Decision Support System for Cash Direct Assistance for Victims of The Covid-19 Outbreak Based On Cloud Computing

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Abstract

The Covid-19 outbreak came suddenly and shocked all humans who live on earth because the rate of spread was so fast and resulted in high mortality and an extremely bad economic impact. The economic impact is very big, especially for the poor. Therefore, to protect the poor and vulnerable from the impact of the COVID-19 pandemic, the government of Indonesia has designed several social protection security programs. One of them is the Village Fund Direct Cash Assistance or "BLT" (Bantuan Langsung Tunai -Dana Desa), which is financial assistance sourced from the Village Fund and is aimed at poor and vulnerable people who have difficulty fulfilling their daily needs, especially due to the COVID-19 outbreak. So far, the process of selecting people who receive assistance has been done manually by considering several criteria that must be met by these community members. Because the feasibility assessment process is carried out manually, the process is less effective and less efficient. Thus, this research aims to assist the assessment process to determine assistance for the poor by using a decision support system so that the process can be carried out more efficiently and effectively. . The result of the research is a DSS model for determining direct cash transfers for the poor.

Keywords
assistance , DSS, covid-19, model

1. Introduction

The rapid spread of the COVID-19 virus, which became a worldwide pandemic in a matter of weeks, has been attributed to the hypermobility of our current lifestyle, globalization, and the connectivity and accessibility of Wuhan, the first epicenter Since then, the COVID-19 pandemic rapidly evolved into a situation with profound effects on lifestyle and travel worldwide, ranging from a dramatic decrease in air travel to an unprecedented increase in teleworking. These impacts resulted from governmental measures (e.g., travel restrictions and shutdowns of whole sectors in the economy) as well as individual choices to refrain from traveling in order to reduce exposure to other people and the risk of contamination (Turban, 1998). The Indonesian government states that the Corona virus Disease 2019 (COVID-19) has been declared by WHO as a global pandemic and in Indonesia is declared a type of disease that causes public health emergencies as well as non-natural disasters, which not only cause death but also cause considerable economic losses, The economic impact of this pandemic has had a dramatic effect on the well-being of many families and communities. For vulnerable families, loss of income will result in increased poverty, children who will receive less nutrition, and reduced access to health for things other than COVID-19. With cases confirmed in many low and middle income countries, this pandemic will have an impact on the poor who are most vulnerable to its impact.

By observing these conditions, the government provides cash assistance to the poor who have met several determined criteria in order to help their economic needs. This assistance is given periodically to the poor   The previous research used DSS and AHP (Analytical Hierarchy Process) for "BEKRAF" (Inayatulloh ,2029),   to control

immaterial priority issues for technology transfer implementation (Kumar,2009) and AHP analysis the Obstacles for green SCM implementation (Lee ,2012)

DSS is an information system that aims to provide information, guide, provide predictions and direct information users to make decisions better and based on evidence. DSS is usually developed for users at middle and highest management levels. In the development of information systems, DSS can only be developed if the transaction processing system (first level) and management information system (second level) are already running well. A good DSS must be able to extract information from the database, conduct analysis and provide interpretation in a form that is easy to understand with a format that is easy to use (Tripathi,2011).

This study aims to help the government select recipients of direct cash assistance to the poor affected by the corona19 outbreak using a decision support system and analytical hierarchical processing so that the selection process and determination of beneficiaries are more effective and efficient. The result of this research is a DSS model to determine direct cash assistance to the poor affected by the covid-19 outbreak

2. Literature Review

2.1 Decision Support System

Decision support systems are one of the latest developments in computer-based information systems. There are a variety of indications that their development differs in important ways from other types of information systems. This article reports the findings of an investigation of how 18 decision support systems were developed. Six major areas were explored:

(1) the nature of the developmental approach;
(2) user involvement in system development;
(3) the time required for system development;
(4) the incorporation of the decision maker's style in the system;
(5) the role of information systems and operations research/management science personnel in the developmental effort; and
(6) specific procedures and techniques used in system development Introduction should be built, used, and modified as needed.

The system should reflect the user's decision style (Hogue,1984). Other definition of DSS, Decision Support System is a collection of data and information processing procedures oriented to the use of models to produce various answers that can help management in decision making(Alavi,1985). Decision Support Systems are also defined as a computer-based information system that produces various alternative decisions to assist management in dealing with various structured or unstructured problems using data and models (Turban,1998)

2.2 Analytic Hierarchy Process

In solving problems with the AHP method, there are several basic principles that must be understood, among others (Saaty,2008)

(1) Decomposition
   1. Decomposition is solving or dividing a complete problem into its elements into a hierarchical form of the decision-making process, where each element or element is interrelated. The decision hierarchy structure can be categorized as complete and incomplete. A decision hierarchy is called complete if all elements at a level have a relationship to all the elements that are at the next level, while an incomplete decision hierarchy is the opposite of a complete hierarchy. The form of the
   2. Decomposition structure ie
      a. First level: Goal decision
      b. Second level: Criteria
      c. Third level: Alternatives
      d. The hierarchy of problems is used to help the decision-making process in a system by taking into account all the decision elements involved.
(2) Comparative Judgment Comparative Judgment is an assessment based on the relative importance of two elements at a certain level in relation to the level above it. Comparative Judgment is at the core of using AHP because it will affect the priority order of its elements. The results of the assessment will be shown in the form of a pairwise comparisons matrix, namely the pairwise comparison matrix containing the preference levels of

several alternatives for each criterion. The preference scale used is scale 1 which indicates the lowest level (equal importance) to scale 9 which indicates the highest level (extreme importance).

(3) Synthesis of Priority Synthesis of Priority is carried out using the eigenvector method to obtain relative weights for decision-making elements.

(4) Logical Consistency Logical consistency is done by aggressing all eigenvectors obtained from various levels of the hierarchy and then obtaining a weighted composite vector that produces a sequence of decision making. a. Priority setting each element in the hierarchy must be known its relative weight to one another. The aim is to determine the level of interest of the parties concerned in the problem against the criteria and hierarchical structure or the system as a whole. The initial step in determining the priority of the criteria is to compile pairwise comparisons, which is to compare in pairs all the criteria for each hierarchical sub-system. The comparisons are then transformed into a pairwise comparison matrix for numerical analysis. Suppose there is a hierarchical sub-system with criteria C and a number of n alternatives under it, Ai to An. Comparisons between alternatives for the hierarchical subsystem can be made in the form of an n x n matrix, as in table 1 below

$$
\begin{array}{c|cccc}
 & A_1 & A_2 & \cdots & A_n \\
\hline
A_1 & a_{11} & a_{12} & \cdots & a_{1n} \\
A_2 & A_{21} & a_{22} & \cdots & a_{1n} \\
\vdots & \vdots & \vdots & \vdots & \vdots \\
A_n & A_{n1} & a_{n2} & \cdots & a_{nn} \\
\end{array}
$$

Table 1. Comparison between alternatives

How far is the level of importance of row A to criterion C compared to column Al 19 2. How far is the dominance of row Al against column Al or 3. How many characteristics of the criterion. C are in row Al compared to column Al. The numerical values applied to all comparisons are obtained from the ratio scale 1 to 9 that has been set by Saaty, as in table 3 below. Table 3: Pairwise Comparison Rating Scale (Bhushan, 2004)

2.3 Model

A model is a representation, or description that describes an object, system, or concept, which is often a simplification or idealization. The form can be in the form of a physical model (mock-up), a prototype form, an image model (design drawing, computer image), or a mathematical formula. The model has been used in many studies such as the TAM model for SME(Inayatulloh,2020), the block chain model for regional head elections(Inayatulloh,2020), the CSF Model for SMEs(Inayatulloh,2020), a model for new businesses (Inayatulloh,2016) and a model for early warning systems for diseases(Inayatulloh,2015)

3. Methods

The social and economic impacts caused by the COVID19 pandemic have a profound effect on the level of community welfare. This is due to the limitation of economic activity which at a macro level reduces economic growth and causes many people to lose their jobs, which has the potential to increase the number of poor people. The government has designed various new policies in order to reduce the spread and handling of this virus. One of them is by publishing:

Village Fund Direct Cash Assistance (BLT-Dana Desa) is financial assistance from the Indonesian government to poor families in villages sourced from the Village Fund to reduce the impact of the COVID-19 pandemic. The value of "BLT Dana Desa" is IDR 600,000 per month for each poor family that meets the criteria and is given for 3 (three) months and IDR 300,000 per month for the following three months. The" BLT-Dana Desa" is tax exempt (Minister of Finance Regulation,2020)

No	Aspect	score	
		5	1
A1	Citizen of the Republic of Indonesia	Yes	No
A2	Have a National Identity Number	Yes	No
A3	Have a family card	Yes	No

General requirements

		5	1
B1	Has not received any assistance from the government	Yes	No
B2	Lost job due to the covid-19 outbreak	Yes	No
B3	Do not have savings for living expenses for the next 3 months	Yes	No
B4	Have a family member who is chronically ill	Yes	No
B5	The head of the family is a woman, elderly or disabled	Yes	No

B. Special requirements

		5	1
C1	Data has been verified by population officers	Yes	No
C2	The data has been approved and signed by the local government	Yes	No

Table 2 the criteria for cash transfers

Based on table 2 it can be concluded that people who receive direct cash assistance must meet several criteria. Our research will produce a DSS model by considering these multi.

C. Method

The DSS model is designed to use information based on table 2. Information about the status of residence and other related information will be stored on. AHP and DSS are methods to be used to evaluate the feasibility of potential beneficiaries. Data and information on community members of potential beneficiaries received by officers will be given priority order for analysis by DSS. Each criterion has a first weight. Table 3 shows the weights between the criteria

	Criteria 1	...	Criteria n
Criteria 1			
...			
Criteria n			

Alternative	f1(.)	F2(.)	...	fm(.)
a1	f1(a1)		...	
a2	f1(a2)		...	
...	...	...	...	...

Table 3 Weight comparison matrix

The weighting criterion is the result of the Analytical Hierarchical Processing calculation to describe the consistency test. The final rating of the documents of the prospective recipients of cash transfers will test the consistency. Table 3 illustrates the analysis of the data. The alternative represents the potential recipient of direct cash assistance, only fm (.) = Assessment criteria. Sorting based on alternatives with the highest value
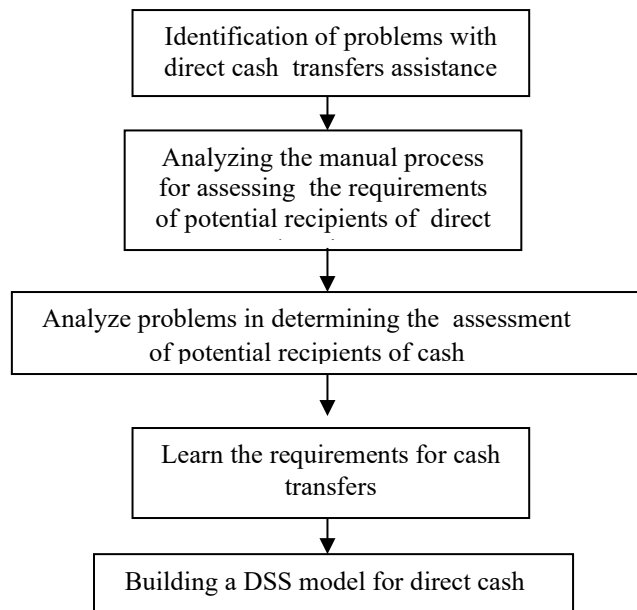

Figure 1. Research method

Figure 1 shows the activity of completing the requirements of the proposal. The first step is determining the priority criteria. The next step filling in the comparison of one requirement with other requirements. The value in the process of calculating AHP and Promethee which will result in a ranking of proposals that have the highest value

4. Results and Discussion

The DSS model of cash transfers for the poor family affected by the Covid-19 outbreak is described in Figure. 2.

The model depicted in Figure 2 is a data base model that contains data on prospective recipients of cash assistance, then the model base contains the AHP analysis section containing organized data and decision hierarchies. These parts are part of the DSS model to be built.

Figure 3 explains the use case diagram of the DSS model to be built where in this diagram there are 3 actors involved in the system, namely the collected data, the system administrator and the government. Each actor has a different role, the data collector fills in the data of prospective recipients of cash assistance, the administration system inputs data related to the data model and government will verify and validate the data.
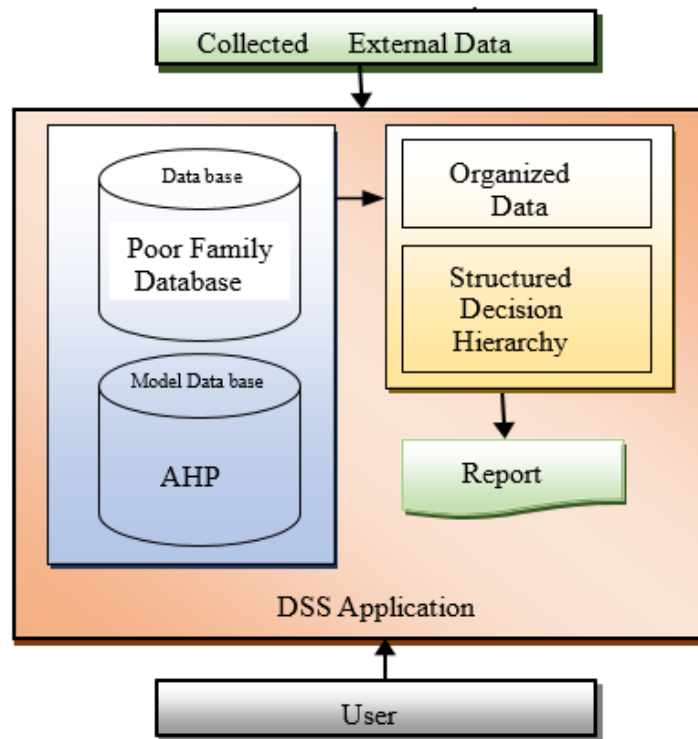

Figure 2 DSS is a cash transfer model for the poor affected by the Covid-19 outbreak
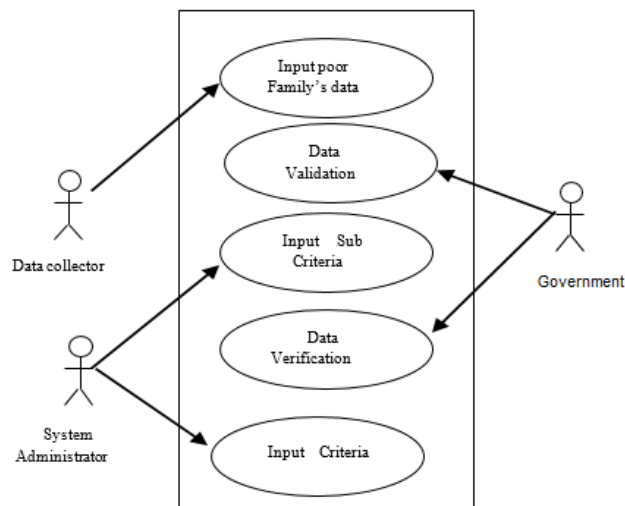

Figure 3 Use Case Diagram for DSS Model BLT

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Figure 4 describes a cloud computing-based DSS model where the service used is PaaS or Platform as Service because the government-owned infrastructure is already available.
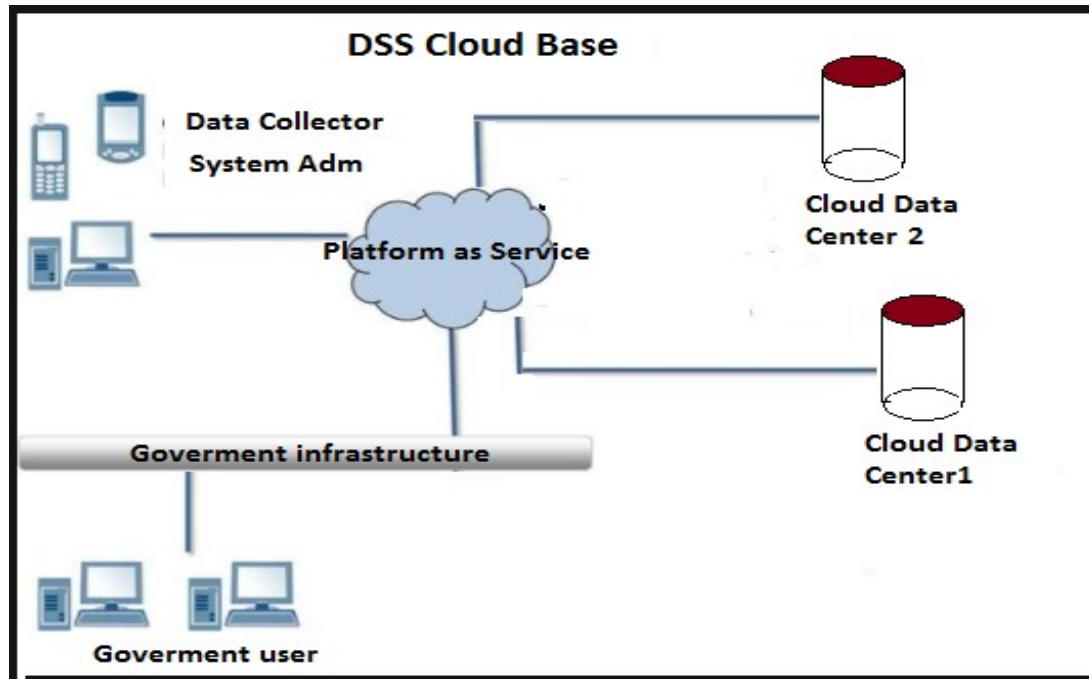

Figure 4. DSS cloud base for BLT

The result of this research is that the cloud-based DSS model can be used to help the government determine that members of the community, including poor families affected by the Covid-19 outbreak, get direct cash assistance (BLT), given the many criteria that must be met and the amount of other government assistance that has the potential for overlapping. Assistance so that direct cash transfers are not on target

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Biography

Inayatulloh is a candidate doctor at Bina Nusantara University's Doctor of Computer Science. Since 2000, Inayatulloh has been a lecturer at Bina Nusantara University, school of information system. I am experienced in system development in several companies such as garment, petroleum, retail and others. Scopus indexed publications have been produced with topics related to information systems such as e-learning, e-SCM, e-CRM. E-government, block chain and others