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Application of The Simple Additive Weighting Method in Developing Employee Assessment Decision Support System in Marketplace Company Bukalapak

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Abstract

The purpose of this study is to investigate how managers, team leaders, and supervisors can evaluate top performers with the aid of simple additive weighting in decision support systems. In this study, interviews, observation, and related literature reviews were employed as data collection techniques. This system employs fuzzy simple additive weighted (FSAW) as its approach. Two techniques, AHP and WP, were used to develop the system. Rapid Application Development, or RAD, is the system development methodology employed in this study. The findings of the study led to the following deductions: The results of this application calculation do not directly determine when assessing the best employee; you must wait for a decision from the team leader, supervisor, manager or meeting. The results provided by the best employee assessment decision support system method can be implemented using dynamic or changeable criteria to determine the best alternative. There are seven criteria used for research on evaluating the best employees in this application, namely: average process. Processes include: quantity; quality; on time; and teamwork. Productivity, which includes days in and days out/holidays. These criteria are only a basis for research in writing about the best employees, but to add or subtract criteria, you can add or subtract them in the best employee assessment application system using SAW.

Keywords: Decision Support Systems, Best Employees, Simple Additive Weighting, Assessment.

1. Introduction

Bukalapak owns and operates one of the top online marketplaces in Indonesia, which Achmad Zaky founded. Similar to customer-to-customer (C2C) online buying and selling platforms, marketplaces offer a way for consumers to sell to one another wherever they are. Anyone can start an online store and sell products in bulk or individually to potential customers from all across Indonesia [1]. Products like bicycles, cell phones, baby equipment, gadgets, device accessories, laptops, tablets, household equipment, apparel, electronics, and so on can be purchased and sold by individuals or businesses. One of the key elements in boosting an agency's performance productivity is its human resource quality [2]. Therefore, performance levels can be supported by highly skilled human resources. The performance evaluation will help to identify each employee's successes. This is something that agencies might consider while selecting the top workers. Subordinate employees are subject to job performance assessments by an assessing officer. An assessment of the employee, who is a subordinate, must be completed by an evaluating officer who has had direct supervision over the employee for at least six months. Loyalty, performance at work, accountability, compliance, honesty, cooperation, initiative, and leadership are the components that are evaluated [3].

Information technology is constantly evolving in all spheres of life, and its application can facilitate human labor. In daily life, humans frequently struggle with decision-making. Whether a problem is big or minor, it always affects how decisions turn out [4]. Humans are currently beginning to create decision support systems (DSS), which are systems that assist in choosing the optimal solution to a given issue. The best option is chosen using a combination of weights, criteria, and alternatives in the decision system [5]. Generally, decision support systems (DSS) are designed to facilitate the resolution of an issue or an opportunity. A flexible, interactive, and adaptive computer-based information system, or CIBS, is used by the decision support system application. It was created to facilitate the solutions of particular, unstructured management challenges [6]. The assessment of a division's employee performance only has a few indicators, namely by calculating the total number of processes or number of working days for each agent or employee. Obtained from the total process during the specified time period.

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Productivity is obtained from the total number of days an agent or employee works [7]. Currently, employee performance assessment still uses an inadequate system in the process, namely by calculating criteria scores using Microsoft Excel. This assessment process is very likely to cause errors in calculating each criterion, as well as take a long time to calculate, and there will also be unfairness to employees in their assessment [8].

It is possible to offer decision support solutions and enable a computerized system for employee assessment with the use of a decision support system (DSS). One approach to the employee assessment issue is the decision support system (DSS) mechanism. The board of directors or superiors can evaluate employee performance more readily as all assessment criteria can be computed quickly and the system can assess fairly thanks to the simple management of employee data in a linked and online system [9]. The option that utilizes multiple criteria and outperforms others is the simple additive weighting (SAW) method. Generally speaking, there are three primary uses for decision support system software (DSS): processing personnel, department, and corporate data; and processing position data. In order to generate final employee ranks, the system can also process employee scores. The user is given the best suggested answer by using the simple additive weighting (SAW) method, which takes into account the initial weights and criteria that were established before the calculation [10]. The weighted addition method, often known as the SAW (simple additive weighted) approach, is a notion in methodology. It is predicated on calculating the weighted total of each alternative's performance ratings across all categories. The decision matrix must be normalized using the SAW approach so that it may be compared to every alternative rating system currently in use [11].

Employee assessment, or employee performance, is a systematic study of employee working conditions that is carried out formally and is linked to work standards that have been determined by the company. In addition, employee performance as a measurement and evaluation system influences attributes related to employee work, behavior and output, and absenteeism levels to determine the employee's current level [12]. A method and software tools are part of the object-oriented approach to system development known as rapid application development. The analyzer is used in the evaluation, design, and implementation processes throughout the course of three phases of the Rapid Analysis and Design (RAD). Users are deeply involved in the business design phase of the development process, and they are involved in every aspect of it thanks to RAD [13]. Analyzers and users participate in three stages of rapid analytical design (RAD): assessment, design, and implementation. Requirements planning, RAD design workshop, and implementation are the three stages. The stages of application development for each application development phase are as follows, following the RAD methodology: Users and analysts gather during the requirement planning phase to determine the objectives of the application or system and the information needs that result from these objectives [14]. The goal of this phase's orientation is to resolve business issues. While some of the suggested approaches may be guided by information technology and systems, the accomplishment of business objectives will always take precedence [15].

RAD design workshop: this stage can be seen of as a workshop where ideas are designed and improved. Programmers and analysts can collaborate to create and convey to users visual representations of designs and workflows [16]. Depending on how big the application that has to be developed is, this design workshop may take several days to complete. Users react to pre-existing prototypes during the RAD design workshop, and analyzers modify the designed modules in response to user feedback [17]. According to Kendall, if a developer or user has experience, their innovative work can spur progress to a higher degree [18]. Implementation: During this stage of the process, the analyst collaborates closely with users through workshops to develop the business and non-technical elements of the organization [19]. New systems or components of systems are tested before being brought to the organization once these elements have been decided upon, developed, and improved. Using object-oriented programming methods, the unified modeling language, or UML, is a standardized modeling language for software development [20] [21]. The necessity for visual modeling to design, describe, construct, and record software systems gave rise to UML [22]. There are four different types of specifications in UML 2.3, the most recent version: object constraint language (OCL), UML superstructure, UML infrastructure, and diagram interchange specification [23].

2. Research Methods

Data collection methods in this research used interviews, observation, and similar literature studies. In this interview, there are several questions regarding the ongoing best employee assessment process and the expected solutions. The decision support system was created to produce employee assessment rankings. From the tests produced, the ranking was produced based on four permanent criteria using the SAW method. The weakness of this system is that there are few criteria used to evaluate employees. Data collection on employees who are suitable to be rated as the best employees is separate from the system and is carried out incompletely by each existing division. The explanation is not clear enough, and there are also shortcomings in terms of the interface, which is still simple. The method used in this system is fuzzy simple additive weighted (FSAW). With its flexible fuzzy concept, the assessment carried out by this system is quite good and easy to implement, but it also has shortcomings

in terms of calculations carried out. There are differences in matrix normalization according to attribute values, namely benefits and costs, so it will be difficult for those who don't understand this concept.

The system was created using two methods: AHP and WP. Where AHP is used as a weighting criteria and WP is used as a ranking. The use of these two methods creates a level of accuracy in the ranking. The author calculates the final scores of three hotel employees manually, then asks for help from HRM (the human resources manager) to calculate the final scores of the same three employees using the system that has been created. First, the number and type of criteria used, the comparison scale of the criteria used, and the value of each employee used as the test sample are determined. The criteria used are: level of education, work experience, length of service, special abilities, responsibility, thoroughness, loyalty, absence scores, IQ scores, and interview scores. The weakness of this system is that the interface is still simple. And each calculation is limited to only three employees. The system development method used in this research is RAD (rapid application development).

3. Results and Discussion

Referring to system analysis, the current system relies more on less effective calculations using Microsoft Excel, where the calculations do not use the SPK method and enter formulas on a per-assessment basis. For further details, the following is the process flow that is already underway: the system flow that is already underway in the marketplace for assessing the best employees. The details are as follows: The manager will carry out the requirements that each employee must meet in order to meet the criteria for that employee's assessment for each best employee evaluation. Notify via SPV and team leader. After that, it will be announced to employees via the SPV and team leader what needs to be done to become the best employees. Every employee who has completed the requirements will see the results from the team leader. The team leader will conduct an assessment and selection of the existing requirements. Observations and investigations are carried out to find out the truth of the conditions that the employee will fulfill. Once several employees are found who meet the requirements, they will be reported to the SPV. The team leader assesses the employee's performance while in the marketplace using the Microsoft Excel application. Then the next step is to submit the results of the SPV obtained from the team leader for verification or approval. The results of the verification are submitted to the manager. If the results are declared approved, the manager will announce the results to the employees. If not, the assessment process will be repeated again.

In the current system, the team leader, the SPV, and the manager all use data that the employees separately provided to determine which employees will be considered to be the best employees. This is sometimes susceptible to subjective judgment. Problems will also occur when employees only carry out the requirements, namely the work process in each division, but their attitudes are not good, but they can become the best employees because they are calculated only by a process or a few criteria. Therefore, this is a problem that must be addressed in the future. This application runs optimally. Then the criteria in the assessment increase, not only based on the few existing criteria. Making the best employee evaluation decision support system must meet requirements that include the completeness of data, software, and hardware. The complete data used in creating the best employee assessment decision support system using the SAW method is: employee data; employee work process data; criteria data; assessment data; and SPK calculation data. The system that the author wants to create is the best employee assessment decision support system using the SAW method and is expected to help solve existing problems. The system can determine which employees truly deserve the title of best employee. The system can provide decision reinforcement from the input SPK method calculations. The process of determining employees who will be declared the best employees using the decision support system is as follows: The team leader runs the application by following the application workflow. Then the application will issue the final result in the form of a report or letter, containing the results of the assessment and the name and value of the employee who will be declared the best. SPV receives results reports from team leaders who have carried out assessments using the SPK system for assessing the best employees. The manager receives the results from the SPV or team leader and makes an agree-or-no decision. The results of the manager's decision will be announced to employees.

Workflow flowchart of the best employee assessment decision support system using the SAW method, where: Start by filling in the assessment criteria first. After the criteria data has been successfully entered, the data will be displayed in the application. Carrying out an assessment here is done by opening the employee assessment menu in the application and inputting an assessment based on 4 assessments (bad = 1, quite good = 2, good = 3, very good = 4). Continue processing the values that have been entered by multiplying the assessment in number 3 by the minimum weight value for each assessment criterion. After that, the data is saved and displayed in the application. Then the next process is to enter the employee division that will be used for assessment by entering the requirements, such as the name of the division and job description, before starting the method. After that, the data is saved and displayed in the application. Start the saw method calculation process in the application, using the profit attribute formula. After completing the calculation process using the method. Then the results will be displayed in the application. After that, the process is complete.

Select all employees in a division who adhere to the criteria for the best employees, such as those who exhibit the work process, behavior (attitude), teamwork, and punctuality. Determining the assessment criteria and importance scale is a procedure for entering assessment aspects for employees with the level of importance scale for each criterion (not very important, quite important, important, very important). Determining the weight of the criteria is part of the assessment process for each employee. Normalizing the X matrix is to make employee values simpler to process using the SAW method. Calculating the value means calculating the total value of each employee using the SAW method. Correcting the weights is to make employee values easier to process using the SAW method. Calculating the vector is the result of raising the total value to a power using the SAW method. Determining alternative rankings from values and vectors is the final result of the SAW method calculation process.

In the calculation process, there are three values. The first is the lowest weight value, namely the minimum weight selected in the employee assessment process. Second is the maximum weight value, namely the highest weight given to employee evaluations. And the third is the preference weight, which is the weight of the importance of each criterion and has a max function because the largest value is the best value. The employee assessment process in the division involves monthly parameter assessments, namely the value of the number of users processed, the average number of users processed, and the number of working days for each employee. Each employee has different standards for carrying out the process and speed of work. This assessment is purely based on observations from the assessment team, namely the team leader and supervisor (SPV) in the division. The following will explain how the manual calculation of employee assessments is applied. Customer satisfaction management (CSM) Division now. Because the employee assessment on the marketplace has too few criteria and the calculations are not complex, it is easy for unfairness to occur for the employee in the assessment; therefore, the leaders also want a more accurate calculation and make suggestions for weighting the assessment criteria.

An overview of the flow of activities for adding, modifying, and deleting SPV/team leader access rights, as well as for displaying detailed SPV/team leader data in the form of a file with a PDF extension, can be found in the activity diagram below, which details how to manage SPV/team leader data in the best employee assessment decision support system using the SAW method. The SAW approach, which can give an overview of the flow of activities for adding, editing, deleting, viewing, and assessing people, is used to create activity diagrams for managing employee data in the best employee assessment decision support system. An overview of the flow of actions for adding, editing, removing, and viewing assessment criteria data can be found in activity diagrams for managing criteria data in the best employee assessment decision support system that use the saw method. An overview of the flow of actions for adding, modifying, and removing division data, as well as viewing division data and employee assessments that will be calculated using the SAW method, can be found in activity diagrams for managing division data for assessment and calculations in the best employee assessment decision support system using the SAW method.

Where each class represents an element contained in the use case diagram, which refers to a noun, shows a person or actor, or shows a process, as below. There are two use cases within this employee that carry out the same task but with different actors. For example, if employees (admins) act to manage the SPV/team leader's data management usecase, then the SPV/team leader manages the regular employee data management usecase apart from these two actors. In this criteria class, several other use cases are also linked, including input, update, view, and delete, but with the aim of managing criteria data only. In this division class, several other use cases are also linked, including input, update, view, and delete, but with the aim of managing division data only. In this assessment class, it does not represent the use case directly. This class is indirectly contained in the employee class. However, the relationship can be seen through the employee activity diagram. In this assessor class, it is related to employee class, assessment, criteria, and position. This class is a processing class for the maximum value of each alternative value entered. SAW weight improvement: this class is for processing the value of improving the weight of each alternative value entered to make it simpler. SAW results are a processing class of the input value of the results and are still in the form of unit values for each criterion. The overall saw result is a class of processing value results from all criteria per alternative. And it is a ranking of the final results. Job Desk is a class that processes the rank value of each alternative value entered. Vector s is a class for processing the resulting values from the vector s that are entered and are still in the form of unit values for each criterion.

The login page is displayed at the start of the application, and all users who want to enter the system must go through this page first by entering the username and password that the user has. This is the display that the author expects. This home page displays the main menu of the administrator actor who can manage SPV/team leader data. This display is what the author expected. Form page for entering SPV/team leader data. Where there is a combo box for the latest education, including SMA/Equivalent, D1, D2, D3, S1, S2, S3, and a division combo box that can be filled in in the division menu under SPV/team leader User access rights, and the position text field that is set automatically contains SPV/team leader, this is what the author hopes for. The author anticipates this kind of display when using this page to display HRD manager data that the administrator has registered. This form page is used to add or edit employee data, while the last education combo box contains SMA/Equivalent, D1, D2, D3, S1, S2, and S3. In the length of work combo box, there is a calculation per month, and in the position combo box,

it contains Staff 1, 2, 3, and executive staff according to existing ones. Then, in division/job desk, there is also a division combo box that was previously input in the division menu, which looks like what the author expected. This form page is used to display employee data; this is the kind of display that the author expects. This form page is used to add or edit criteria data.

The finest employee assessment decision support system using the SAW method's module sequence is followed when creating the PHP programming language throughout the development stage. Depending on the code that was created, these modules can show user interfaces and perform various functions. Black box testing is a phase designed to determine whether every function in the best employee assessment decision support system that has been executed and built using the SAW technique is operating in accordance with the design that was produced. Using the SAW approach and the black box technique, tests were conducted on the best employee evaluation decision support system. The RAD (rapid application development) system development approach and the foundation for calculating decision making using the SAW (simple additive weighted) method were used to construct the finest employee evaluation decision support system utilizing the SAW method. The requirements planning phase, the design workshop phase, and the implementation phase are the three steps of RAD. The process of identifying issues pertaining to employee assessment is done during the requirements planning phase, which includes determining the requirements for creating the best employee assessment decision support system utilizing the SAW approach. then ascertain the goals that this application is expected to achieve. In addition to determining the information needs resulting from these goals. Identifying planned systems and current systems, for example. Using the SAW technique, a design for the best employee assessment decision support system was completed during the design workshop phase.

The decision-making process for the design stage entails deciding on the alternatives, specifications, and standards that will guide the selection of the employees who will undergo evaluation. In the calculation process, each existing alternative will be evaluated against the proposed requirements and required criteria. The method will produce a decision value that will be compared with the decision results from other methods. After that, UML (a unified modeling language) was used to carry out system design throughout the workshop's design phase. The use case, activity, and class diagrams are the UML diagrams that were utilized in the development of this application. Usecase diagrams are a useful tool for outlining an actor's capabilities within an application. The administrator and the SPV/team leader are the two actors in this scenario. The workflow or tasks that can be completed using the program are then described in the activity diagram. The system structure is then defined in terms of the classes that will be formed by the class diagram. During the design stage of this workshop, user interfaces were also created to depict how the user interface will look in the future. Subsequently, the coding process is executed; this phase involves constructing the application by modifying the user interface designs. The finest employee assessment decision support system utilizing the SAW technique uses a sequence of modules that determines the use of the PHP programming language and MySQL database. Testing is done on the application at the last phase, which is the implementation phase. Testing is carried out using black box testing, where the system will be executed and tested.

4. Conclusion

Based on the research results, the following conclusions were obtained: The results of this application calculation do not directly determine the best employee or agent; you have to wait for a decision from the team leader, supervisor, manager, or meeting. To choose the best option, use dynamic or flexible criteria to implement the results of the best employee assessment decision support system method. There are seven criteria used for research on evaluating the best employees in this application, namely: Average process. Processes include: quantity; quality; on time; and teamwork. Productivity, which includes absences and vacations. These criteria are only a basis for research in writing about the best employees, but to add or subtract criteria, you can add or subtract them in the best employee assessment application system using SAW. Because the research and development of this system are not yet perfect, there are several suggestions that the author can make after carrying out research on the development and testing of this system, such as that the decision support system cannot accommodate the annual assessments that have been carried out. Therefore, if an annual assessment can be added, the method calculation process will be much more accurate and fairer.

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