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Application of Exponential Comparison Method in Designing Decision Support Systems For Performance and Promotions Assessment in Banking Industry

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Abstract

This research aims to find out how to design a decision support system for evaluating employee performance as a promotion. Data collection in this research used observation, interviews, and a literature study. The population in this study were employees. Rapid Application Development (RAD) is the system development method that the author used to create this application. The tools that the author uses in system design are UML (Unified Model Language) diagrams to show the process and data flow to be designed; Adobe Dreamweaver CS6 is used to design applications; Wamp Server is used as a webserver; and Diaportable is used to illustrate UML diagrams. Based on the results of the discussion, the following were obtained: The decision support system with MPE analysis (Exponential Comparison Method) aims to find employees who are worthy of promotion. The assessment system consists of seven, including education, work performance, discipline, communicativeness, cooperation, reasoning, encouragement of achievement, and responsibility for self-assessment, which are carried out by HRD staff and supervisors, while the HRD manager is only responsible for the decision-making process. The results of this research are in the form of graphs and accumulated MPE assessments, which show the ranking order of each candidate employee.

Keywords: Decision Support System, Rapid Application Development, Unified Modeling Language, Hrd, Performance.

1. Introduction

In the current era of globalization, there are increasingly more opportunities and challenges for an organization or company to be able to achieve its goals [1]. One of the most important factors for achieving a company's goals is the role of high-quality and high-performance human resources (HR), which plays a very important role in the company achieving its goals, so companies need to know and evaluate how big [2]. The potential of human resources (HR) continue to strive to improve the quality of human resources (HR), which can be measured from employee performance assessments based on previous data. In companies or agencies that have a large number of employees, the employee performance evaluation (assessment) process is carried out relatively often, so companies need standard procedures in determining the requirements for an employee to get a promotion to occupy the promoted position [3]. Assessment in employee evaluation includes many aspects. For example, assessment is not only concentrated on employee productivity but is related to tasks with an assessment of discipline, skills, ability to work, and so on [4]. Through evaluating employee performance assessments, leaders will obtain information about the quality and commitment of employees, and the quality of employees who are always evaluated periodically makes it possible to provide input in employee development programs [5]. In terms of employee performance appraisal, each employee must be informed about the results of their work appraisal, in terms of good, average, or poor [6]. Employees will be encouraged to behave well, improve, and eliminate substandard performance [7].

Several problems that often occur in banking, namely in the process of evaluating (assessing) employee performance for promotion, include the difficulty of HRD managers in determining the best employees if there are employees who have the same potential to get a promotion, even if there are employees who immediately get promotion for promotion by looking at one criterion even though it is not certain that the employee will excel in the next criteria [8]. Currently, the assessment process is still computerized using MS Excel and is not yet integrated between HR managers, HR staff, and supervisors [9]. If this decision-making process is assisted by a computerized and integrated decision support system between HRD managers, HRD staff, and supervisors, it is hoped that

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difficulties in decision-making can be reduced and can provide an alternative solution for HRD (human resources development) managers in deciding which employees are worthy [10]. get a promotion. Based on the problems in assessing employee performance, to overcome problems that often occur, use MPE analysis (the exponential comparison method). Employee performance can be evaluated using the exponential comparison approach, or MPE analysis. Selected employees will be promoted based on this method's ability to rank decision alternatives according to a variety of criteria [11]. Therefore, the exponential comparison method, or MPE, can be used as a solution to this problem in order to use this method as an evaluation tool for employee performance assessments [12]. Later on, the staff of HRD (human resources development) will receive the results of these assessments, which will aid HRD (human resources development) managers in making decisions regarding promotions [13].
A system, in general, is a collection of elements that interact to achieve a certain goal as a single unit. According to information systems theory, a system is "a group of components that are interconnected, work together, and achieve a common goal by receiving input processes and producing input in an orderly transformation process." As a result, it is possible to define a system as any process or component that is coupled to other elements. An input, a process, and an output are all part of a system to help it reach its objectives [14]. A helpful fact or form that may be applied to the process of making business decisions is called information [15]. A human, technological, and procedural component working together to process, store, analyze, and distribute information in order to accomplish objectives is called an information system [16]. Organizational managers are familiar with decision support systems, or DSSs for short. They are a class of application system. Decision support systems, or DSSs, are made to help managers make decisions and can enhance both the process and the caliber of decisions made [17]. Taking or making a decision is a process that people carry out based on the knowledge and information available to them at that time in the hope that something will happen. Decisions can be taken as alternatives to existing decisions [18]. These alternative decisions can be made with information that is processed and presented with the support of a decision support system. Information is formed from data consisting of numbers that are arranged, processed, and presented [19].
The exponential comparison method, or MPE, is a technique for ranking decision alternatives according to certain criteria. Using a well-defined design-and-build model from the process stage is how this technique helps individuals make decisions [20]. There are several steps involved in using the exponential comparison method: gathering the alternatives to be chosen for the decision, identifying the criteria or comparison of criteria that are significant to assess, assessing the relative importance of each criterion or consideration of criteria, assessing each alternative in relation to each criterion, computing the total value or score of each alternative, and establishing the decision priority order based on the total value or score of each alternative [21]. Every employee sees a promotion as crucial, to the point where it becomes a fantasy that they eagerly anticipate [22]. A promotion indicates that the employer has faith in the concerned employee's abilities and talents to hold a more senior role [23]. Therefore, employees who get promoted will have higher salary, authority, responsibility, and social prestige [24]. Employees will be motivated to work hard, be passionate, be disciplined, and perform well if there is a chance for them to advance based on fairness and objectivity [25]. This will help the organization reach its goals as best it can [26].

The wave of object-oriented analysis and design techniques that appeared in the late 1980s and early 1990s was introduced by UML (unified modeling language). Object modeling technique (OMT) developed by James Rumbaugh, object-oriented software engineering (OOSE) developed by Ivar Jacobson, and the Booch Method by Grady Booch were among the numerous object-oriented techniques in use at the time in industry [27]. The primary issue with system development at the time was the abundance of modeling approaches and techniques due to the lack of standards or uniformity, so there were limitations between projects and between members of the development team [28]. This makes communication difficult and leads to many errors in the project. This problem has led to efforts to find a standard modeling language that can be used in all situations throughout the world. One definition of UML (unified modeling language) is an image-based language used for software system specification, construction, and documentation [29] [30]. UML combines a number of previously developed techniques with notation [31]. This is meant to make design simpler and can be applied to large-scale models with a high degree of complexity, numerous teams, and dispersed components [32] [33]. UML's ultimate objective is to be as straightforward as feasible while still fulfilling the requirement to model the system that will be constructed [34] [35]. A method and software tools are part of the object-oriented approach to system development known as rapid application development [36]. The internet (international network) is the largest network in the world, where all networks in all organizations are connected to one large network so that they can communicate with each other.

2. Research Methods

Data collection in this research used observation, interviews, and a literature study. The population in this study were employees. The system development approach that the author employed to create this program was called rapid application development, or RAD. The author selected this approach because Rapid Application Development (RAD) is a technique for system development that prioritizes speed of development through significant user involvement in building, rapid iteration, and increasing the number of functional prototypes of a

system that eventually evolves into the final system. The tools that the author uses in system design are: UML (unified model language) diagrams to show the process and data flow to be designed; Adobe Dreamweaver CS6 is used to design applications; Wamp Server is used as a webserver; and Diaportable is used to illustrate UML diagrams. After that, the system development stages are carried out using the rapid application development (RAD) development method, which consists of the requirements planning stages, the design process (workshop design), and implementation for system modeling using the Unified Modeling Language (UML) tools. The first stage is requirements planning, namely the analysis of the running system and the analysis of system requirements. At this stage, the author meets with the HRD manager, the purpose of which is to find out the initialization and weaknesses in the running system, then analyze them and produce a picture of the system that will be built. The second stage is the design process (workshop design), namely modeling the design of the system to be built using use case diagrams, activity diagrams, sequence diagrams, and class diagrams. At this stage, namely the stage after planning the conditions where the researcher and the relevant HRD manager agree that the system to be built has been identified and has been described, the next step is designing the system to be built, namely the interface design process stage with the aim of the implementation stage, the system that will be produced according to what is intended by the user. The third stage of implementation is the stage of writing system program scripts that will be built in accordance with the system design produced at the design process stage. At this stage of producing the application, after the application is finished, system testing is carried out, namely in this research using black box testing to determine whether the application output is in accordance with the agreed system design. Then, finally, the author concludes the results.

3. Results and Discussion

Based on the results of observations and interviews conducted by the author with the users involved, the current system can be explained as follows: The HRD manager gives an order for employee performance evaluation for promotion to HRD staff and section heads. The department head provides data on potential employees. The HRD staff inputs data on employees who are nominated to receive promotions and makes a list of employee performance assessments consisting of several criteria, which will be given to the marketing and financing supervisor. Supervisors begin assessing employee candidates after one month. The assessment consists of several criteria consisting of achievement, communicativeness, reasoning, responsibility, and achievement drive, which are the company's standard standards. After one month's assessment and the previous values are added, the assessment results are given back. to HRD staff for evaluation. HRD staff receive employee performance assessments for one month, along with assessments while the employee is working, and then input them back into MS. Excel and add two assessment criteria consisting of education and discipline. After that, they are evaluated and look for candidates with greater results. After being evaluated, the HRD staff made a list of the names of the best employees to get promotions in the form of archives. The list of names of the best employees is immediately submitted to the HRD manager for a report in the form of an archive, after which the HRD manager immediately assigns the position that the employee deserves. From the problem identification, we can find several advantages and disadvantages in the existing running system. With that, the author proposes a proposed system that can develop and solve existing problems using rich pictures.

This employee performance assessment decision support system provides the following benefits: It makes it easier for HRD staff to input data on employees who will be promoted, makes it easier for HRD staff to assign value weights, and makes it easier for HRD staff to see the results of the assessment in the form of a report consisting of a list of assessment criteria for each employee, in the form of systematic MPE method calculation results, and in the form of systematic assessment charts. It makes it easier for supervisors to input employee performance values in the field for one month by adding previous values consisting of achievement, communicativeness, reasoning, responsibility, and achievement encouragement. It makes it easier for supervisors to input employee performance history for one month, which can be used as evidence and a reference in terms of giving assessment weights to each employee. Make it easier for HRD managers to determine which employees are worthy of promotion by looking at their highest score. It makes it easier for HRD managers to see the best employee data, and HRD managers can see graphs of the value of each employee. It makes it easier for admins to manage users, which functions to grant access rights to other users and can change active and inactive status for users.

From the results of the interview, the author received input on several things that need to be implemented in the banking program, including: It can make it easier for users if they want to add, delete, or update employee data. Can make the calculation process easier. Can facilitate and help in the decision process for employees who are worthy of promotion. Reports are easy to understand and can be saved as PDFs. After completing the analysis, the author can provide requirements, limitations, and program capabilities that can affect the company. The things that need to be considered include: The aim of developing this program is to make it easier to input data and output data, making it easier and less time-consuming. The targets for creating a decision support system program for employee performance assessment for promotions are as follows: Can save time from 2-3 days of the assessment and termination process to 1 day of the assessment and termination process for the best employees to get a

promoted position; be able to improve employee performance; be able to expedite the process of recording employee data; and be able to expedite the process of creating reports for HRD (human resource development) managers. Apart from the objectives in designing a decision support system program for employee performance assessment for promotion, it is also necessary to pay attention to the limitations in the function of the decision support system program being made, including: creating a decision support system program for employee performance assessment for promotion.

Financing and marketing based on plans that suit your wishes; The manage employee data section has a number of access rights, including: HRD staff can only input employee data; supervisors can only update employee data in the form of achievement history; HRD managers, HRD staff, and supervisors can view employee data; and HRD managers have access rights in determining user access rights. The employee performance assessment section using the exponential comparison method (MPE) consists of the results of the summary of values and calculation results of the exponential comparison method (MPE), which can help in the decision process and can help in showing employee rankings that have been calculated using the exponential comparison method (MPE); The report section consists of a list of the best employees who are worthy of promotion and a graph that clearly shows employee rankings. The program that the author created has the ability to work according to the design that the author has created. The capabilities of the program that the author created include: it can store employee data; it makes it easier to search for employee data; it is not difficult to use the program that the author created; it facilitates the calculation process and can assist in the decision support process for evaluating employee performance for promotion; it is able to add data, change data, and delete data if an error occurs in making a report.

There are seven criteria that are the basis for evaluating employee performance to obtain promotion: education, work performance discipline, communicativeness, reasoning, encouragement of achievement, and responsibility. The HRD (human resource development) manager gives a weight of five because for formal and non-formal education in terms of promotion, promotion is very necessary; the candidate must have at least a high school education and have skills. The more skills there are, the more opportunities there are for the employee to get a promotion. The HRD (human resource development) manager gives a weight of five because the level of work performance in promotions is very important. Someone who has work achievements in his field means he has proven that he is able to work in his field and he is able to provide benefits to the company, so candidates who have good work achievements can have a big chance of getting promotions. The HRD (human resource development) manager gives a weight of five because, for assessing employee performance, the level of discipline is an added value for candidates in getting promotions because employees who will get promotions must have a high level of discipline so that they can set a good example for their subordinates. The HRD (human resource development) manager gives a weight of four because communicative skills are important for employees. If the employee has high communicative skills, then the risk of misunderstanding between superiors and subordinates can be reduced or avoided, and if the employee has high communicative skills, then he has proven that he is able to provide ideas or thoughts verbally.

The HRD (human resource development) manager gives a weight of four because reasoning is the skill of understanding the core of a problem in depth from the existing symptoms, so if an employee is able to reason about a problem, then he is able to find a solution to solve the problem. So if a prospective candidate is able to reason about a problem, then he has the opportunity to gain a promotion. The HRD (human resource development) manager gives a weight of four because if an employee has a sense of responsibility, then he can show that he has a sense of thoroughness and care for the company. Therefore, if a prospective employee has a high level of responsibility, he or she has the opportunity to be nominated as a candidate. The HRD (human resource development) manager gives a weight of four because this drive for achievement must be possessed by all prospective candidates because with this drive for achievement, the employee can demonstrate the willingness and ability to achieve, as well as the ability to develop themselves.

In the use case diagram, there are 4 actors who can use the system: admin, HRD staff, supervisor, and HRD manager. The first actor is HRD staff, who, after logging in, are tasked with inputting employee data. Apart from inputting, HRD staff can delete and update employee data, and HRD staff are tasked with inputting positions, inputting criteria, and inputting departments. They are also tasked with giving weight to employee achievement assessments consisting of education and discipline. Apart from that, HRD staff can see the assessment results report, which has been produced systematically in the form of a data list of assessment criteria for each employee, graphs, and can be printed via PDF, after which the actor can log out to exit the system. The second actor is the supervisor, who, after logging in, is tasked with viewing employee data. After that, during the assessment, the supervisor enters the weight of the employee's performance value for one month, adding the previous values consisting of achievement, communicativeness, reasoning, responsibility, and achievement encouragement. In addition, the supervisor can see the assessment results report that has been produced systematically in the form of a data list of assessment criteria for each employee, graphs systematically, and can be printed via PDF. After that, the actor can log out to exit the system. The third actor is the HRD Manager, who, after logging in, can see employee data and delete all employee data, see the accumulated MPE calculations that have been produced

systematically, and see the assessment results report that has been produced systematically in the form of a data list of assessment criteria for each employee, graphs systematically, and can be printed via PDF. After that, the actor can log out to exit the system. The fourth actor is the admin, who, after logging in, has access rights to view employee data, view MPE values, and view reports, and the admin has access rights in determining user access rights.

Activity diagrams describe work flow, a sequence of activities in a process. This diagram is very similar to a flowchart because activity diagrams can model logical processes, business processes, and workflows. The main difference is that flowcharts are created to describe the workflow of a system, while activity diagrams are created to describe actor activities. Below is the activity diagram for each use case. The activity diagram below illustrates the actors who must first log into the system in order to access the system according to their access rights. The system displays a login page, and then the actor enters the username and password. If the username and password combination is correct, the system will display the main system page. However, if it is wrong, the system will display an error message, and the actor will be asked to enter the username and password again correctly. For more details, you can see the activity diagram. Administrators, HRD employees, supervisors, and HRD managers can use activity diagrams. This activity diagram describes how users' input, update, delete, and view. Each user has different access rights, such as HRD staff who have access rights to input, update, delete, and view employee data, while supervisors have access rights to view and update employee performance history data obtained from one month's field assessments, and HRD managers have access rights to view employee data and delete all employee data. The activity diagram below illustrates how the user inputs the weight of achievement scores for employees. This weighting is used to assist HRD (human resource development) staff in entering employee performance assessments, after which the data that has been input is immediately processed by calculations using the MPE method systematically. The results of the accumulated calculations and the highest-ranking scores can be directly seen by the user in the form of a report.

The activity diagram illustrates how the user inputs the performance value weights for employees. This weighting aids supervisors in entering employee performance reviews, and after that, calculations using the MPE method systematically process the data that has been input. The user can view a report that contains the results of the total calculations and the highest-ranking scores right away. The HRD manager views the MPE calculation results, which have been calculated systematically, and the user can immediately view the ranking of the employees who get the highest scores after already knowing which employees get the highest scores. The HRD manager can decide which employees are worthy of promotion. The admin inputs user data and updates user data, which functions to update positions and active/inactive status. Apart from that, manage user admin to grant access rights to users. Admin, HRD staff, supervisors, and HRD managers can see reports in the form of data lists of employee assessment criteria, graphs, and the accumulated MPE value of each employee so that users can find out which employees are worthy of promotion and HRD managers can feel helped in deciding which employees are eligible for promotion. Besides that, users can print or save reports in PDF form, which are used for documentation.

The sequential diagram shows the user's work sequence in order to enter the system. The first thing to do is enter your username and password. The system will validate the username and password. If the combination is correct, the system will display the main page. However, if it is wrong, the system will display an error message and the login process will fail. The sequence diagram of this employee data use case is the process carried out by admin, HRD staff, supervisors, and HRD managers. Each user has different access rights, such as HRD staff, who have access rights to input, update, delete, and view employee data, positions, and departments, while supervisors have access rights to view and update employee performance history data obtained from field assessments for one month, and admins and HRD managers have access rights to view employee data. The process by which HRD enters criteria and assessment weights is the criteria use case. These criteria are used as reference material in entering assessments based on company standards. Input of achievement value weights is a process that admin and HRD staff carry out in this value weight use case. This weighting is used to assist HRD (human resource development) staff in entering employee performance assessments, after which the data that has been input is immediately processed by calculations using the MPE method systematically.

The administrator and supervisor carry out the process of entering achievement value weights in this value weight use case. This weighting is used to assist supervisors in entering employee performance assessments, after which the data that has been input is immediately processed into calculations using the MPE method systematically. The HRD manager and admin are responsible for carrying out this MPE use case, and this sequence describes the HRD manager's procedure for viewing the MPE calculation results. The user can then immediately view the ranking of the employee who received the highest score. After already knowing which employee got the highest score, the HRD manager can decide which employees are worthy of promotion. This use case report is used by administrators, HRD staff, supervisors, and HRD managers to view reports in the form of data lists of employee assessment criteria, graphs, and the accumulated MPE value of each employee so that users can find out which employees are worthy of promotion and HRD managers can find it helpful in deciding which employees are worthy of promotion. Besides that, users can print reports in PDF form, which are used for documentation. The Sequence

A diagram of this user data use case is used by the administrator to provide access rights to users, and this user data is useful for providing active and inactive information to the access rights holder.
For the initial stages of creating a database, a design is needed. As a reference for creating a database, a class diagram is used. To create a class diagram, the first step is to identify potential objects. Not all candidates (nouns) describe business objects within the scope of the problem domain. By analyzing each candidate, it can be determined whether the candidate should be retained or deleted. From the list of potential objects, an analysis is then carried out to select the object. After the list of potential objects is selected and analyzed, an object is obtained that is proposed for a decision support system for promotion. HRD managers, HRD staff, supervisors, and administrators use this report design to view reports of employee assessment results for one month, graphs, employee list data, and accumulated MPE, and to determine which employees are deserving of promotion. The programming language used in the application of coding programs in the promotion decision support system for promotions is the PHP programming language, and the database used is MYSQL. Testing is carried out using a black-box testing approach. The black box testing method carries out testing without looking at the program source code and is run by the tester or user to observe whether the program has received input and processed it, and this test can determine whether the system can provide output as expected or not.

4. Conclusion

Based on the results of the discussion, it can be concluded that: the decision support system with MPE analysis (exponential comparison method) aims to get employees who are worthy of promotion; the assessment system consists of seven factors, including education, work performance, discipline, communicativeness, cooperation, reasoning, encouragement of achievement, and responsibility for self-assessment, which are carried out by HRD staff and supervisors, while the HRD manager is only responsible for the decision-making process. The results of this research are in the form of graphs and accumulated MPE assessments, which show the ranking order of each candidate employee. Based on the conclusions and analysis that have been put forward, several suggestions for further research are proposed, namely: This application only covers a few types of employee data; it would be better if this application covered all existing types of employee data. This application does not yet have user history events to view user activity. It would be better in the future for this application to have user history events.

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