



HOTEL EMPLOYEE ACCEPTANCE ASSESSMENT SYSTEM WITH ANDROID-BASED MOORA METHOD

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Abstract

Hotel is a company engaged in the field of services, which requires employees who have competencies in accordance with their fields. At present the existing employees are deemed to lack competency in accordance with their field of work. In order for employees to have competence according to their field of work, the hotel must carry out an acceptance assessment that requires certain criteria, such as education, foreign language acquisition, discipline, experience and others. One of the appropriate decision making methods for evaluating acceptance is the MOORA (Multi Objective Optimization on the basis of Ratio Analysis) method which is a multi-objective system that optimizes two or more conflicting criteria. The MOORA method has a degree of flexibility and ease of understanding in separating the subjective parts of an evaluation process into criteria, by determining the weights and attributes as decision making, the form of decision matrices and ranking. The criteria used in this study are height, experience, discipline, interviews, written tests, foreign languages, friendly, computer, software and medical checkups. To facilitate the assessment of acceptance, this system is applied based on Android, so that in addition to the hotel, prospective employees can also find out the results of the assessment. Based on the implementation of the system application, the use of the MOORA method for the hotel employee acceptance evaluation system can produce the right decision system, in accordance with the predetermined ranking, criteria and weight of the assessment.

1. Introduction

Every person is facilitated by the development of information and communication technology at this time, both to carry out communication, find every important activity, and play music or watch videos on a mobile phone. The use of mobile phone Technology, will make it easier for someone to get information about job vacancies desired, where information can be obtained through electronic print media, such as newspapers, magazines,

brochures or information from social media. Employee acceptance and assessment, as in other aspects of business today, depends on speed and accuracy. The more applicants who meet the requirements according to the existing field of work, the leadership needs to find ways to determine the application quickly, accurately in selecting the best candidates [1]. This can be seen and assessed from the criteria set by the company for the process of receiving prospective employees, which of course differs according to the job function

required [2]. The number of applicants who submit job applications in accordance with the vacancies that have been spread by the Hotel, it must be assessed by each applicant, which requires a long time and thoroughness. This is because the assessment is still done manually in the form of answers on a sheet of paper and sums up all values adjusted to the specified criteria. Another problem is the lack of acceptance in accordance with competencies and occupations, which is caused by the inaccuracy of the assessment system used for the acceptance of its employees. Based on this, a solution is needed to overcome this, namely the use of an appropriate application system to be able to assess employee acceptance according to the expected competency requirements based on predetermined criteria and weights. One of the appropriate methods to overcome this problem is the MOORA (Multi-Objective Optimization on the basis of Ratio Analysis) method, as a method for providing priority recommendations for receiving employees needed by the company [3]. The advantage of using the MOORA method is that it has a good degree of flexibility and selectivity because it can determine the objectives of conflicting criteria that are more accurate and precise in helping decision making for each individual [4]. However, there are many potential individual differences such as personality traits and cognitive abilities that can predict employee acceptance assessment results [5].

previous research conducted by [6], that the MOORA (Multi Objective Optimization on the basis of Ratio Analysis) Method was first proposed by Brauers and Zavadkas by considering useful and not useful goals (criteria) for determining rankings or selecting one or more alternative to the set of options available. Decisions made can be effective and better. The use of the MOORA method can be used as part of a decision support system that contains simple calculations and only requires some physical

data from the field. This study discusses the analysis for selecting teaching assistants who work in laboratory computers based on several assessment criteria [7]. Then [8] states the growth and development of a company depends on its ability to recruit and choose high-quality personnel at all levels in each section by conducting a proper acceptance assessment. Next the employee acceptance assessment starts with a clear statement of the company's objectives based on the type of knowledge, skills, abilities and other characteristics.

From the research that has been done more focused on the use of the MOORA method as an analysis to help decision-making related to acceptance, employee evaluations based only on criteria, and the absence of the use of applications for their implementation. This research discusses the assessment of employee acceptance using the Android-based MOORA method. The final result of this study is an application system for hotel employee acceptance evaluation with the Android-based MOORA method. The use of this system application can assist hotel management in determining employee recruitment in accordance with the requirements, attributes and weights and competencies that are appropriate in their fields more effectively, according to the ranking by the system.

2. Research method

The research method used in the study of hotel employee recruitment assessment systems using the Android-based MOORA method, was carried out through several stages. The stages of the study are explained in the form of data collection, MOORA methods, system analysis and design, system implementation and conclusions. Research stages, can be seen in Figure 1.

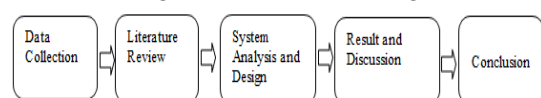


Figure 1. Stages of research methods

Data collection in conducting this research was carried out using several methods:

1. Observation, were made at the Fox Harris Hotel Pekanbaru City branch located on Jalan Riau No.147, Kampung Baru, Senapelan District, Pekanbaru City, Riau Postal Code 28154.
2. Interviews, interviews are conducted to get data that suits the needs of the system. The interview was made to ask a number of questions related to the employee recruitment assessment system, the system used, job vacancy criteria, other terms and conditions. Interviews were conducted with five applicants and HRD Hotel Manager.

3. Litareture Review

Literature review is conducted to obtain appropriate data and information as a reference in conducting research. The literature review used in conducting this research includes the following:

1. Assessment system, Every company (organization) will always focus on the employee appraisal process, at the beginning of the reception and on the work process in progress. The assessment is based on a number of criteria and prepared questions [9]. Assessment can be for your self, the assessment of the company and the assessment of colleagues. A good appraisal system provides accurate results and will encourage companies to be more advanced and developed.
2. Employees, are vital resources for almost all companies, mainly because they represent a significant investment in terms of placement, recruitment, health services, bonuses and others [10]. The management of many companies develops their employees in several trainings as a form of long-term career development.
3. MOORA, is a multi-objective system that optimizes conflicting attributes

simultaneously. Namely, the criteria that are worth or benefit and which are not worth or cost. The MOORA method was first used by Brauers in 2004 and introduced in 2006 by Zavadkas and Brauers [11]. in the MOORA method is divided into several stages to carry out the process, until finally the maximum value is obtained.

The MOORA method has a degree of flexibility and ease to understand in separating the subjective parts of an evaluation process into decision weight criteria with several attributes of decision making [12]. This method has a good level of selectivity because it can determine the objectives of conflicting criteria. The steps to solve the problem using the MOORA method as follows

1. Determine the normalization matrix, representing all the information available for each attribute in the form of a decision matrix, using the formula:

$$X = \begin{bmatrix} X_{11} & X_{1i} & X_{1n} \\ X_{j1} & X_{ij} & X_{jn} \\ X_{m1} & X_{mi} & X_{mn} \end{bmatrix} \quad (1)$$

explanation :

- a. X_{ij} : Alternative response j to criterion i
- b. $i: 1,2,3, \dots n$ is the order number of the attribute or criterion
- c. $j: 1,2,3, \dots n$ are alternative sequence numbers
- x: Decision matrix

the next step,

2. Normalize the X matrix using the formula

$$X_{ij}^* = \frac{x_{ij}}{\sqrt{\sum_{i=1}^m x_{ij}^2}} \quad (2)$$

explanation:

- a. X_{ij} : Alternative matrix j in criterion i
- b. $i: 1,2,3, \dots n$ is the order number of the attribute or criterion
- c. $a: 1,2,3, \dots n$ is an alternative sequence number
- d. $X_{ij}^* \wedge *$: Alternative normalization matrix j in criterion i

the next step,

3. Optimizing Attributes

For Multi objective optimization, the normalized measure is added in the case of maximization (for the beneficial attribute) and subtracted by the minimization case (for the unfavorable attribute), by formula

$$y_j^* = \sum_{i=1}^{i=g} X_{ij}^* - \sum_{i=g+1}^{i=n} X_{ij}^* \quad (3)$$

Explanation:

- a. i: 1,2,3, ... n is the order number of attributes or criteria with maximized status
- b. j: g + 1, g + 2, g + 3, ... n are attributes or criteria with minimized status
- c. y_j^* : Alternative max-min Normalization Matrix j

Where g is the number of attributes to be maximized, (n-g) is the number of attributes that will be minimized and y_i is the normalized value of alternative 1 for all attributes. When the weight attribute is considered, equation 3 becomes as follows.

$$Y_i = \sum_{j=1}^g W_j X_{ij}^* - \sum_{j=g+1}^n W_j X_{ij}^* \quad (4)$$

Explanation:

- a. i: 1,2,3, ... n is the order number of attributes or criteria with maximized status
- b. W_j : Weight of alternatives
- c. j: g + 1, g + 2, g + 3, ... n are attributes or criteria with minimized status
- d. y_j^* : Alternative max-min normalization matrix j for all attributes

next to Rank Y, where Y_i values can be positive or negative depending on the maximum and minimum totals in the decision matrix. The ranking order and Y_i indicate last resort. The best alternative has a high Y_i value, while the bad alternative has a low value.

4. Android, is a mobile device that is currently used more than desktops / PCs, with around 72% of all computer device owners in Indonesia using mobile devices. Mobile device applications with the Android operating system can facilitate the transfer of interactive and practical information anywhere and anytime [13]. This

research application uses Android studio for IDE (Integrated Development Environment) official for Android application development and is open source or free. Since then, Android Studio has replaced Eclipse as the official IDE for developing Android applications

5. Unified Modeling Language (UML), is a diagram of interaction very relevant in system design activities as the interaction between the various components involved. The steps of using UML diagrams by explaining the behavior or structure either statically or dynamically by using several diagram models, such as use case diagrams, activity diagrams, sequent diagrams, class diagram and others [14].

4. System Analisis and Design

4.1 System Application

The description proposed by the admin can do the data processing of new job input data or see applicants who register the vacancy. Applicants can also see detailed information from the vacancy information and requirements that have been inputted or determined by the admin. In this application, the system will send data and then the data will be converted into JSON (Java Script Object Notation) form before the data is sent to the server and stored in a database. To get data from the database data requested by the application will first be converted into JSON and then converted into data that can be read by android. The following picture of the system to be proposed can be seen in Figure 2

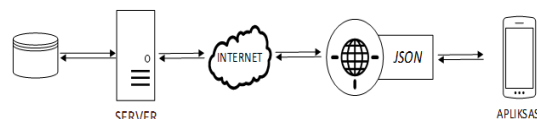


Figure 2. The proposed application system

The application system is complemented by the MOORA method that will assist the HRD in ranking ranking based on the

criteria and weight of the results of the calculation of the assessment carried out, as a recommendation to HRD in making decisions or determining suitable candidates for employment.

4.2 Assessment criteria

In applying the MOORA method for recommendations on evaluating employee acceptance, there are several things that need to be done beforehand, namely:

1. Identification of criteria

in this study there are 10 criteria that will be used for the calculation of assessment, namely: C₁=Height, C₂ = Diving, C₃ = Friendly, C₄ = Discipline, C₅ = Medical Check, T₁ = Written test, T₂ = Interview, T₃ = Interview Software, T₄ = Foreign Language, T₅ = Computer

Here are the criteria for the criteria and their weights:

Table 1. Criteria (C₁) High

Range	Value weight
161 - 162	2
163 – 164	3
> 165	4

Table 2. Criteria (C₂) Experience

Range	Value weight
< 1 year	1
2 year – 3 year	2
4 year – 5 year	3
> 6 year	4

Table 3. Criteria (C₄) Dicipline

Range	Value weight
very good	4
well	3
enough	2
less	1

Table 4. Criteria (C₅) Medical Checkup

Range	Value weight
Very good	4
Well	3
Enought	2
Less	1

Table 5. Criteria (T₁) Written

Range	Value weight
Very good	4
Well	3
enought	2

Table 6. Criteria (T₂) Interview

Range	Value weight
very good	4
well	3
Enought	2

for the next table, with the criteria T₃, T₄ and T₅ have the same weight as Table 6.

2. Determine the criteria weights, which are divided into two stages:

Table 7. Determine stage one

Code	Criteria	Value weight
C ₁	High	0,15
C ₂	Experience	0,2
C ₃	Friendly	0,3
C ₄	Dicipline	0,2
C ₅	Medical Check-up	0,15

Table 8. Determine stage two

Code	Test	Value weight
T ₁	Written	0,15
T ₂	Interview	0,3
T ₃	Software	0,15
T ₄	Foreign language	0,2
T ₅	Computer	0,2

3. Steps to use the MOORA method: provide alternative value criteria for stage one.

Table 9. Value of stage one criteria based on weight

Alternative	C ₁	C ₂	C ₃	C ₄	C ₅
A1	1	3	3	2	4
A2	4	1	2	3	1
A3	2	3	2	2	4
A4	3	4	1	2	2
A5	2	3	1	1	4

Table 10. Value of stage two criteria based on weight

Alternative	T ₁	T ₂	T ₃	T ₄	T ₅
A1	2	2	3	1	1
A2	2	1	2	2	2
A3	4	2	2	3	2
A4	1	2	4	2	4
A5	1	4	1	3	2

4. Calculation process for stage one criteria. The following are the calculation steps to find alternatives to the criteria for stage one

4.1 Make a decision matrix

Table 11. Matrix decision stage one

Rifa (A1)	1	3	3	2	4
Ilham (A2)	4	1	2	3	1
Anto (A3)	2	3	2	2	4
Dewi (A4)	3	4	1	2	2
Ana (A5)	2	3	1	1	4

4.2 Determine the normalization value for each criterion from each alternative and make it a normalization matrix.

$$C_1 = \sqrt{1^2 + 4^2 + 2^2 + 3^2 + 2^2}$$

$$C_1 = 5,83$$

$$A_{11} = 1/5,83 = 0,17$$

$$A_{21} = 4/5,83 = 0,69$$

$$A_{31} = 2/5,83 = 0,34$$

$$A_{41} = 3/5,83 = 0,51$$

$$A_{51} = 2/5,83 = 0,34$$

$$C_2 = \sqrt{3^2 + 1^2 + 3^2 + 4 + 3^2}$$

$$C_2 = 6,63$$

$$A_{12} = 3/6,63 = 0,45$$

$$A_{22} = 1/6,63 = 0,15$$

$$A_{32} = 3/6,63 = 0,45$$

$$A_{42} = 4/6,63 = 0,6$$

$$A_{52} = 3/6,63 = 0,45$$

$$C_3 = \sqrt{3^2 + 2^2 + 2^2 + 1^2 + 1^2}$$

$$C_3 = 4,36$$

$$A_{13} = 3/4,36 = 0,62$$

$$A_{23} = 2/4,36 = 0,46$$

$$A_{33} = 2/4,36 = 0,46$$

$$A_{43} = 1/4,36 = 0,31$$

$$A_{53} = 1/4,36 = 0,31$$

$$C_4 = \sqrt{2^2 + 3^2 + 2^2 + 2^2 + 1^2}$$

$$C_4 = 4,69$$

$$A_{14} = 2/4,69 = 0,43$$

$$A_{24} = 3/4,69 = 0,64$$

$$A_{34} = 2/4,69 = 0,44$$

$$A_{44} = 2/4,69 = 0,44$$

$$A_{54} = 1/4,69 = 0,21$$

$$C_5 = \sqrt{4^2 + 1^2 + 4^2 + 2^2 + 4}$$

$$C_5 = 7,28$$

$$A_{15} = 4/7,28 = 0,55$$

$$A_{25} = 1/7,28 = 0,14$$

$$A_{35} = 4/7,28 = 0,55$$

$$A_{45} = 2/7,28 = 0,27$$

$$A_{55} = 4/7,28 = 0,55.$$

4.3 Make a nominated matrix

Table 12. Matrix nominated

0,17	0,45	0,69	0,43	0,55
0,69	0,15	0,46	0,64	0,11
0,34	0,45	0,46	0,43	0,55
0,51	0,6	0,23	0,43	0,27
0,34	0,45	0,23	0,21	0,55

4.4 Calculating the normalized matrix

Table 13. Normalized matrix

0,17 x	0,45 x	0,69 x	0,43 x	0,55 x
0,15 =	0,2 =	0,3 =	0,2 =	0,15 =
0,0255	0,091	0,207	0,086	0,0825
0,69 x	0,15 x	0,46 x	0,64 x	0,11 x
0,15 =	0,2 =	0,3 =	0,2 =	0,15 =
0,1035	0,03	0,138	0,128	0,021
0,34 x	0,45 x	0,46 x	0,43 x	0,55 x
0,15 =	0,2 =	0,3 =	0,2 =	0,15 =
0,0051	0,091	0,138	0,086	0,0825
0,51 x	0,6 x	0,31 x	0,43 x	0,27 x
0,15 =	0,2 =	0,3 =	0,2 =	0,15 =
0,081	0,121	0,069	0,086	0,0405
0,34 x	0,45 x	0,31 x	0,21 x	0,55 x
0,15 =	0,2 =	0,3 =	0,2 =	0,15 =
0,051	0,091	0,069	0,042	0,0825

4.5 Value Search Yi

Table 14. Value Yi

Code	Max (C ₁ +C ₂ +C ₃ +C ₄ +C ₅)	Yi = max- min	min
A1		0,491	0
A2		0,4205	0
A3		0,4475	0
A4		0,392	0
A5		0,3345	0

4.6 Ranking results

Table 15. Ranking result

Code	Yi	Rangking
A1	0,491	1
A2	0,4205	3
A3	0,4475	2
A4	0,392	4
A5	0,3345	5

The next stage is calculating the criteria for the second stage, where the process steps with stage one. From the second process stage, the results of ranking are obtained in Table 16.

Table 16. Rangking result, second stage

Code	Yi	Rangking
A1	0,308	4
A2	0,2885	5
A3	0,429	3
A4	0,4365	2
A5	0,4975	1

5. All Criteria Calculation Process

The last stage of the first stage criteria will be added to the second stage criteria, then look for the average value of the two stages. The results can be seen in the following Table 18.

Table 18. Final Results of the Assessment

Code	Process			Rangking
	A	B	C	
A1	0,491	0,308	0,799	4
A2	0,4205	0,2885	0,649	5
A3	0,4475	0,429	0,876	1
A4	0,392	0,4365	0,828	3
A5	0,3345	0,4975	0,832	2

From the calculation process carried out by the MOORA method, it is found that the prospective employee who gets the highest score is A3 named Anto.

4.3 System Design

The system application design using UML modelling, is a standardized software design model that uses object-oriented programming techniques. UML modeling includes Use case diagrams and Activity diagrams.

3.1. Use Case Diagrams

Use case diagram is a system behavior in response to an action or request from outside the system. The following is the use case diagram modeling in the application system.

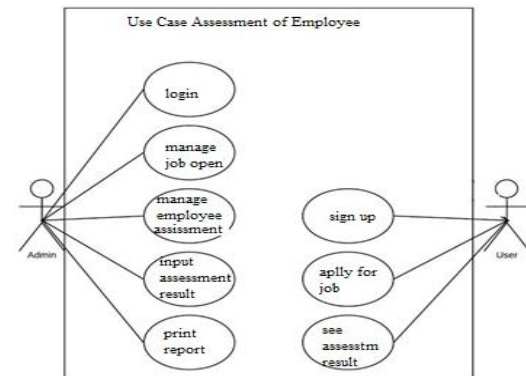


Figure 3. Use case diagram

3.2 Activity Diagram

Activity diagram illustrates how the activities that occur on a system designed. Activity diagrams on the application system are as follows:

- a. Activity Diagram of the Prospective Employee Value process. This activity illustrates the activity of the admin in carrying out management starting from the calculation value of the MOORA method for each prospective employee who submits a job application. The description of the activity diagram can be seen in Figure 4 as follows:

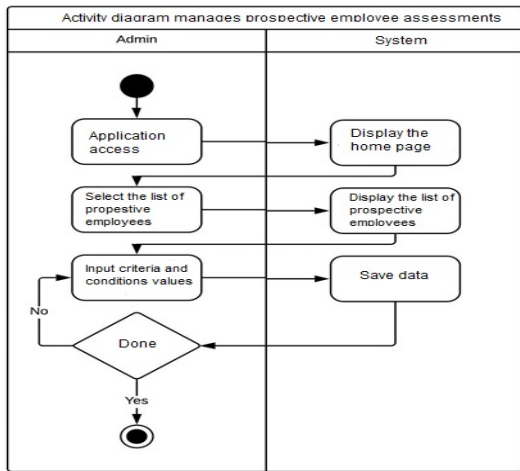


Figure 4. Activity diagram of employee value
 b. Activity Input Diagram of Selection Results. This activity describes the admin's activities in carrying out activities to include the assessment of the results of exams conducted. The activity diagram can be seen in Figure 5 as follows:

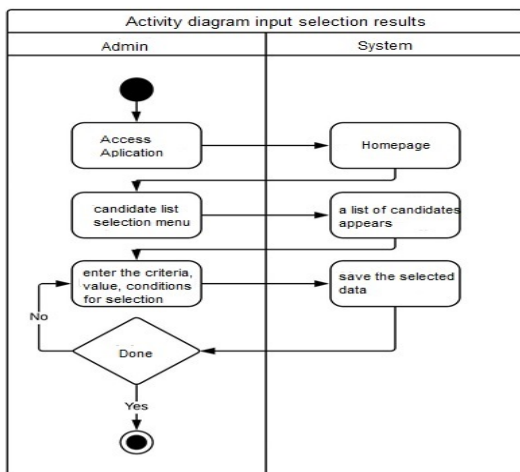


Figure 5. Activity diagram entering the results of the selection

3.3 Interface design

Interface design is the design of the interface of an application that focuses on system users when using the application. There are two stages in interface design, namely input and output design. input design is a display that users use to interface with the application system.

a. Input design

For the input design is the beginning of the user process with the system in the

form of data input into the system, which can be seen in Figure 6 below:

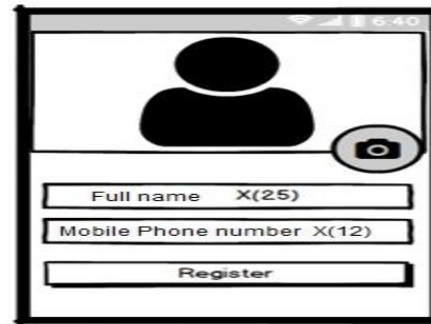


Figure 6. Design of mobile telephone numbers

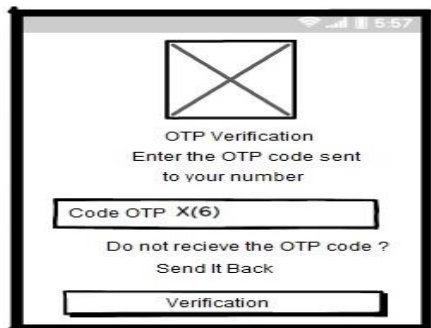


Figure 7. Design verification of OTP receipt

The system design of Figure 7, functions to enter the applicant's cellular telephone number in order to receive the OTP code. The following will be a user verification process to be able to use the application system.

Next design the user page display to enter a job application. The page is already equipped with an existing job position, and the user simply presses the job application button now, then the user will be saved as a job applicant on the form. Application system design as follows:



Figure 8. Design the position of selected workers

Next is Design an input system for employee acceptance value. The design of this interface is based on predetermined criteria and weighting. Enter the value of prospective employees through the selection stage conducted by HRD management. The details can be seen in Figure 9 below:



Figure 9. Design assessment input

b. Output design

Output design is a place to display data from input design. In the draft output can provide a report, how the input has been given. The output design of the employee assessment system can be seen in the following design:

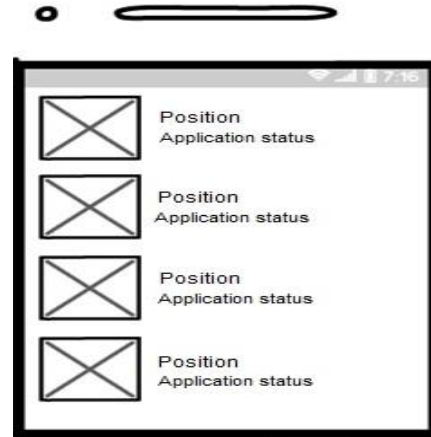


Figure 10. Design of main page application system output

Design output of the recapitulation results of the employee appraisal system, displaying reports by month or year adjusted to HRD management requirements. This report provides information on the assessment results obtained by each applicant who has submitted their application. The report also comes with a cell phone number, applicant's name and job position, according to the part that was wanted at the time the application was registered. In more detail the output design for the recapitulation report, can be seen in Figure 11 below:

Applicant data report on month X() year g(r)
 Fox Harris Hotel Pekanbaru
 Jl. Riau No.147, Kp. Baru, Kec. Senapelan, Pekanbaru city, Riau 28154

No.	No HP	Employee name	Rating result	Position
q(5)	X(12)	X()	X(10)	X(35)
q(5)	X(12)	X()	X(10)	X(35)

Pekanbaru, 9-X()-9999
 Administrator
 Nama Admin X(32)

Figure 11. Design output report recapitulation report system results

5. Result and Discussion

The results of the implementation of system software is the process of implementing new software, then this new software will be operated in its entirety, in accordance with the analysis and design of the system. The results of implementing the input interface design are as follows:

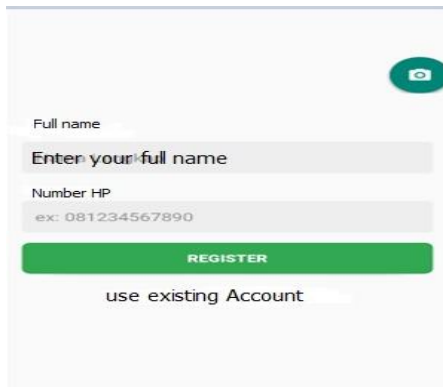


Figure 12. New user account employees
 After registration by the user, in order to enter the OTP code that has been received by the employee as verification process for the application system user. OTP code display results as shown in Figure 13 below:



Figure 13. Verification display results for OTP code

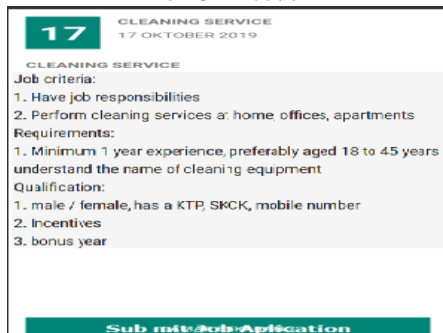


Figure 14. Display results of applying for employee jobs

Figure 14 is the results of the user page display to apply for the selected job. Users only submit applications now, then the user's data as applicants who follow the assessment will be stored in the database automatically.

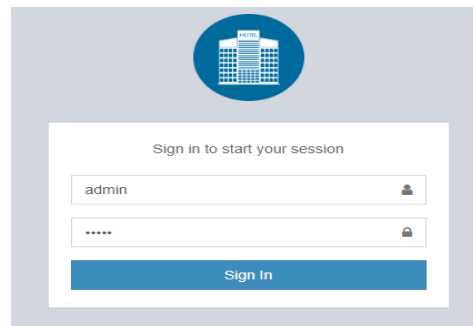


Figure 15. Admin login results

To run the application system and make adjustments and enter assessment criteria, the admin must first login to enter the user name and password, to validate before displaying the main page of the employee value application system. The results of the admin login in Figure 15 above.

Next is the implementation of employee assessment given by HRD Hotel Management. In the system view, the admin application provides an evaluation in accordance with the requirements and then automatically stored in the database. Display the application system can be seen in Figure 16. Below:

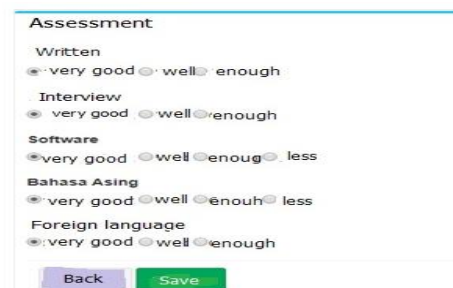


Figure 16. Display stages of employee value



Figure 17. Display the main page of the application system

Figure 17. Above is the display of the main page of the application system for evaluating employee recipients, will first be displayed to the application system user after logging into the system. The figure representing numbers 17, 18 and 25 is a list of usernames that have already submitted employee applications. This interface makes it easy to find out what areas of work there are and the conditions that need to be determined by HRD Management. This display also makes it easier for prospective employees to submit application files to HRD management.

To see the final results of the value that has been done, the implementation of the interface Figure 18. Interface display system employee values can be seen directly by the user of the system, in addition to HRD Management. Display on the system will provide information about the value that has been done, so prospective employees can know whether received or failed. More detailed display of the interface can be seen in Figure 18 below:

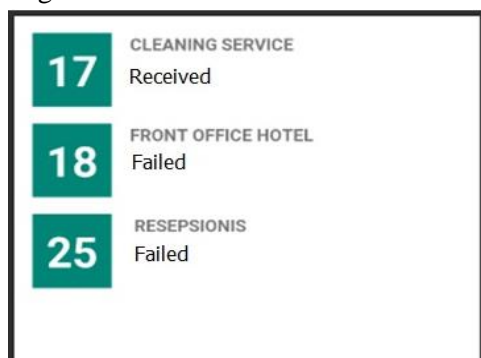


Figure 18. Interface of the final display employee application system

From this view, the application system looks at employees received with code 17 in the cleaning service field. While the front office and reception rates failed.

Next, the application system interface results are for report display. This report displays the names of employees received and failed on the basis of priority values generated, according to the position the application has been submit, as in Figure 19 below:

Applicant Data Report for September 2019
 Fox Harris Hotel Pekanbaru
 Jl. Riau No.147, Kp. Baru, Kec. Senapelan, Pekanbaru City , Riau 28154

No	No. HP	Employee name	Rating result	Position
1	08126111883	Anto	0,8765	Cleaning Service
2	081346749337	Iham	0,6492	Front Office Hotel

Pekanbaru, 18 September 2019
 Administrator

Figure 19. Report on employee acceptance assessment application system

6. Conclusion

From the implementation of the system application with the MOORA method that has been tested using Android system. Hotel employee acceptance assessment application and produce the right Decision Support System, in accordance with predetermined grades and ratings, criteria, weights and assessments for the field of service cleaning jobs.

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