

# Decision Support System Analysis as a Recommendation for the Program Keluarga Harapan (PKH) Using a Decision Table in Pematang Serai Village

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**Abstrak** The Pematang Serai Village Office is a government institution responsible for addressing various issues in the village, including providing aid to the community. The office frequently organizes social programs, such as distributing financial aid to underprivileged residents. However, in managing these funds, problems often arise, such as aid recipients not being properly targeted and the manual process of collecting the required documentation. Additionally, when creating reports, staff must manually go through the files one by one. Each condition selected will have two possible outcomes: fulfilled or not fulfilled. If  $x$  conditions are selected, there will be  $N$  possible outcomes, calculated as  $N = 2^x$ . The rule above shows that columns 17 through 64 no longer affect the decision to provide aid, so those columns can be removed. This writing aims to develop an application that simplifies the process of calculating beneficiaries and distributing aid in Pematang Serai Village, making aid management more organized. The development method used is the Decision Table Method, with system requirements analysis conducted through observation and interviews. The system design is documented using UML (Unified Modeling Language). The results of this research are implemented in a web-based system, which will make the management of financial aid more effective.

**Kata Kunci:** Desa Pematang Serai, DSS, Decision Table.

## 1. INTRODUCTION

The issue of decision-making is essentially the process of selecting from various alternative actions that can be taken, through a specific mechanism, with the hope of producing the best decision. The formulation of a decision-making method is a way to develop logical relationships underlying the decision problem into a mathematical method that reflects the relationships between the factors involved. Therefore, the decision-making process must be conducted step by step, systematically, consistently, and with consideration of various factors from the outset. Discussing poverty is a never-ending issue and remains a major challenge to overcome. Poverty is one of the main problems faced by almost every country, especially developing countries like Indonesia [1]. The poverty rate in Indonesia continues to rise, one of the causes being the low level of education and the limited availability of jobs. According to data from the Central Statistics Agency (BPS), the number of poor people in Indonesia reached 27.55 million in September 2020, an increase of 1.13 million people compared to March 2020, and an increase of 2.76 million people compared to September 2019. As of September 2020, the poverty rate was recorded at 10.19 percent, up by 0.41 percentage points from March 2020, and 0.97 percentage points from September 2019.

The direct cash assistance distributed is expected to be allocated quickly and accurately to beneficiary families in the village. The aim is to ease the economic burden, especially for those significantly affected. The scheme for assisting with the Family Hope Program (PKH) differs from other aid programs [2]. For PKH funded by Village Funds, the prospective recipients are determined by the village government through Village Deliberations (Musdes). However, the determination of PKH recipients in Pematang Serai Village has not been optimal [3]. This is due to the village authorities still relying on estimates without clear calculations when selecting eligible recipients. Additionally, the village has difficulty with the selection process due to the large number of criteria that must be considered. As a result, some residents protested the selection outcomes, as some who should have qualified for the assistance did not receive it, while others who should not have qualified did. This issue has sparked the idea of developing software or a system to assist decision-makers in providing recommendations for PKH recipients that meet the criteria. One system capable of supporting problem-solving and facilitating better communication is the Decision Support System (DSS) [4]. With this system, it is hoped that the village authorities can make better decisions in determining PKH recipients, ensuring that assistance is accurately targeted at those who truly need it [5].

For poor communities, government assistance is very helpful in easing the burden of their lives. To address the impact of crises on inability, extra efforts, known as "rescue actions," are needed in the form of direct aid aimed at reducing the economic burden on the community. This action is taken so that underprivileged families can continue to meet their daily needs. In 2023, the Indonesian government re-launched the Family Hope Program (PKH) to help the community cope with rising raw material prices. This program aims to ease the economic burden, especially for low-income individuals. The main goal of PKH is to provide financial assistance to the community so they can continue to meet basic needs such as food, education, and healthcare, even amidst rising commodity prices. In the Decision Support System (DSS) used, the

model applied is the Decision Table Method. This method was chosen because it is considered effective in solving complex problems. A decision table is a table that describes various conditions and can be used as a tool in decision-making. The structure of the decision table consists of four main parts: Conditional Stub, Conditional Entry, Action Stub, and Action Entry. The Conditional Stub contains the conditions to be selected, while the Conditional Entry contains the possibilities of the selected conditions, where each condition has two possibilities: fulfilled (denoted by "Y") and not fulfilled (denoted by "N"). If  $x$  conditions are selected, there will be  $2^x$  possible outcomes. The Action Stub contains the statements of actions to be taken, whether the conditions are fulfilled or not. Meanwhile, the Action Entry is used to mark which actions will be taken and which will not.

## 2. RESEARCH METHODOLOGY

### 2.1 System

A system is a group of interacting or interrelated elements that act according to a set of rules to form a unified whole. A system, surrounded and influenced by its environment, is described by its boundaries, structure, and purpose, and is expressed through its function. A system is the subject of study in system theory [6]. A subsystem is a set of elements, which is a system in itself, and a component of a larger system. The IBM Mainframe Job Entry Subsystem Family (JES1, JES2, JES3, and their predecessor HASP/ASP) is an example. The main elements they possess include components that handle input, scheduling, spooling, and output; they also can interact with both local and remote operators. A subsystem description is a system object that contains information defining the characteristics of the operating environment controlled by the system. Data Testing is conducted to verify the correctness of the configuration data of individual subsystems and they are related to one subsystem to test its specific application.

### 2.2 Information

Information is a set of messages, data, or facts that have been processed and organized in such a way using specific methods to produce something useful and meaningful that can be understood by its recipient or those who need it as a basis for making decisions or taking action [7]. Information can be found in any format or form, whether in print or online media. Data can be considered information when it truly functions or can be used. As cited from Arkansas State University, there are various types of information we may encounter, such as factual, analytical, subjective, and objective information. Factual information relates only to facts and usually provides little in-depth background on a specific topic. Meanwhile, analytical information is usually produced by researchers in specific studies.

### 2.3 Information System

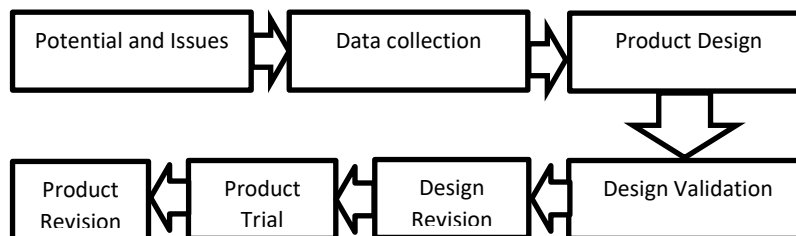
An information system is a system within an organization that addresses the need for processing daily transactions to support the organization's operational and managerial functions, as well as its strategic activities, to provide the necessary reports for certain external parties [8]. A computer information system is a system that consists of people and computers that process or interpret information. This term is sometimes used in a more limited sense to refer only to software used to run computerized databases or to refer only to computer systems. Information systems refer to the academic study of systems, particularly concerning information and complementary networks of hardware and software used by individuals and organizations to collect, filter, process, create, and distribute data. Emphasis is placed on information systems that have definite boundaries, users, processors, storage, input, output, and the communication networks mentioned above. An information system is a system that combines human labor and technology to support management and operational activities. Archives or new data will be well stored and recorded, providing users with ease of access to find data or information when needed [9].

Each specific information system aims to support operations, management, and decision-making. Information systems refer to the information and communication technology (ICT) used by organizations, as well as the ways people interact with this technology in supporting business processes. Some authors make a clear distinction between information systems, computer systems, and business processes. Information systems usually include ICT components but are not entirely about ICT; instead, they focus on the end use of information technology. Information systems are also distinct from business processes. Information systems help control the performance of business processes. Alter suggests it is beneficial to view information systems as a special type of work system. A work system is a system in which humans or machines perform processes and activities using resources to produce specific products or services for customers. Information systems are work systems whose activities are dedicated to capturing, transmitting, storing, retrieving, manipulating, and displaying information. Thus, information systems are interconnected with data systems on one side and activity systems on the other. Information systems can also be viewed as a form of communication system in which data represent and are processed as a form of social memory. An information system can also be considered a semi-formal language that supports human decision-making and actions.

Information systems are a central focus of study in organizational informatics. There are various types of information systems, such as transaction processing systems, decision support systems, knowledge management systems, learning management systems, database management systems, and office information systems. For most information systems, information technology is a crucial and versatile resource that enables humans to perform tasks that the human brain is not well-suited for, such as handling large amounts of information, performing complex calculations, and controlling many simultaneous processes. Information technology is an essential and adaptable resource available to executives. Many companies have created the position of chief information officer (CIO), who sits on the executive board alongside the chief executive officer (CEO), chief financial officer (CFO), chief operating officer (COO), and chief technical officer (CTO). The CTO can also serve as the CIO and vice versa. The chief information security officer (CISO) focuses on information security management.

## 2.4 Development Methods

The type of research used in this study is the research and development (R&D) method. Research and development is a research method used to produce a specific product and test the effectiveness of that product. The steps of research and development are shown in the following figure:



**Figure 1:** Research and Development Method (R&D)

The steps of the research and development process demonstrate a cycle that begins with the existence of a need or problem that requires a solution using a specific product. In this study, the method used for system design is the Prototype Method. The prototype method involves creating a system model (prototype) that can be developed or constructed quickly. The purpose of this prototype method is to obtain an overview of the application that will be built through the design of the prototype application, which will then be evaluated by the user. [10].

## 2.5 Decision Support System

Decision Support Systems (DSS) are a part of computer-based information systems, including knowledge-based systems or knowledge management systems used for decision-making within an organization or company. They can also be described as computer systems that process data into information to make decisions regarding specific semi-structured problems [11]. According to Moore and Chang, decision support systems can be described as systems capable of supporting ad hoc data analysis and decision modeling, decision-oriented planning, and future-oriented planning, and are used in unusual situations. According to Raymond McLeod, Jr., decision support systems provide capabilities for problem-solving and communication for semi-structured issues [12].

From the understanding above, it can be explained that decision support systems are not decision-making tools; rather, they are systems that assist in decision-making by providing relevant and necessary information derived from processed data to make decisions about a problem more quickly and accurately. Therefore, this system is not intended to replace decision-making in the decision-making process. Essentially, DSS is designed to support all stages of decision-making, from identifying problems, selecting relevant data, and determining the approaches used in the decision-making process, to evaluating choices. The term DSS refers to a system that utilizes computer support in the decision-making process [13]. To provide a deeper understanding, several definitions of DSS developed by various experts will be outlined, including one by Man and Watson, who define DSS as an interactive system that assists decision-makers through the use of data and decision models to solve both semi-structured and unstructured problems [14].

According to Simon (1960), there are three phases in the decision-making process, which are as follows:

1. Intelligence

This phase involves the process of searching and detecting the scope of problems through problem recognition. Input data is obtained, processed, and tested to identify the issues.

2. Design

This phase is the process of finding, developing, and analyzing alternative actions that can be taken. It includes testing the feasibility of solutions.

### 3. Choice

In this phase, the process of selecting among various possible actions takes place. The results of this selection are then implemented in the decision-making process.

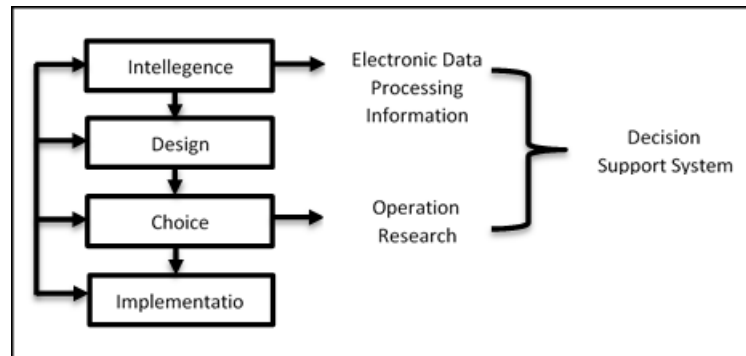


Figure 2. Phases of the Decision Making Process

The concept of Decision Support Systems (DSS) is limited to activities that assist managers in evaluating and replacing their roles and positions. The concept of DSS was first introduced in the early 1970s by Michael Scott Morton, who referred to it as a "Management Decision System." The DSS concept is an interactive computer-based system that aids in decision-making by utilizing data and models to address unstructured and semi-structured problems. DSS is designed to support all stages of decision-making, beginning with identifying problems, selecting relevant data, determining the approaches used in the decision-making process, and evaluating choices. Decision-making, as a continuation of problem-solving methods, serves as the starting point for all conscious and directed human activities, both individually and collectively, in institutional and organizational contexts. Additionally, the function of decision-making is inherently futuristic, meaning it relates to the future, a time to come, when its effects or impacts endure for a considerable duration [15], [16], [17], [18]

The decision-making process begins with the intelligence phase. Reality is examined, and problems are identified and defined. Ownership of the problem is also established. Next, in the design phase, a model representing the system is constructed. This is done by making assumptions that simplify reality and writing down the relationships among all variables. This model is then validated, and criteria are established using principles for selecting and evaluating the identified alternatives [19]. The model development process often identifies alternative solutions, and vice versa. The next phase is the choice phase, which involves selecting the proposed solutions for the model (without requiring the presented problem). This solution is tested to determine its viability. Once the proposed solution appears reasonable, we are ready to move to the final phase, which is the implementation of the decision. Successful implementation results in the resolution of real problems, while failure in implementation requires us to return to the previous phase [20].

### 2.6 Decision Table

A decision table is a structured tool for visualizing decision rules in rows and columns [21]. The decision table works by combining all existing conditions, where these conditions contain rules stored in tabular form for a specific problem, ensuring that no possibilities are overlooked in the logical analysis of that problem. There are five types of decision-making using decision tables: (1) maximax, (2) maximin, (3) minimax regret, (4) Hurwicz, and (5) equal likelihood. The decision table is a method used to explain and logically describe the flow of data stored within it, which can be used to solve a problem. The decision table works by combining all existing conditions, where these conditions contain rules stored in tabular form for a specific problem, ensuring that no possibilities are overlooked in the logical analysis of that problem. A good decision table will cover or account for all situations by showing all combinations or sets of conditions [22], [23], [24], [25].

### 2.7 Elemen Decision Table

Elemen decision table dapat ditunjukkan pada tabel dibawah ini:

**Tabel 1** Elemen Decision Table

		Table Header							
		1	2	3	4	5	6	7	Condition Entries
Condition Stub	1								
	2								
Action Stub	1								Action Entries
	2								

Tiap elemen penyusun decision table dapat dijelaskan sebagai berikut:

- Table Header : nama dari tabel
- Condition Stub: menunjukkan kondisi
- Action Stub : menunjukkan sebagai akibat dari action/aksi
- Rules Column : sebagai tempat dari pernyataan Y (yes) dan N (no) untuk mengeset logika dari kondisi.
- Conditions Entries: merupakan pernyataan Y atau N yang mengikuti status dari setiap kondisi.
- Action Entries : digunakan untuk setiap rule dan berisi satu atau lebih X untuk mengindikasikan bahwa aksi tersebut telah dipilih dan digunakan atau juga tidak berisi apa-apa/blank untuk mengindikasikan bahwa tidak ada aksi yang digunakan.

### 3. RESULTS AND DISCUSSION

#### 3.1 Discussion Analysis

The PKH Program is a National Program aimed at accelerating poverty alleviation. Since 2007, the Government of Indonesia has implemented the PKH. This Social Protection Program, also known internationally as Conditional Cash Transfers (CCT), has proven to be quite successful in addressing poverty issues faced in these countries, especially chronic poverty. As a conditional social assistance program, PKH provides access for poor families, particularly pregnant women and children, to utilize various available healthcare (faskes) and educational services (fasdik) in their vicinity. The benefits of PKH are also being encouraged to include individuals with disabilities and the elderly while maintaining their social welfare status by the mandate of the constitution and the Nawacita of the President of Indonesia. The social assistance of PKH in 2019 is divided into two types: Permanent Assistance and Component Assistance, provided under the following provisions:

- Permanent Assistance for Each Family
  - Regular
  - PKH ACCESS
- Component Assistance for Each Individual in the PKH Family
  - Pregnant women
  - Early childhood
  - Elementary school
  - Junior high school
  - Senior high school
  - Severe disabilities
  - Elderly

Component assistance is provided for a maximum of 4 individuals within one family.

#### 3.2 Decision Table

In general, a decision table is similar to the concept of a decision tree, as both use the basic concepts of if-else or switch-case. The difference lies in their representation, where a decision table uses a table format. The table is divided into two main parts: conditions and actions. Conditions are the factors that influence the decision-making process, while actions represent the decisions made. The decision taken can be more than one.

Here is a description of the decision table:

- A decision table is a table used as a tool to resolve logic within a program.
- Algorithms containing multiple layered decisions are very difficult to represent directly using structured English or pseudocode and can be initially created using a decision table.
- Therefore, decision tables are effectively used when the conditions to be selected within the program are numerous and complex.

The following will illustrate how to make decisions regarding the allocation of PKH funds to the community of Pematang Serai Village using the Decision Table method. The table below outlines the criteria for PKH recipients within the community.

NO	Code Condition	Condition
1	KS1	Have an Electronic Resident Identity Card (e-KTP) as proof of citizenship.
2	KS2	Make sure you are included in the group that needs assistance registered in the local sub-district.
3	KS3	Not a member of the TNI, Polri or State Civil Apparatus (ASN).
4	KS4	Have never received other assistance such as BLT UMKM, BLT subsidies, salaries, or Pre-Employment Cards before
5	KS5	Registered with the Indonesian Ministry of Social Affairs' Integrated Social Welfare Data (DKTS).
6	KS6	Very Poor Families (KSM)

The role rules above show that columns 17 to column 64 no longer affect the action of giving funds, so these columns can be deleted.

RULE	KODE SYARAT						KODE DANA
	KS1	KS2	KS3	KS4	KS5	KS6	
1	Y	Y	Y	Y	Y	Y	KD1
2	Y	Y	Y	N	Y	Y	KD2
3	Y	Y	Y	Y	N	Y	KD2
4	Y	Y	Y	Y	Y	N	KD2
5	Y	Y	Y	Y	N	N	KD3
6	Y	Y	Y	N	N	N	KD4
7	Y	Y	Y	N	N	Y	KD4
8	Y	Y	Y	N	Y	N	KD4
9	Y	N	Y	Y	Y	Y	KD5
10	Y	N	N	Y	Y	Y	KD5
11	Y	N	N	N	Y	Y	KD5
12	Y	N	N	N	N	Y	KD5
13	Y	N	N	N	N	N	KD5
14	Y	Y	N	Y	Y	Y	KD5
15	Y	Y	N	N	Y	Y	KD5
16	Y	Y	N	N	N	Y	KD5

From the table above, the following are the steps taken in creating the decision table.

1. Steps for creating the decision table for the recipient named xx
  - a. Determine the conditions to be selected.
    - Does xxxxx meet the eligibility criteria with code KS1?
    - Does xxxxx meet the eligibility criteria with code KS2?
    - Does xxxxx meet the eligibility criteria with code KS3?
    - Does xxxxx meet the eligibility criteria with code KS4?
    - Does xxxxx meet the eligibility criteria with code KS5?
    - Does xxxxx meet the eligibility criteria with code KS6?
  - b. Determine the number of possible outcomes that may occur.
    - Yes, X meets the eligibility criteria for KS1, KS2, KS3, KS4, KS5, and KS6.
  - c. Determine the action to be taken.
    - I will receive PKH funds.
  - d. Condition entry
    - Condition entry is filled in such a way that all possible outcomes can be represented.
  - e. Fill in the action entry
    - Action entry is filled in column by column from the first column to the Nth column. Since xx meets all the eligibility criteria, I will receive funds with code KD1.
2. Steps for creating the decision table for the recipient named by
  - a. Determine the conditions to be selected.
    - Does yyyyyy meet the eligibility criteria with code KS1?
    - Does yyyyyy meet the eligibility criteria with code KS2?
    - Does yyyyyy meet the eligibility criteria with code KS3?
    - Does yyyyyy meet the eligibility criteria with code KS4?

- Does yyyyyy meet the eligibility criteria with code KS5?
  - Does yyyyyy meet the eligibility criteria with code KS6?
- b. Determine the number of possible outcomes that may occur.
- yyyyyy meets the eligibility criteria for KS1, KS2, KS3, and KS4.
  - yyyyyy does not meet the eligibility criteria for KS5 and KS6.
- c. Determine the action to be taken.
- yyyyyy will receive PKH funds according to the criteria.
  - d. Fill in the condition entry
  - Condition entry is filled in such a way that all possible outcomes can be represented.
- e. Fill in the action entry
- Action entry is filled in column by column from the first column to the Nth column. Since it does not meet the eligibility criteria KS5 and KS6, you will receive funds with code KD3.
3. Steps for creating the decision table for the recipient named Z
- a. Determine the conditions to be selected.
- Does a meet the eligibility criteria with code KS1?
  - Does a meet the eligibility criteria with code KS2?
  - Does a meet the eligibility criteria with code KS3?
  - Does a meet the eligibility criteria with code KS4?
  - Does a meet the eligibility criteria with code KS5?
  - Does a meet the eligibility criteria with code KS6?
- b. Determine the number of possible outcomes that may occur.
- Z meets the eligibility criteria for KS2 and KS4.
  - zzzzz does not meet the eligibility criteria for KS1, KS3, KS5, and KS6.
- c. Determine the action to be taken.
- I will not receive assistance funds.
- d. Fill in the condition entry
- Condition entry is filled in such a way that all possible outcomes can be represented.
- e. Fill in the action entry
- Action entry is filled in column by column from the first column to the Nth column. Since it does not meet the established eligibility criteria, Sugiarti will not receive funds with code TDK.

## 4 CONCLUSION

Based on the results and discussion regarding the decision support system for the distribution of social assistance funds under the PKH program using the Decision Table in the village of Pematang Serai, several conclusions can be drawn to achieve the desired objectives. The conclusions that can be made are as follows: The system developed is capable of processing data from applicants for funds from the less fortunate community into useful information for the village of Pematang Serai in the decision-making process to determine the recipients of PKH funds. This system uses a Decision Table to establish the criteria that participants must meet, thereby facilitating the village authorities in determining who is eligible to receive PKH funds. The developed system accelerates the process of determining the recipients of PKH funds because the selection process is carried out automatically. The operator only needs to accurately input the participant data according to the existing regulations, and this data will be automatically processed using the Decision Table method to produce a list of PKH fund recipients from the results of the system's process.

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