



## Designing an E-Recruitment Information System Using Simple Additive Weighting Method for Employee Recruitment in Banking Industry

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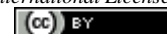
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### Abstract

This research aims to find out how to design and build an employee e-recruitment information system using the simple additive weighting method. There are three types of data collection methods in this research: observation, interviews, and literature study. The system development method used in this research is the OOAD (Object-Oriented Analysis and Design) method with the rapid application development model, while the tools used in object modeling are UML (Unified Modeling Language). From the discussion that has been described, the following conclusions can be drawn: This e-recruitment information system was designed and built using the RAD system development method and the SAW method for calculations in decision-making, using the PHP and MySQL programming languages as the database, and tested with black box testing. By using the e-recruitment information system to recruit employees, the HR and general divisions have a reference for selecting which prospective employees most closely match the predetermined criteria. This e-recruitment information system can reduce the possibility of human error occurring during the selection process, and with the value of each applicant calculated in the system, it will become a reference for HR staff in selecting employees more objectively. The administrative selection process, which takes one month, can be reduced to a maximum of seven working days. With the e-recruitment information system, selection results that were previously reported via message can now be seen directly in each applicant's account at a predetermined time.

**Keywords:** E-Recruitment Information System, Simple Additive Weighting, Application, Information System.

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### 1. Introduction

Human resources (HR) are an important asset to support the success of a company, in addition to other factors such as capital. Not only conventional companies, but sharia-oriented companies also need superior human resources. Superior human resources will have a direct impact on a company's performance. To recruit employees, companies need to carry out outreach so that everyone has the same opportunity to join the company. Indonesia is a country that has abundant human resources, and the majority of its population is Muslim. So that conventional and sharia companies can freely recruit employees [1] [2]. In order for a company to have superior employees, facilities are needed to select prospective employees who comply with company standards and meet the criteria. The object of this study is a sharia people's financing bank that is committed to being the best sharia people's financing bank in Indonesia [3] [4]. It has 30 branches in some big cities in Indonesia and will continue to grow [5]. At least in all existing branches, a minimum of 25 employees are required in each branch. This commitment is outlined in the company's objectives, namely providing customer service through the provision of optimal financial services; improving welfare for employees; and providing the best results for stakeholders. To achieve this goal, quality employees are needed [6] [7].

However, in recruiting employees, the HR division experienced difficulties. One of the obstacles is when there are so many applicants applying [8]. Because there are no specific criteria, the HR division has difficulty determining employee candidates who best meet the criteria [9] [10]. This is because the selection process is carried out manually without any calculations, and applicants can be selected subjectively [11]. A lot of applicant data is also a problem because it takes a long time to carry out administrative selection and requires a lot of space to store files. Data on prospective employees must be sorted to separate which files are accepted and which are rejected [12]. Apart from that, in sorting or selection, accuracy is needed so that HR staff can choose which prospective employees meet the desired criteria [13]. After administrative selection, the next stage is interview selection and psychological test selection using vendor services [14] [15]. HR staff still use short messages to provide feedback

to applicants regarding the applicant's status, whether they have passed or not; this requires a lot of time and money. So it can slow down the recruitment process [16] [17]. Therefore, we need a means of storing, grouping, and disseminating information regarding employee recruitment. This aims to make it easier for the HR department in the employee recruitment process [18].

A system is defined in a very wide way that impacts every element of existence. In order to operate well and in an organized manner toward management, systems are essential [19]. This system's integration enables teamwork to generate precise, accurate, and timely information [20] [21]. A system is a network of interconnected procedures that are brought together to carry out an activity or to accomplish a certain objective, according to the procedures-focused systems approach [22] [23]. In the meantime, the emphasis of the systems approach, which is a network of procedures, is on the order in which the system's functions are performed. Information is simply data that has been processed such that the user's knowledge has increased [24]. The purpose of information is to lessen uncertainty while making decisions regarding a given circumstance [25]. If the advantages of having the information outweigh the expenses, it is considered useful [26]. Data that has been transformed into a format that makes sense to the recipient and may be used to inform decisions in the future is called information. Data that has been transformed into a format that is more understandable and helpful for the recipients is called information [27]. Information systems are groups of people, information, technology, and work processes arranged to accomplish organizational objectives. On the other hand, an information system is a set of hardware and software intended to convert data into information that is helpful [28]. A system that gathers, organizes, preserves, examines, and distributes data for particular objectives is called an information system. An information system is a combination of information, people, and information technology that is disseminated, processed, stored, and analyzed to accomplish specific objectives, as can be inferred from the descriptions given above [29].

project management for information systems comprehension [30]. Information systems management is the process of organizing, guiding, and managing a company's resources in order to accomplish short-term objectives that have been set forth [31]. Project management is defined as a method of resolving issues that users must bring to the table; user needs must be evident and well communicated in order for these needs to be identified. E-recruitment is the process of using the internet, such as the company website, organization, and online commercial job notice boards, to draw in prospective employees to an organization. The definition of e-recruitment varies among authors, but it always has the same basic meaning [32]. Posting job openings on a company's website or the website of an online recruitment vendor, along with providing an electronic application form for candidates to fill out, is known as online recruiting. When e-recruitment is done, other dimensions can be added to this specification. The potential for conducting remote interviews and evaluations, such as online aptitude or psychometric exams, as well as the use of intelligent agents and advertising banners to conduct web searches are all possible aspects of e-recruitment [33]. Furthermore, interactive tools like search engines, interactive application forms, email autoresponders, and electronic mailing lists can be used to connect a business's database with a website. A decision support system (DSK) is a computer-based information system that helps managers and business professionals make decisions by offering interactive information support [34]. Semistructured and unstructured business decisions are supported by decision support systems through the use of analytical models, specialized databases, decision makers' assessments and insights, and interactive computer-based modeling procedures.

## **2. Research Methods**

In the data collection process, there are several methods used according to the research objectives. In this study, data were gathered using three different methods: literature review, interviews, and observation. UML (Unified Modeling Language) tools are used for object modeling, and the OOAD (Object-Oriented Analysis and Design) method with the Rapid Application Development model is the system development methodology used in this study. In requirements planning, there are several steps taken in building an information system, including identifying the purpose of the application or system and being oriented towards solving business problems. In this stage, several things will be explained, namely the flow of the recruitment process and procedural data (in the form of a CV) that determines which procedures are required for submitting an application. The running system explains the business processes carried out by applicants and employees carrying out related activities such as submitting applications, selecting applications, and hiring employees. The proposal system describes several proposals that can help resolve existing problems in the current system. Identify user and system needs in identifying problems and determining the objectives of the employee e-recruitment information system. The stage of creating a prototype design for the system to be built includes when designing a system using Unified Modeling Language (UML), the following are the stages namely designing a use-case diagram. Designing use-case narratives. Designing activity diagrams. Designing sequence diagrams. The UML (Unified Modeling Language) notation system design process uses the Astah Community application as a system design tool. Create an interface design for the Mudharabah savings information system using Balsamiq Mockups 3 as an interface depiction tool. Create a layout design for the Mudharabah savings information system. The PHP programming language and the MySQL database are used to build the system during the implementation workflow (coding) phase. Application testing, also called an

application trial, is a step in which the researcher employs the black-box method of system testing to see if the output of the system is consistent with the developed proposal. Data is inserted into the system.

### **3. Results and Discussion**

Before designing a proposed system, researchers need to know the system that operates in employee recruitment. Researchers have gathered information through interviews and observation to learn more about how the system functions. From these results, it is known that in recruiting employees, we still use a manual system. Even though we use a special job search website to disseminate job vacancy information, we still use a manual selection process. The applicant files obtained from the website are printed one by one, then screened by HR staff to select which applicants pass the administrative selection. After carrying out the administrative selection and being approved by the head of HR, data that passes the selection is separated from those that do not pass the selection. After passing the administrative selection stage, the HR staff contacts the applicants who pass the selection stage to come to the interview stage by the HR staff and a psychological test by a third party. After passing several stages, applicants are given an assessment, and those with the best scores can be accepted as employees. In this process, there are three actors involved: the applicant, HR staff, and the head of HR. Based on the problems above, an integrated system is needed between applicants or prospective employees, HR and general staff, and also the Head of HR and General Affairs in order to make it easier to process data. Apart from that, a system is also needed to support decision-making so that the employee recruitment and selection process is more objective. The proposed problem solution is to create an e-recruitment information system using the simple additive weighting method in employee recruitment, which will later function to record applicant data, calculate applicant assessments, and process recruitment activities that produce reports.

After analyzing system requirements, it can be concluded that a system can solve problems and meet needs. The analysis of this proposed system uses modeling with UML. The researchers propose integrating actors related to employee recruitment activities. Actors related to employee recruitment are applicants, HR and general staff, psychological testing staff, interviewers, and heads of HR and general affairs. The division of roles for each actor is explained as follows: applicants play a role in inputting personal data via the available website with the position or title required by the company. HR and general staff are tasked with processing applicant data, processing psychological test scores and interview scores, and selecting applicant data using the e-recruitment system. The psychological testing team is tasked with assessing based on the results of the psychological testing exam and inputting the scores of each applicant into the system. The interviewer's job is to score each applicant based on the interview and enter their results into the system. The responsibility of approving and choosing which applicants want to be accepted into the company falls on the head of HR and general affairs.

Functional requirements are a description of the actions and services that the system must offer. In a system, there is a program that will help the user solve the problem. The employee e-recruitment information system's functional requirements will explain what services or functions the system offers to make it simpler for users to use. The functional needs of the employee e-recruitment information system include the input. The input in the employee e-recruitment information system is username and password, user, applicant data, vacancy data, psychological test scores, and interview scores. The second is process, the process contained in the system, namely: user login, process of adding, changing, saving, and deleting user data; process of adding, changing, saving vacancy data; process of adding, changing, saving applicant data; process of adding, changing, saving applicant psychological test scores; process of adding, changing, saving applicant interview scores; process of calculating SAW; process of viewing, accepting, or rejecting applicants; process of printing accepted applicant data; process of viewing and printing employee acceptance reports. The third is output, the output of the system, namely applicant data report, administrative assessment report, psychological test and interview, and applicant data report received. Lastly, the database proposed in this system is: user table, applicant table, vacancy table, criteria table, and report table.

At the use case modeling stage, there are several stages that need to be made, namely actor identification, to explain the actors involved, and a general description of this e-recruitment information system. At the analysis stage, use cases are described in narrative form to document interactions between system users and the system itself. The admin, applicants, HR staff, interviewers, psychological testing staff, and the head of HR must log in using the username and password in the activity diagram. After that, the system will confirm the entered password and username. The user will be prompted to enter their username and password again if they enter them incorrectly, as the system will display an error message. Nonetheless, the system will show the main menu if the username and password entered are accurate. Activity flow chart Inputting user data is a way to include users. The User Input form will be displayed by the system once the admin selects the User Input menu. After that, the system will validate the user data that is filled in and the admin can add users by filling out the user input form. The system will display an error message if there is a mistake in the user data entry. Nonetheless, the system will present a password for the user to enter if the data they entered on the form is correct.

An activity diagram for managing user data is an activity for managing user data, such as deleting or editing user data. The admin is capable of carrying out this task. The system will display user data after the administrator selects

the user data menu, initiating this activity. Subsequently, the administrator has the option to remove the user, which will be accomplished by the system. Nonetheless, the system will validate the modified user data if the administrator decides to do so and updates the user data in the change data form. If there is an error in filling in user data, the system will display an error message, but if there are no errors in filling in user data, the system will display changes saved successfully. HR staff input the vacancy data into the activity diagram. HR staff can enter new vacancy data as needed. HR staff can change changes in vacancy data and change the status of active or inactive vacancies by completing the activity diagram for managing vacancies. The activity diagram for registering applicant users is an activity to get users; applicants will get access to applicants if they have registered in the registration menu. Applicants are asked to enter their username, password, and email to register. After successful registration, applicants can log into the system. The activity diagram for managing applicant data is an activity diagram that shows applicant activities in filling in and changing applicant data, such as personal data, education, organization, and work experience. Each of these activities can be accessed via the edit data menu and selecting the next sub-menu. This activity is carried out to be able to carry out job application activities, because if the application data is not complete, applicants cannot apply. The activity diagram for applying is the applicant's activity in submitting an application. Applicants can apply for the vacancy they wish to apply for by selecting one of the vacancies and pressing the "Apply" button, and then the applicant data will automatically be entered into the applicant data for the selected vacancy. The activity diagram looking at applicant data is an activity for applicants, interviewer HR staff, psychological testing staff, and the head of HR. Applicant data presents data regarding complete applicant data. The administrative selection activity diagram is an activity carried out by HR staff to carry out selection based on the highest score.

The activity that the interviewer performs to fill in the interview results for each applicant is activity diagram input. HR staff members engage in an activity called an activity diagram for interview selection to make decisions based on the highest score. The interviewer enters the psychological test results into the activity diagram to fill in the interview results for each applicant. The activity diagram for the SPK calculation process is an activity for carrying out the SPK calculation process. After this process is carried out, it will produce a score for each applicant. This value will be a reference in employee recruitment. Activity diagram: viewing deposit data is an activity in viewing data resulting from calculating the SPK for each applicant. Users who can view the results of calculating the SPK are HR staff and the head of HR. Activity diagram: The head of HR is responsible for employee recruitment verification. The head of HR may have the right to determine which applicants will be selected for acceptance. Activity diagram: An announcement is an activity that can be carried out by applicants. The selection results can be in the form of information regarding the application submission schedule, selection stages, and employee recruitment information. Activity diagram printing selection results is an activity that can be carried out by applicants. After seeing the selection results, we can print them by pressing the "Print" button.

For the initial stage of creating a database, a design is needed. As a reference for creating a database, a class diagram is used. The first step that needs to be taken is to identify potential objects. After identifying potential objects, create a class diagram. Class diagrams describe the object classes that make up a system and also the relationships between object classes that occur in the demand and supply information system. Sequence diagrams emphasize the time sequence of receiving messages. This diagram shows the message-based interactions between objects that occur during the execution of an operation or use case. The sending and receiving of messages between objects is shown in this diagram. The following is the interaction between objects in the proposed system. This diagram depicts the interaction between user objects, vacancies, and the r matrix. Where the user provides data on vacancies, then vacancies provide data to matrix r. This diagram depicts the interaction between applicant objects, personal data, and administration, where applicants provide their data to their personal data, and then their personal data provides data to the administration. After that, the data is validated to determine whether the applicant passes or not. This diagram depicts the interaction between applicant objects, personal data, and administration, where applicants provide their data to education data and then personal data provides data to administration. After that, the data is validated to determine whether the applicant has passed or not. This diagram depicts the interaction between the applicant object, personal data, and administration, where the applicant provides his data to the organization's data and then his personal data provides data to the administration. After that, the data is validated to determine whether the applicant passes or not.

This diagram depicts the interaction between applicant objects, personal data, and administration, where applicants provide data on work experience and then personal data provides data to administration. After that, the data is validated to determine whether the applicant passes or not. This diagram depicts the interaction between administrative objects and the r matrix, where the administration provides its data in the r data matrix. The relationship between the applicant object, the interview, and the r matrix is shown in this diagram, where the applicant contributes data to the interview data and then provides data to the r matrix using his personal data. The data is then verified to ascertain whether or not the applicant is successful. This diagram shows the relationship that exists between the applicant object, the psychological test, and the r matrix. The applicant contributes data to the test data, and subsequently provides data to the r matrix using his personal data. The data is then verified to

ascertain whether or not the applicant is successful. This diagram shows the relationship between the final value and the matrix object *r*, where the matrix *r* gives information about the final value. An implementation-style diagram used to visually represent a software system's physical architecture is called a component diagram. The management, upkeep, or upgrade of existing databases will be simpler with a good database. There are several stages in order to create a good database. The following are the stages that the author uses to create a database: Normalization is useful for identifying attribute group tables that have high dependencies between one attribute and other attributes. In the first normal form, it can be seen that it does not show a flat table. However, there are still attributes that have repetitive content. When the relationship satisfies the first normal form, it is said to be in the second normal form. In this case, all non-key attributes must be totally dependent on the key attribute. When the relationship satisfies the second normal form and all attributes that are transitive to key attributes are removed, the third normal form is formed.

Implementing the design's outcomes comes next after the design workshop phase is over. XAMPP, which consists of MySQL version 5.0.54 for the database, PHP version 5.2.4 for the programming language, and Apache version 2.2.6 for the web server, is used to implement the system. Apart from that, supporting facilities are also needed so that the system can run as expected. Hardware consists of: processor, equivalent to Pentium IV and above; minimum memory of 256 MB; 80 GB hard disk; 32 MB VGA card; LCD monitor. Software, namely operating system specifications and supporting software, are as follows: Windows XP/Vista/7, XAMPP version 1.6.4, which includes Apache version 2.2.6 and MySQL version 5.0.45, and browsers include Mozilla Firefox and Google Chrome. After the Mudharabah savings information system is under construction, the next stage is testing the system. Black-box testing is a testing methodology used in system testing. The module unit must only be run or executed in order to test the method. Once this is done, it is necessary to see if the generated results match the intended business process. To test if the output matches the expected business process, all that needs to be done in this black-box testing is input data. Black-box testing is carried out, with the data used in this test being the actual data contained in the Mudharabah savings information system. Following testing, it can be said that the Mudharabah savings information system generates output that satisfies requirements and is compliant with current business procedures.

#### **4. Conclusion**

The following conclusions can be made based on the described discussion: Black box testing was used to test this e-recruitment information system, which was created and developed utilizing the RAD system development method and the SAW method for computations in decision-making. The database was created using the PHP and MySQL programming languages. By using the e-recruitment information system to recruit employees, the HR and general divisions have a reference for selecting which prospective employees most closely match the predetermined criteria. This e-recruitment information system can reduce the possibility of human error occurring during the selection process, and with the value of each applicant calculated in the system, it will become a reference for HR staff in selecting employees more objectively. The administrative selection process, which takes one month, can be reduced to a maximum of seven working days. With the e-recruitment information system, selection results that were previously reported via short message can now be seen directly in each applicant's account at a predetermined time. Based on these conclusions, several suggestions for further development can be made, including: To support the author's decision to use the SAW method, for further development, it is recommended to add other methods to produce more convincing considerations. This information system is limited to using six criteria that are assessed; to get more accurate results in further development, the author suggests increasing the criteria used and adding additional selection stages. In developing a system using four UML diagrams in system design, it is recommended to add other system development diagrams. In the testing stage, the author uses black box testing to carry out testing; for further development, it is recommended to add white box testing. The author recommends that the e-recruitment information system be developed into a system with strong security in the future because it handles personal data of individuals.

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