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Comparative Method of Weighted Product and TOPSIS to Determine The Beneficiary of Family Hope Program

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Abstract

The Family Hope Program (PKH) is a government program that provides cash assistance to impoverished households. The implementation of PKH in Cimrutu Village has not been implemented optimally, namely prioritizing the targets of PKH participants who are not yet on targets. This happened because the officers in registering the poor were still using manual methods. To simplify the work and avoid miscalculation of data with the old system, a decision support system was built that could help make decisions on PKH recipients quickly and more accurately. The calculation method used is the Weighted Product (WP) method. Data collection methods used in this study were interviews and documentation. System development in this study uses waterfall through black-box testing. System design tools in the form of DFD and ERD. The software used in making this application is Visual Studio 2012, Xampp, and Crystal Reports. The programming language used is Java with its supporting database using MySQL. This decision support system is expected to be able to help officers in Cimrutu Village in selecting and determining communities that are eligible for PKH.

Keywords: DSS; PKH; wp; TOPSIS.

1. Introduction

Family Hope Program (PKH) is a program that provides cash assistance to very poor households. The primary purpose of the family program of hope is to help reduce poverty by improving the quality of human resources in an impoverished community by providing conditional cash grants for low-income families in accessing specific health and education services [1].

PKH implementation has not been carried out optimally in Cimrutu Village, Cilacap. The program is devoted to underprivileged communities or poor people. However, the community questioned the presence of participants or prospective participants who assessed the PKH excluding the low-income family, while at the same time, there were people who in the family could have been eliminated or elected as participants PKH. This means that the target priority determination of PKH participants is not correct. Process of collecting prospective PKH receiver still using manual way so often the occurrence of less precise target because of fewer data in the update, this is due to village-level census officers in census data often negligent in delivering the altitude data of the subdistrict so that the people who are entitled to receive help sometimes get no help.

One method to determine the eligibility of recipients of PKH is to use a computerized system that can generate priorities that correspond to the criteria that are by implementing one of the methods of Weighted Product (WP) and TOPSIS[2][3]. The WP method uses multiplication to connect the branches of the attribute, where each attribute's branches must be first loaded with the corresponding attribute weights. While the TOPSIS method uses the principle that the chosen alternative should be the closest distance from the ideal positive solution and the farthest of the ideal negative solution from a geometric point of view using the euclidean distance to determine the relative proximity of an alternative with the optimal solution[4][5][6].

Based on the above background, the problem that will be discussed is how the results of the method calculation of WP and TOPSIS to help the related parties in the data and determine the eligibility of PKH beneficiaries quickly and accurately.

The limitations of the problem in this study are:

a. The PKH attribute types used in this study were income, number of children, floor type, roofing type, wall type.

b. This study will compare the results of the calculation of the Weighted Product and TOPSIS method.

c. This DSS is only used in Cimrutu village.

Based on the problems above, the purpose of this research is to build a decision support system that is expected to be used as a guideline and handle in determining the prospective beneficiaries of the PKH with more objectives and effective manner.

2. Literature Review

2.1. System

The system is a network of interconnected procedures, gathered together to do an activity or for a specific purpose[2]. The system can be interpreted as a group or set of organized elements, components, or variables, interacted with each other, interdependent, and integrated [7][8].

2.2. Decision

A decision is an activity to choose a strategy or action in the resolution of the problem. The action of choosing a strategy or action in which the manager will provide the best solution for something is called decision making. The purpose of the decision is to achieve specific targets or actions that must do [9][10].

2.3. Decision Support System

According to [4], a decision support system is an interactive information system that provides information, modeling, and data harvesting. It is also used to help make decisions in semi-structured situations and unstructured situations, where nobody knows exactly how decisions should be made[11][12].

DSS is usually built to support solutions to a problem or to evaluate an opportunity. The DSS is called the DSS application. The DSS application is used in decision making. The DSS application uses a flexible, interactive and adaptable CBIS (Computer Based Information System), developed to support solutions to unstructured, specific management problems[13].

2.4. Multi-Attributes Decision Making (MADM)

According to Rudophi [15], the MADM process is carried out through three phases, namely the preparation of the components of the situation, analysis, and synthesis of information. At the stage of the arrangement of the components situation, the assessment table will be formed which contains alternative identification, goal specification, criteria and attributes.

There are several methods used to solve the problem of MADM among others:

a. Simple Additive Weighting (SAW)

   The SAW method is often also known as the weighted summation method. The basic concept of the SAW method is finding the weighted summation of the performance rating on each alternative to all attributes.

b. Electre

   This method is one of the methods of multi-criteria decision making based on the concept of outrangking by using a comparison pair of alternatives based on each criteria accordingly[14].

c. Tecnique For Order Preference By Similarity To Ideal Solution (TOPSIS)

   This method uses the principle that the chosen alternative should be the closest distance from the ideal positive solution and the farthest of the ideal negative solution from a geometric standpoint using the euclidean distance to determine the relative proximity of an alternative to the optimal solution.

d. Analytic Hierarchy Process (AHP)

   This method is a framework to effectively make decisions on complex issues by simplifying and accelerating the decision making process by solving the issues into parts, arranging the tau section this variable in the hierarchy array, defines the numerical value of the objective consideration of the importance of each variable and

systematically defines these considerations to establish which variables have a high priority and act to affect the outcome of the situation[14].

e. Weighted Product (WP)

WP method according to [15] is a method that uses multiplication to link the rating of attributes, where the rating of each attribute should be pre-populated with the corresponding attribute weights.

2.5. Family Hope Program

a. Definition

Family Hope Programme (PKH) is a social assistance program for households that meet certain qualifications by enforcing the requirements in order to change the behavior of poor. The program, as intended, is a program of awarding money to the very poor households (RTSM) and for members of the RTSM family is obliged to enforce the stipulated terms and conditions.

b. Basic implementation

1) Decree of the Coordinating Minister for People's Welfare as chairman of the coordinating team for poverty reduction, No: 31/KEP/MENKO/-KESRA/IX/2007 about "the team of family hope Program controllers" on September 21, 2007.
2) Decree of the Minister of Social Republic of Indonesia No. 02A/HUK/2008 on "Family Hope Program Executive Team (PKH) year 2008" on 08 January 2008.
3) Governor's decision on "the technical Coordination team of the Provincial Family Hope Program(PKH) /TKPKD".
4) The Regent/Mayor decision on "the technical Coordination Team of the District family Hope (PKH) Program/town/city/TKPKD".
5) Letter of agreement to participate in the family hope Program.

3. Method

3.1. Data Collection

a. Interview

In this study, the interview method was conducted with the village head of Cimrutu and the head of the affair that took care of the PKH. The interview was conducted to find out about the criteria of the community being the recipient of PKH's help. The criteria are such as income, number of children, type of floor, type of roof, type of wall.

b. Observation

In this study observations were conducted by observing how the PKH process is being run, so that the solution to receive the scholarship process is carried out more effectively and still adjust the existing procedures.

c. Documentation

In this research, the method of documentation is done by observing the community data, details and income of the community, so that the solutions obtained by the acceptance of PKH help data processing is more effective.

3.2. System Development

In the design of information systems in this research, the method of system development used is waterfall method. The waterfall method is often called a sequential linear or classiclife cycle. The waterfall model provides a sequential or successive flow of software approach from analysis, design, coding, testing, and support phase [6].

The reason for the research is using waterfall development method because the implementation of the research follows the sequential groove such as the flow picture mentioned in easy-to-understand waterfall model, also supported with the detailed knowledge of data that will be processed in the system to be built later.

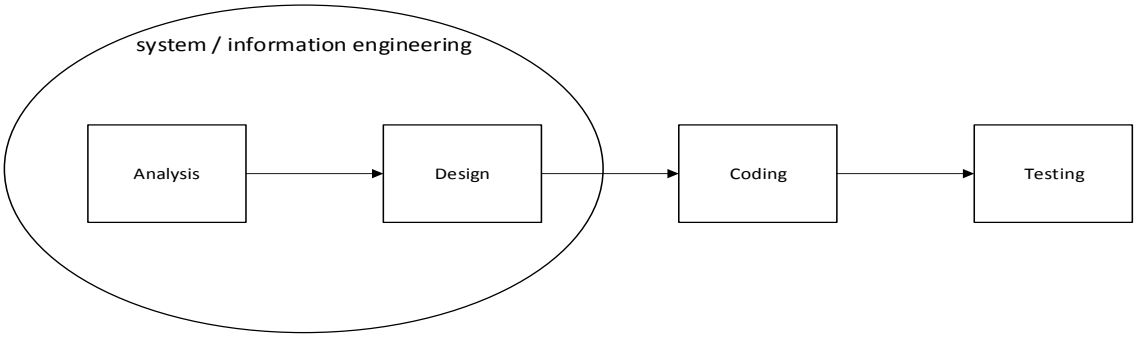

Fig. 1 Illustration of The Waterfall Model

4. Results and Discussion

4.1. System Analysis

The analysis phase of the system contains the description of an intact information system into the parts of its components with the intent to identify and evaluate the problems, barriers and needs expected by the system users to arise a thought, idea and proposed idea as one alternative solution to be offered to the user.

4.2. Design

a. Data Flow Diagram

Data Flow Diagram (DFD) is a system design tool that is a data flow that is used to describe the results of analysis and system design.

1) Context Diagram

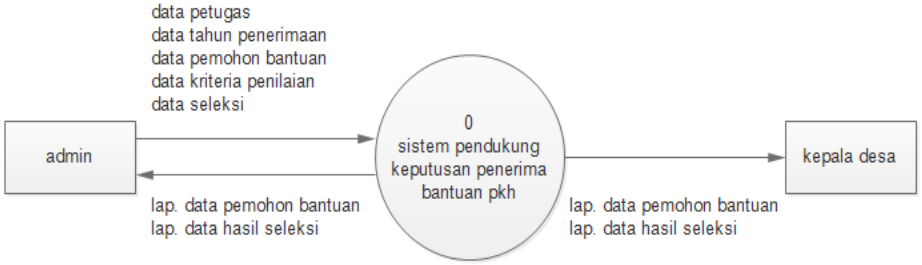

Fig. 2 Context Diagram

2) DFD 0

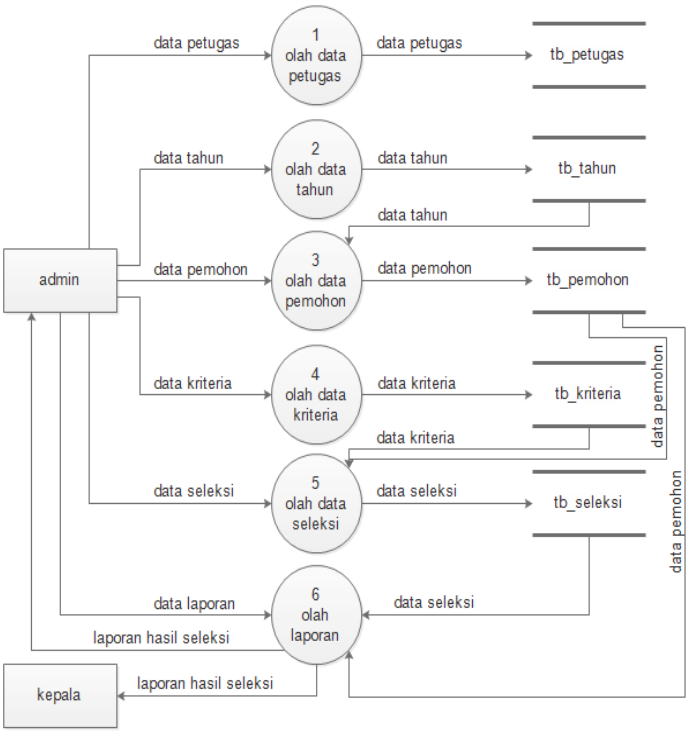

Fig. 3 DFD 0

b. Interface design

The interface design is done to find out how the interface designs of system programs have been created

1) Design Home page

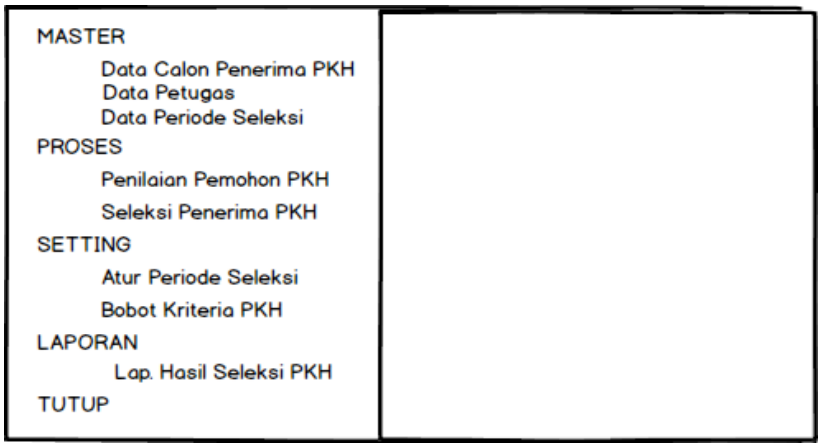

Fig. 4 Homepage Design

2) Applicant Page Design

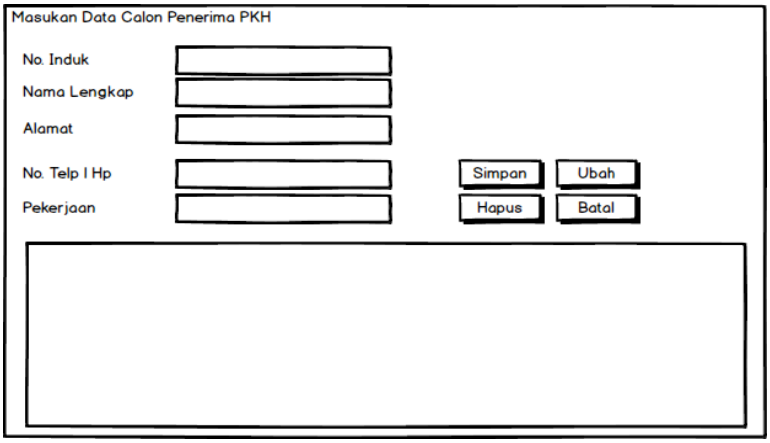

Fig. 5 Applicant Page Design

3) Design process selection

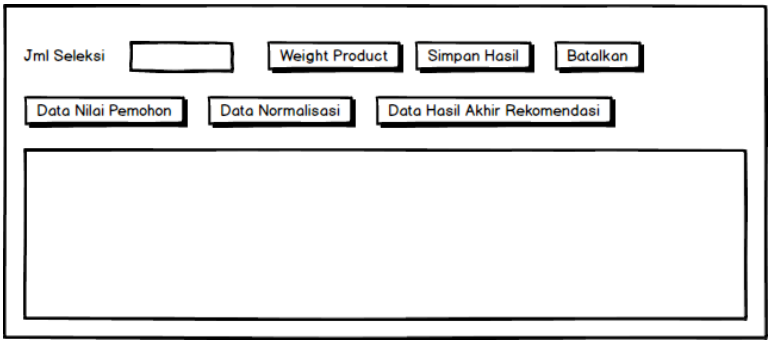

Fig. 6 Selection Process Page Design

4.3. Coding

At this stage, the system that has been designed began to be implemented implementation of coding implemented from the creation of databases using MySQL and coding using Visual Basic 2012.

a. Main Page

Fig. 7 Home Page

b. Applicant Page

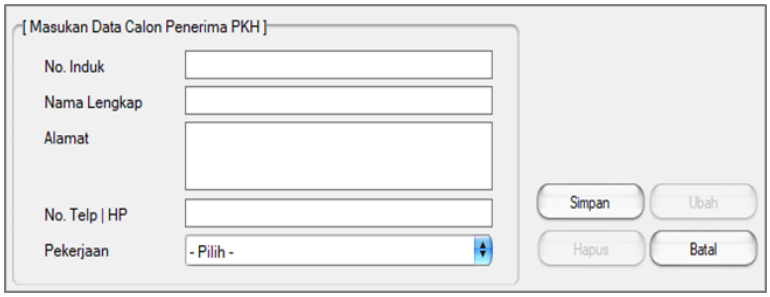

Fig. 8 Applicant Page

c. Selection Process Page

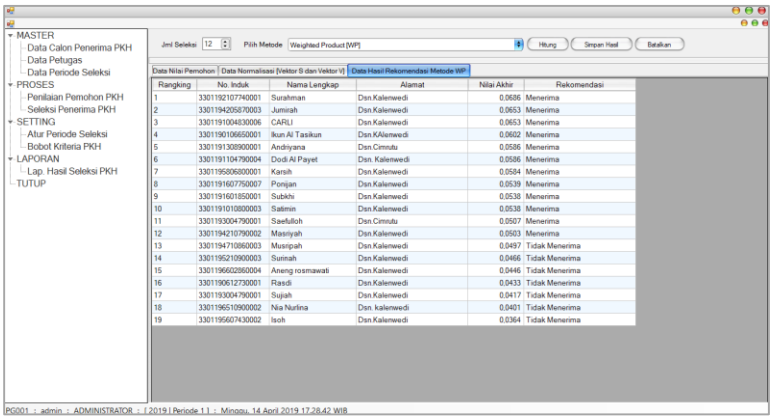

Fig. 9 Selection Process Page

4.4. Testing

According to [7] Blackbox testing is testing software in terms of functional specifications without testing the design and code of the program. Testing is intended to know if the functions, inputs and outputs of the software correspond to the specifications taken.

Black box testing is done by making a test case that is trying all functions by using the software as per the required specifications. A test case created to perform a black box test should be created with the correct case and an incorrect case.

5. Conclusion

a. Has successfully created application decision support system using Weighted Product (WP) method and TOPSIS to assist the relevant officers in the process of selection feasibility of PKH beneficiaries in Cimrutu village.

b. The result of a comparison of the WP and TOPSIS methods for case studies the feasibility selection of PKH beneficiaries in the village Cimrutu has a level of difference in results 2 alternatives or 10.52% and has a yield accuracy rate of 89.48%.

c. For a recommendation of a more suitable method in case studies the feasibility selection of PKH beneficiaries in Cimrutu village based on UAT testing is the TOPSIS method.

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