5	4	4	5	4	4,5	4	5	5	5	5	5	5	5
2	FP/00002	4	4,5	3	3	2	5	5	4	4,5	4,5	4	4	4,5	5	4
3	FP/00003	4	5	2	4	1	2	3,5	3	4	3	4	2	5	5	5

After obtaining the value weights, the next step is to calculate and group the core factors and secondary factors from each aspect as in table 9.

Table 9. Calculation and grouping of core factors and secondary factors

Kode Pelamar	Keterangan	Administrasi		Temprament test		Interview 1		Skill test		Interview 2	
		Perhitungan	Hasil	Perhitungan	Hasil	Perhitungan	Hasil	Perhitungan	Hasil	Perhitungan	Hasil
FP/00001	Core Factor	$NCF = \frac{ENGI}{2Ic}$	$NCF = \frac{5+4}{2} = 4,5$	$NCF = \frac{4}{1}$	4	$NCF = \frac{4}{1}$	4	$NCF = \frac{5+5}{2}$	5	$NCF = \frac{5}{1}$	5
FP/00001	Secondary Factor	$NSF = \frac{ENSI}{2Ic}$	$NSF = \frac{4,5}{1}$	$NSF = \frac{5+4+4,5}{3}$	4,5	$NSF = \frac{5+5}{2}$	5	$NSF = \frac{5}{1}$	5	$NSF = \frac{5}{1}$	5
FP/00002	Core Factor	$NCF = \frac{ENGI}{2Ic}$	$NCF = \frac{4+3}{2} = 3,5$	$NCF = \frac{3}{1}$	3	$NCF = \frac{4}{1}$	4	$NCF = \frac{4+4}{2}$	4	$NCF = \frac{4}{1}$	4
FP/00002	Secondary Factor	$NSF = \frac{ENSI}{2Ic}$	$NSF = \frac{4,5}{1}$	$NSF = \frac{2+5+5}{3}$	4	$NSF = \frac{4,5+4,5}{2}$	4,5	$NSF = \frac{4,5}{1}$	4,5	$NSF = \frac{5}{1}$	5
FP/00003	Core Factor	$NCF = \frac{ENGI}{2Ic}$	$NCF = \frac{4+2}{2} = 3$	$NCF = \frac{4}{1}$	4	$NCF = \frac{3}{1}$	3	$NCF = \frac{4+2}{2}$	3	$NCF = \frac{5}{1}$	5
FP/00003	Secondary Factor	$NSF = \frac{ENSI}{2Ic}$	$NSF = \frac{5}{1}$	$NSF = \frac{1+2+4,5}{3}$	2,5	$NSF = \frac{4+3}{2}$	3,5	$NSF = \frac{5}{1}$	5	$NSF = \frac{5}{1}$	5

After being calculated and grouped, the next process is calculating the total value of each aspect, then ranking from highest to lowest value. As seen in table 10.

Table 10. Calculation of total value for all aspects

Kode Pelamar	Administrasi	Temprament test
	Perhitungan	Perhitungan
FP/00001	$Ni = (60\% \times 4,5) + (40\% \times 4,5) = 4,5$	$Ni = (60\% \times 4) + (40\% \times 4,5) = 4,2$
FP/00002	$Ni = (60\% \times 3,5) + (40\% \times 4,5) = 3,9$	$Ni = (60\% \times 3) + (40\% \times 4) = 3,4$
FP/00003	$Ni = (60\% \times 3) + (40\% \times 5) = 3,8$	$Ni = (60\% \times 4) + (40\% \times 2,5) = 3,4$

Interview test	Skill test	Interview 2
Perhitungan	Perhitungan	Perhitungan
$Ni = (60\% \times 5) + (40\% \times 5) = 5$	$Ni = (60\% \times 4) + (40\% \times 5) = 4,4$	$Ni = (60\% \times 5) + (40\% \times 5) = 5$
$Ni = (60\% \times 4) + (40\% \times 4,5) = 4,2$	$Ni = (60\% \times 4) + (40\% \times 4,5) = 4,2$	$Ni = (60\% \times 4) + (40\% \times 5) = 4,4$
$Ni = (60\% \times 3) + (40\% \times 5) = 3,8$	$Ni = (60\% \times 3) + (40\% \times 3,5) = 3,2$	$Ni = (60\% \times 5) + (40\% \times 5) = 5$

Table 11. Ranking calculation

Kode Pelamar	Nama	Perhitungan Ranking	Peringkat
FP/00001	Budi Adrian	$= (3,54\% \times 4,5) + (4,81\% \times 4,2) + (55,52\% \times 4,4) + (13,73\% \times 5) + (22,40\% \times 5)$	1
		$= 0,1593 + 0,2020 + 2,4429 + 0,6865 + 1,12$	
		$= 4,6107$	
FP/00002	Ahmad Cahyanto	$= (3,54\% \times 3,9) + (4,81\% \times 3,4) + (55,52\% \times 4,2) + (13,73\% \times 4,2) + (22,40\% \times 4,4)$	2
		$= 0,1381 + 0,1635 + 2,3318 + 0,5766 + 0,9856$	
		$= 4,1957$	
FP/00003	Sri Wahyuni	$= (3,54\% \times 3,8) + (4,81\% \times 3,4) + (55,52\% \times 3,2) + (13,73\% \times 3,8) + (22,40\% \times 5)$	3
		$= 0,1345 + 0,1635 + 1,7766 + 0,5217 + 1,12$	
		$= 3,7164$	

In the case of recruiting new employees at PT DigiKidz Indonesia. The results showed that the applicant with the code FP/00001 in the name of Budi Adrian received the highest ranking compared to other applicants with a score of 4.6107. The author also created an application prototype display which can be seen in pictures 1 and 2.

3.10 Design Application

In the case of recruiting new employees at PT DigiKidz Indonesia. The results showed that the applicant with the code FP/00001 in the name of Budi Adrian received the highest ranking compared to other applicants with a score of 4.6107. The author also created an application prototype display which can be seen in pictures 1 and 2.

Fig 1. Main menu layer display and criteria comparison



Fig 2. Comparison matrix and Eigenvector screen display

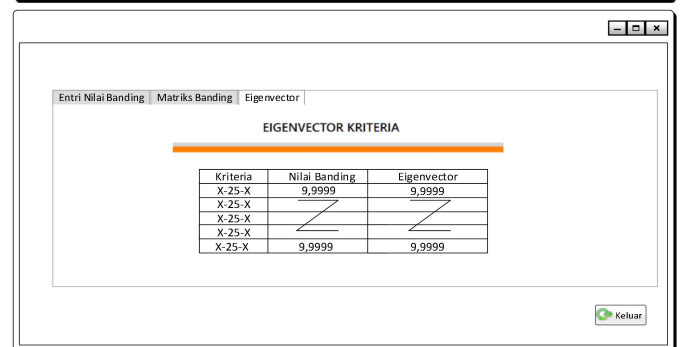
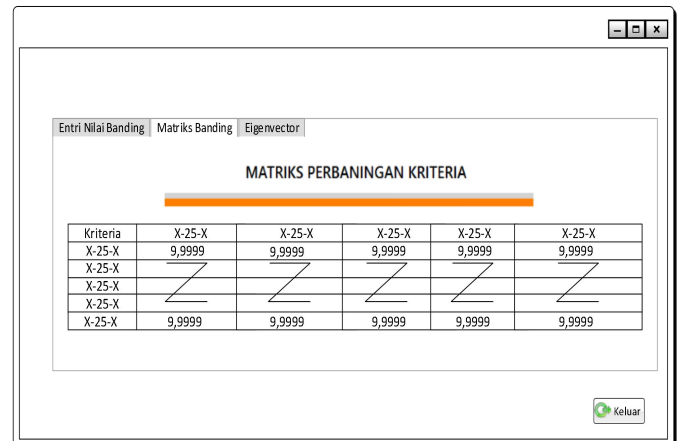


Fig 3. Screen display of profile matching calculations and applicant ranking reports

No	Kode FP	Nama Pelamar	Nilai Pelamar	Gap	Bebot
< < < < < <	< < < < < <	< < < < < <	X-2-X	< < < < < <	< < < < < <
< < < < < <	< < < < < <	< < < < < <	X-2-X	< < < < < <	< < < < < <

Ranking	Nama Pelamar	No. Telp	Email	Nilai	Keputusan
99	x-35-x	x-12-x	x-30-x	9.9999	X-20-x
99	x-35-x	x-12-x	x-30-x	9.9999	X-20-x

IV. CONCLUSIONS

Based on research conducted at PT Digikidz Indonesia, regarding the decision support system for recruiting new employees, it can be concluded:

- a. The system uses the AHP method to determine weights and Profile Matching as a process for determining applicants who pass the selection, which can reduce subjectivity and produce ranking reports in the form of graphs that can help decision makers in making decisions.
- b. The system can speed up the administration stage process carried out by the HRD department, because the process of data collection, calculation and printing of result values is in one system, in accordance with predetermined terms and criteria

- c. The comparison assessment of criteria weights at PT Digikidz Indonesia was declared consistent with a CR of no more than 0.10, namely 0.070176.
- d. Based on the results of a case study in the recruitment of new employees in February 2023 at PT Digikidz Indonesia for the position of teacher, it was found that the applicant with the code FP/00001 named Budi Adrian received the highest ranking with a score of 4.6107 compared to other applicants.
- e. In order to support research, the author suggests that in future research it is hoped that this decision support system will be web-based because it can be more easily accessed by decision makers, and try other methods.

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