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Decision Support System for Selecting Quality Rice at Toko 2 Arshya Using *the Multi-Objective Optimization by Ratio Analysis* (MOORA) Method

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ABSTRACT

Fluctuations in the quality of rice crops, which are influenced by seasonal uncertainty and pest attacks, are the main challenges in determining the right selling price of rice. This inconsistent quality makes it difficult for sellers to have objective and fair price reference standards. Therefore, a mechanism is needed that can address this problem systematically. As a solution, a computer-based Decision Support System (SPK) was developed to assess the quality of rice. This system is designed to help decision-making by analyzing various quality criteria that have been set, so that it can be an objective benchmark in determining the selling price. This system implements the *Multi-Objective Optimization by Ratio Analysis* (MOORA) method. The MOORA method was chosen because of its relatively simple and efficient calculations, but it has a good degree of selectivity in choosing the best alternative from several options. The main advantage of MOORA lies in its ability to take an optimization approach to several objectives or criteria that often contradict each other, such as quality versus price, simultaneously. Thus, this method can produce comprehensive and optimal decisions, providing accurate rice quality recommendations as a basis for more rational and measurable pricing.

Keywords: MOORA, SPK, PHP

ABSTRAK

Fluktuasi kualitas hasil panen padi yang dipengaruhi oleh ketidakpastian musim dan serangan hama menjadi tantangan utama dalam penentuan harga jual beras. Ketidakkonsistenan kualitas tersebut menyulitkan penjual dalam menetapkan standar harga yang objektif dan adil. Oleh karena itu, diperlukan suatu mekanisme yang mampu mengatasi permasalahan ini secara sistematis. Sebagai solusi, dikembangkan Sistem Pendukung Keputusan (SPK) berbasis komputer untuk menilai kualitas beras guna membantu proses pengambilan keputusan. Sistem ini menganalisis berbagai kriteria kualitas yang telah ditetapkan sehingga dapat dijadikan sebagai acuan objektif dalam menentukan harga jual. SPK ini mengimplementasikan metode Multi-Objective Optimization by Ratio Analysis (MOORA) karena metode ini memiliki perhitungan yang sederhana, efisien, serta tingkat selektivitas yang baik dalam menentukan alternatif terbaik. Keunggulan metode MOORA terletak pada kemampuannya mengoptimalkan beberapa kriteria yang saling bertentangan secara bersamaan, seperti kualitas dan harga, sehingga mampu menghasilkan keputusan yang komprehensif dan optimal sebagai dasar penetapan harga beras yang lebih rasional dan terukur.

Kata Kunci: MOORA, SPK, PHP

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INTRODUCTION

Rice is the most widely consumed staple food by the Indonesian people. Rice is the commodity that contributes the greatest to the poverty line, both in urban and rural areas. As the population in Indonesia increases, the need for rice is also increasing. However, the price of rice circulating in the market continues to soar, so that many traders sell rice of poor quality. There are still many consumers who do not know how to distinguish good quality or low-quality rice, and they do not care about the rice they consume.

The MOORA method is a calculation method with minimal calculations and is very simple. This method has a good degree of selectivity in determining an alternative. MOORA's approach is defined as a simultaneous process to optimize two or more conflicting obstacles (National, 2024).

Rice is the most widely consumed staple food by the Indonesian population and is a key commodity that contributes significantly to the poverty line in both urban and rural areas. Along with the continuous growth of Indonesia’s population, the demand for rice also increases. However, the rising price of rice in the market has led to the circulation of rice with inconsistent and often poor quality. Many consumers still lack sufficient knowledge to distinguish between high-quality and low-quality rice, and some do not pay close attention to the quality of rice they consume. This condition creates the need for an objective and systematic approach to assess rice quality.

To address this problem, a computer-based Decision Support System (DSS) is proposed to assist in evaluating rice quality and supporting decision-making. This system applies the Multi-Objective Optimization by Ratio Analysis (MOORA) method, which is known for its simplicity, minimal computational complexity, and high level of selectivity in determining the best alternative. The MOORA method is designed to optimize two or more conflicting criteria simultaneously, making it suitable for assessing rice quality based on multiple factors. Through this system, decision-making related to rice quality can be carried out more easily, the data processing can be performed quickly and accurately, and the results can be stored securely and systematically as a reliable basis for determining rice quality.

Hypothesis

Based on the problems stated in the problem formulation, the hypotheses proposed in this study are as follows. First, it is expected that the development of a decision support system for selecting quality rice will

simplify the decision-making process. Second, the application of the MOORA method in decision-making for quality rice selection is expected to enable the process to be carried out quickly and accurately. Third, the use of the PHP programming language and MySQL database is expected to ensure that decision-making data related to the selection of quality rice can be stored properly, securely, and systematically.

THEORETICAL FOUNDATION

Definition of System

A system is a collection of elements that are interrelated with each other, and cannot be separated to achieve a certain goal (Herian & Lasut, 2019). In simple terms, a system can be interpreted as a set or set of elements, components, or variables that are organized, interdependent, and integrated. A system consists of parts or components that are integrated for a single purpose.

System Characteristics

There are several characteristics of the system including:

Components

A system is made up of components that interact with each other, which means that they work together to form a unit.

System Boundaries

A system boundary is a separating region that defines the scope of a system and distinguishes it from other systems and its external environment, so that the identity of the system can be maintained.

External Environment

The external environment of the system includes all external factors beyond its limits that affect its operation and performance. These entities and conditions directly or indirectly impact the survival of the system in carrying out its functions.

System Connector (Interface)

System connectors serve as an integration medium that connects various subsystems into a single whole. Through these key components, all resources such as information, materials, and energy can be effectively channeled and distributed from one subsystem to another in the entire system.

Input

Input is energy, data, or signals that are fed into a system. It serves as a trigger for system operations and raw materials that will be further processed to produce the expected output, thus becoming a fundamental step in every system transformation process.

Output

Output is the result of a system, in the form of energy, data, or products that have been processed and classified from inputs. This outcome is the end goal of the system process, which is designed to provide benefits and usable value to the user or other systems.

Processor

The core of a system lies in its processor or processing unit, which is responsible for processing all the inputs received. Through a series of transformations and algorithms, this processor transforms that input into valuable, effective, and aligned with the pre-set goals and objectives for the continuity of the system.

Objectives

The system goal is the main determinant of the inputs required and the outputs to be produced. Goals that have been set from the start will guide the entire process design, ensuring that every input processed can produce outputs that match the expected goals of the system.

RESEARCH METHODOLOGY

Research Framework

In order to get the results as expected in conducting research, a research framework is needed, where the research framework carried out can be described as Figure 1. Next:

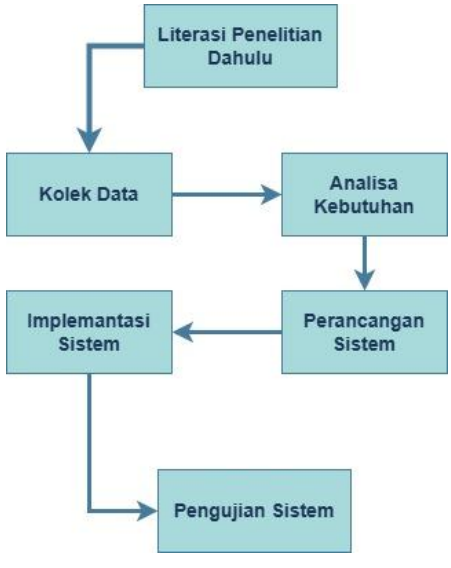

Image 1. Frame of Mind

ANALYSIS AND RESULTS

Systems analysis is a vital critical stage in system development. Its function is to identify weaknesses, obstacles, obstacles, and opportunities that have not been achieved by the running system, so that solutions and alternative solutions can be found (Herian & Lasut, 2019). Precision in this stage is absolutely necessary because the results of the analysis are the foundation for all subsequent stages. An error in the analysis will potentially lead to a chain of errors at the design, implementation, and later stages, thus derailing the overall system development goal (Herian & Lasut, 2019).

UML

UML (*Unified Modelling Language*) is a tool for software analysis and design. UML is a language standard that is widely used in the industrial world to define requirements, make analysis and design, and describe architecture in object-oriented programming (Wantoro, 2018).

Use Case

The use case diagram displayed will be used to describe the features that can be used by admins. This diagram is also used to verify whether all the functions described in the use case have been implemented into the system.

The use case model serves to describe the functional needs and describe the behavior of the system to be created as well as to describe an interaction between one or more actors and the system to be created (Sasmoko et al., 2019). The use case diagram on this system can be seen in Figure 2.

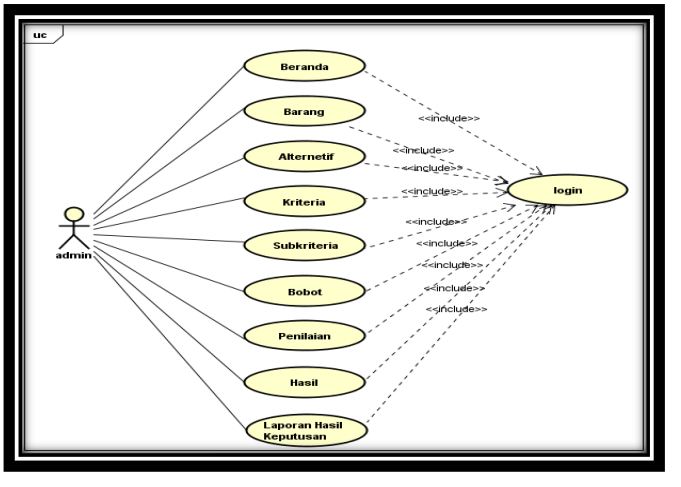

Image 2. Use Case

Class Diagram

Class diagrams serve as the foundation in object-oriented system design modeling by displaying the existence of classes and the different types of relationships between them. Each class in this diagram is a specification or blueprint that defines attributes and methods. When instantized, a class will produce a concrete object. As the core of object-oriented development, class diagrams not only describe the static structure of the system but also serve as a key guide in the code implementation process, ensuring the integrity and consistency of the overall logical design. (Wantoro, 2018). The following are *Diagram Class* on the system to be built can be seen in Figure 3.

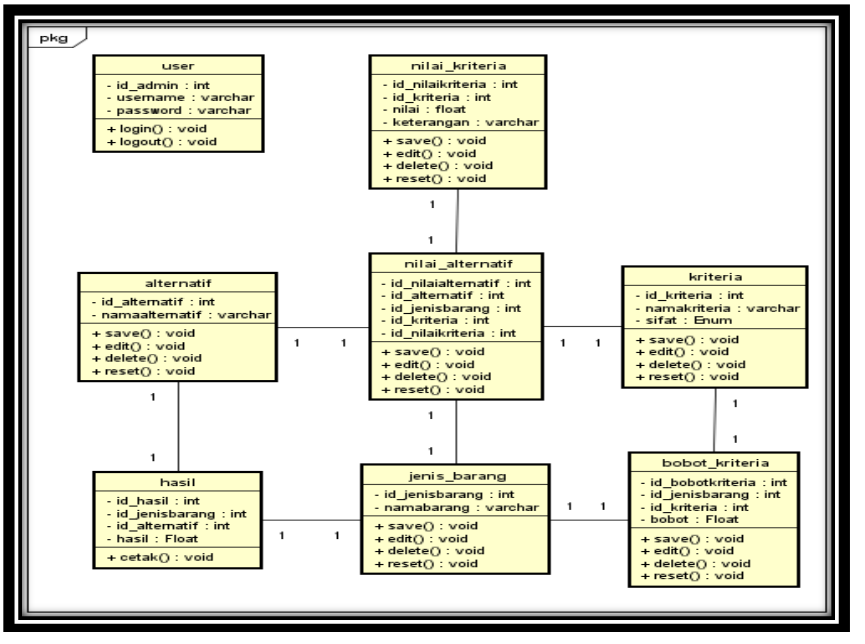

Image 3. ***Class Diagram***

Activity Diagram

An activity diagram describes the various streams of activity in the system being designed, how each flow starts, the decisions that may occur, and how they end. Activity diagrams can also depict parallel processes that occur on multiple executions. Activity diagrams better describe the processes and activity paths from the top level in general (Management et al., 2024). An activity diagram or activity diagram describes the activities that the system performs, not what the actors do. The activity diagram for this system can be seen in Figure 4. Next:

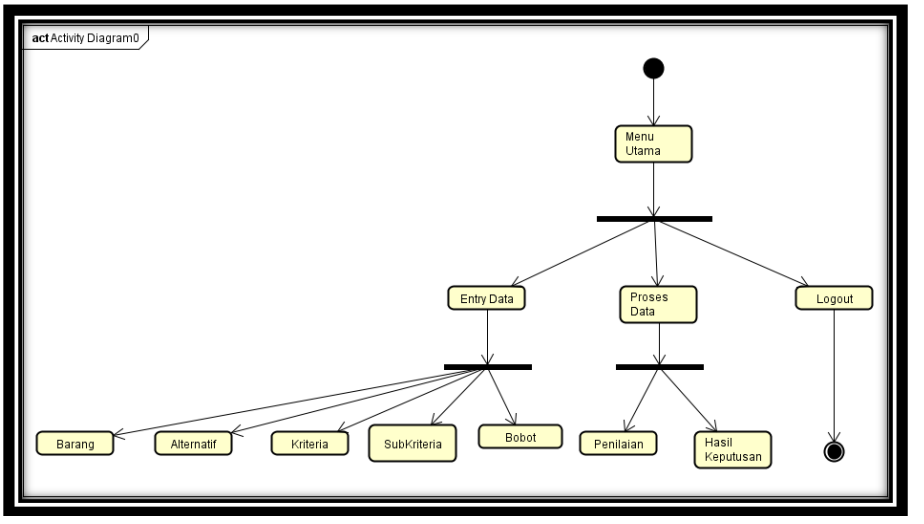

Image 4. *Activity* Diagram

System Implementation and Testing

System Implementation

The implementation of the system is carried out to find out how the application that has been built can be implemented into a system, as well as whether this application can benefit the user, the implementation is also carried out to find out the limitations of the system that has been designed and needed to run this application (Istoni, 2018).

Login

Inside the login there is a username and password menu. For more details, see Figure 5. Next:

Image 5. Login

Main Menu

In the main admin menu there is an entry menu. For more details, see the following Figure 6:

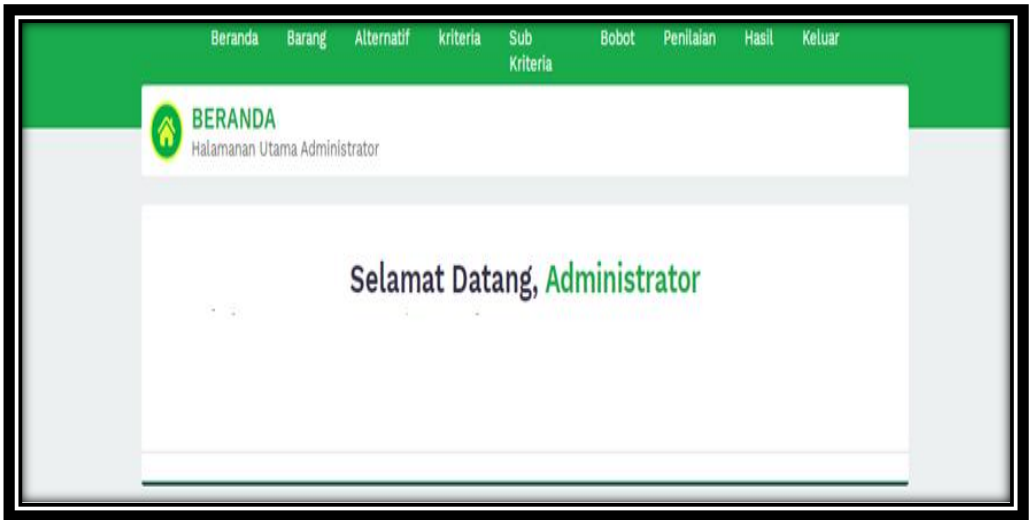

Image 6. Main Menu Page

Goods Data Input Page

On this page the item data information can be viewed, added and edited or deleted. For more details, see Figure 7. Next:

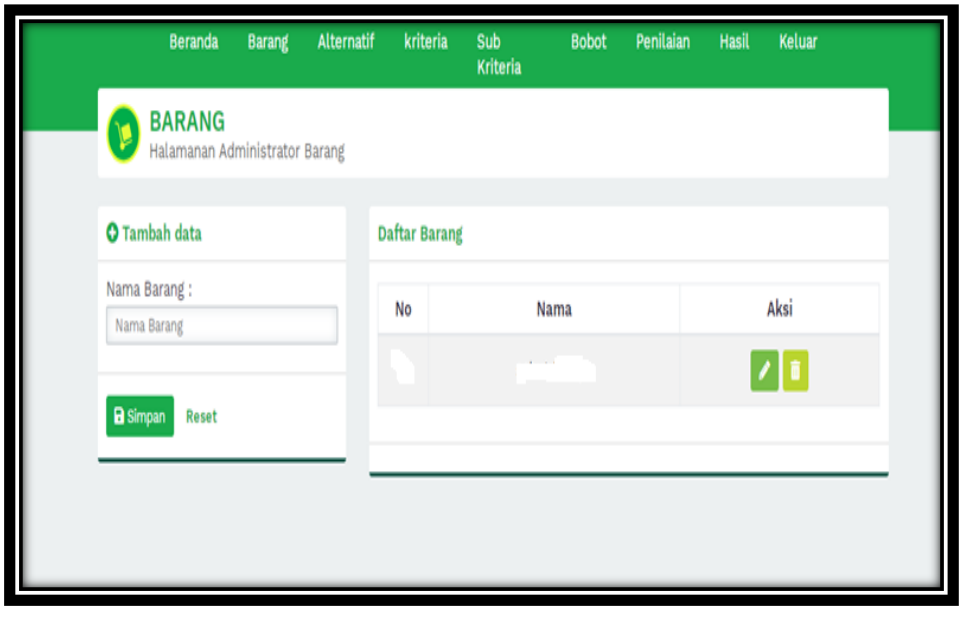

Image 7. Group Data Input Page

Alternative Data Input Page

On this page, alternative data information can be added, edited, deleted, and cancelled. For more details, see Figure 8. Next:

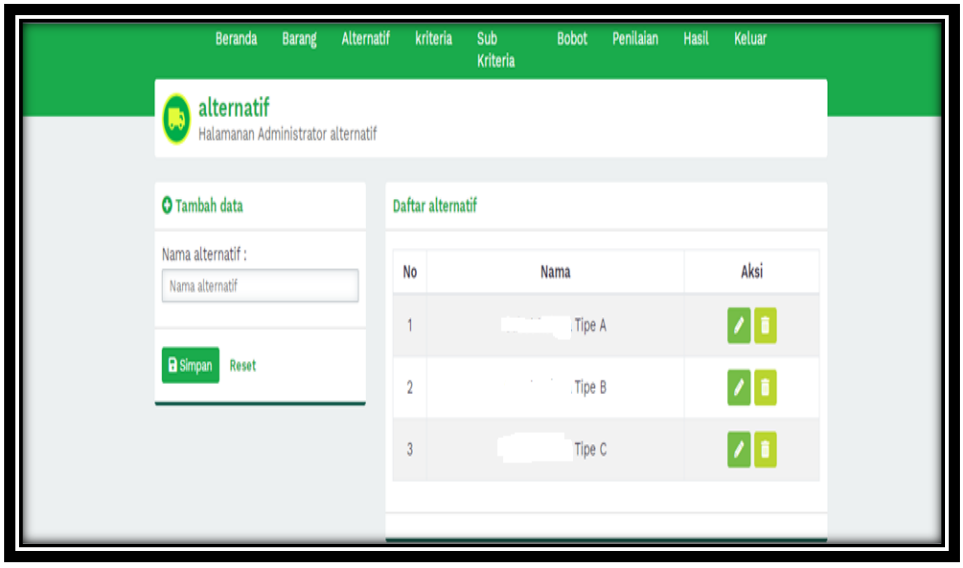

Image 8. Alternative Data Input Page

Criteria Data Input Page

On this page, the data information criteria can be added, edited, deleted and cancelled. For more details, see Figure 9. Next:

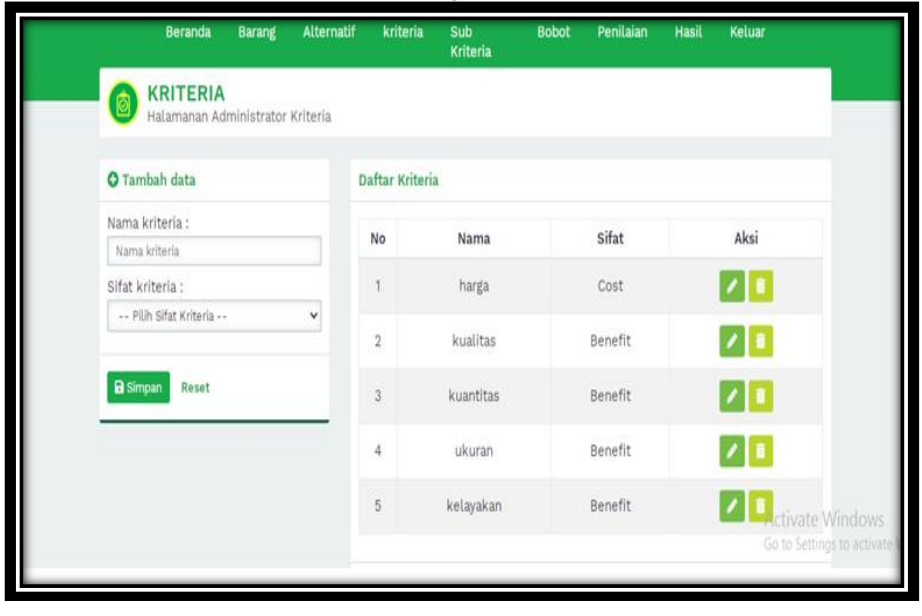

Image 9. Criteria Data Input Page

CONCLUSION

Based on the descriptions and explanations presented in the previous chapters, several conclusions can be drawn from the research that has been conducted. First, the implementation of the system can help and simplify the decision-making process in selection activities. Second, data storage and system organization in the form of a database can reduce storage space requirements and help overcome issues related to data redundancy, data loss, and poor data organization. Third, the PHP programming language is a simple, robust, object-oriented, and secure programming language that is suitable for solving selection and decision-support problems.

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