

The Use of a Decision Support System in The Analysis of the Program Keluarga Harapan (PKH) Provision Using the Table Decision Method in Desa Pematang Serai

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Abstract

The Pematang Serai Village Office is a government office that handles all issues in the village, including assisting the community. It often holds social agendas, such as providing financial aid to underprivileged residents. However, the process of managing this financial aid frequently faces challenges, such as misallocation of aid recipients and manual collection of requirements. Additionally, when preparing reports, it is necessary to review documents one by one. The goal of this writing is to create an application that simplifies the process of calculating aid recipients and distributing financial assistance in Pematang Serai Village, allowing for better organization of aid management. The development method used is the Decision Table Method, analyzing system requirements through observation and interviews. The system design results are documented using UML (Unified Modeling Language). The findings of this research are implemented in a web-based system, making the management process of financial aid more efficient.

Keywords: PKH, Decision Table Method

Introduction

Decision-making is essentially the process of selecting from various available alternatives, to produce the best possible decision. This process is carried out through a structured mechanism. The formulation of decision methods is an effort to develop logical relationships underlying decision problems into a mathematical method that reflects the relationships between the involved factors. Therefore, decisions must be made through a gradual, systematic, and consistent process, taking into account various factors from the outset [1]. Poverty is a complex and difficult issue to resolve, and it continues to be a major challenge, especially in developing countries like Indonesia. One of the main factors exacerbating poverty in Indonesia is the low level of education and the limited availability of job opportunities. According to data from the Central Bureau of Statistics (BPS), in September 2020, the number of poor people reached 27.55 million, an increase compared to previous periods. The poverty rate also rose to 10.19 percent, highlighting the urgency of efforts to tackle this issue.

Cash transfer programs are expected to be well-targeted and help families who are truly in need, especially in facing economic challenges. Assistance schemes, such as the Family Hope Program (PKH), aim to alleviate the economic burden of poor communities [2]. However, in some villages like Pertumbukan Village, the determination of PKH beneficiaries is still not

optimal. The village often relies on estimates without accurate calculations, resulting in aid recipients not always being well-targeted. From this issue, the idea emerged to develop software that can assist decision-makers in selecting PKH beneficiaries according to predetermined criteria [3]. A Decision Support System (DSS) can provide better recommendations in determining who is eligible for assistance. With this system, it is expected that aid distribution will be more accurate and truly benefit those in need [2].

For poor communities, government assistance is crucial in easing the economic burden, especially during times of crisis. This aid acts as a "rescue action" that allows low-income families to survive difficult conditions. In 2023, the Indonesian government relaunched the Family Hope Program (PKH) to help people cope with rising basic commodity prices. The program aims to ensure that communities, particularly those with low incomes, can meet their basic needs, such as food, education, and healthcare.

The model used in this DSS is the Decision Table Method, chosen for its ability to simplify problem-solving. The Decision Table is a table that illustrates complex conditions and assists in the decision-making process [4]. This table consists of four main parts: Conditional Stub, Conditional Entry, Action Stub, and Action Entry. The Conditional Stub contains the conditions to be evaluated, while the Conditional Entry shows the possible outcomes of these conditions, usually marked with "Y" for fulfilled and "N" for not fulfilled. The Action Stub contains the actions to be taken, while the Action Entry indicates the actions selected based on the evaluated conditions.

The results of this research can help underprivileged communities receive Direct Cash Assistance, and it will greatly assist the Village Government in managing village residents' data as a medium for making decisions regarding the selection of eligible recipients for the Family Hope Program (PKH). The designed system can also broaden knowledge, particularly in enhancing digital literacy in Pematang Serai Village. Based on the research described above, the researcher hypothesizes that the application of the Decision Support System in analyzing the provision of the Family Hope Program (PKH) using the Decision Table Method in Pematang Serai Village, as developed from the research, can provide accurate results in selecting PKH recipients. Additionally, it can store and manage data in a structured manner, making data retrieval easier and faster. Furthermore, it will help develop a more organized reading interest from the research results, delivering accurate and quick insights through the decision support system.

Literature Review

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 defined by its boundaries, structure, and purpose, and is expressed in its function. A system is the subject of study in systems theory [5].

A subsystem is a set of elements, which is a system itself, and a component of a larger system. An example is the IBM Mainframe Job Entry Subsystem family (JES1, JES2, JES3, and their predecessor HASP/ASP). 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 containing information that defines the characteristics of the operating environment controlled by the system. Data testing is performed

to verify the accuracy of individual subsystem configuration data and is associated with one subsystem to test its specific application.

2. Information

Data can be defined as information about real events or facts that are formulated into a specific, non-random set of symbols that represent quantities, actions, or objects. Data can take the form of records on paper, or books, or be stored as files in a database. According to Edhy Sutanta (2003: 9-10), information is the result of data processing, making it valuable to the recipient and useful as a basis for decision-making, with effects that can be felt either immediately or in the future. To obtain information, data must first be processed, and a processing unit is required. [6], information is the result of data processing, but not all processed data can be classified as information. Raymon McLeod, as cited by Azhar Susanto (2000: 38), defines information as data that has been processed into a form that is more meaningful to its recipient. From these definitions, it can be concluded that information is data that has been processed to provide more meaningful and useful value to its recipient.

The transformation of data into information can be illustrated as shown in the diagram below. In this diagram, the input is data that will be processed by the processing unit, and the output is the information resulting from the processed data. A storage unit is required to store data, the processor, and the resulting information. Information is a collection of messages, data, or facts that have been processed and organized in such a way using specific methods to produce useful and meaningful data that can be understood by the recipient or those who need it, serving as a basis for taking action [7].

Information can be found in any format and form, whether in print media or online media. Data can be considered information when it truly functions or can be effectively used. As cited from Arkansas State University, there are various types of information we can encounter, such as factual information, analysis, subjective, and objective information. Factual or real information refers to information that deals only with facts[8]. This type of information usually provides little in-depth background on a specific topic. Meanwhile, analytical information is generated by researchers in particular studies.

3. Developmen Method

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:

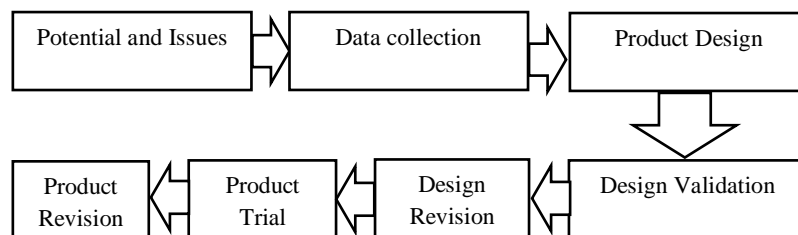


Figure 1. Research and Development Method (R&D)

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 [9].

4. 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 [10]. 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 [11].

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 [12]. 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 [13].

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

a. **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.

b. **Design**

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

c. **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.

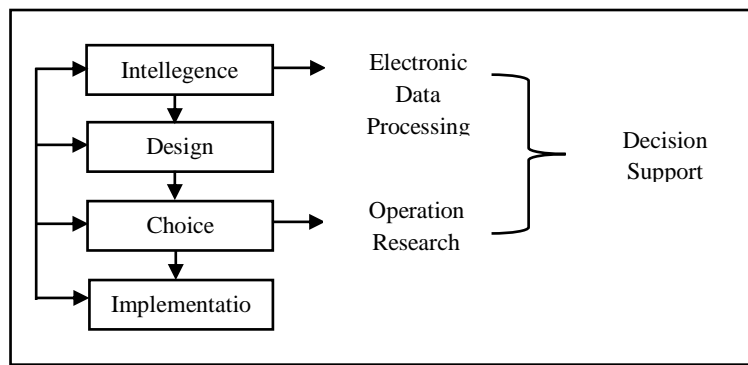


Figure 2. Phases of the Decision Making Process

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 [12].

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 [14]. 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 [3].

5. Decision Table

A decision table is a structured tool for visualizing decision rules in rows and columns [15]. 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 [16].

Classification is an operation that places each individual in a population into several classes based on certain characteristics using a formula, algorithm, or a set of rules, which forms a model [17]. Classification in the results of the DUPAK evaluation is conducted to determine

who is eligible for promotion and who remains in the same rank. It is not easy to organize classification based on the rules of credit score composition, which includes the following attributes: 3 education strata, 9 rank levels, and 5 types of evaluated elements, resulting in $3 \times 9 \times 5 = 135$ rules to obtain NP data, and further considerations for the TDP category. In a study, Baesens et al. used DT (Decision Tree) to develop an intelligent system for credit assessment. The if-then-else rules, originally represented in 6,600 columns, were simplified using the DT algorithm into 11 columns [18]. DT is also another form of Decision Tree, which is visualized in a table where conditions and actions appear in decision columns. Wiegiers and Beatty added that DT is a method that precisely explains business rules [19], and this is affirmed by Lamberink, who stated that DT is a way of illustrating decision rules with The method of tabulation, formally defined as follows:

Let P be a set of propositions, and A be a set of actions. A decision table on P and A is a tuple $= \{i, \rightarrow i\}$ where:

- a. i is the index of the table;
- b. $i \rightarrow$ is a set of decision rules (Φ, α^*) where $\Phi \subseteq P$, and α^* is a sequence of $\alpha \in A$.

In general, a DT (Decision Table) is visualized in a tabular format as shown in Table 2. The decision rule is represented as a set of condition rules, which contains a set of conditions and a set of actions.

Tabel 1. Format umum Decision Table

Condition Rules	
Condition Stub	Condition Entries
Action Stub	Action Entries

Additionally, Lu and Liu mention that DT (Decision Tree) is a classifier that contains a series of rules or conditions, which would be too numerous if classified using if-then-else logic. Therefore, using DT provides faster execution. From an application development perspective, DT facilitates communication between the evaluation team and software developers due to its precise, consistent, and easy-to-understand tabular nature. It is also a rule-based system that can assist the evaluation team in making decisions.

Research Methodology

This research requires a method used to conduct the study to address the problems being investigated and the research objectives. A study typically begins with careful planning that follows a series of instructions arranged logically and systematically, ensuring that the results accurately represent the actual conditions and are reliable.

1. Research Materials

The material of this research covers the process of building a decision support system for selecting recipients of PKH (Family Hope Program) funding for the community in Pematang Serai Village, supporting the government's efforts to improve welfare.

2. Research Procedures

The stages carried out in this research are as follow

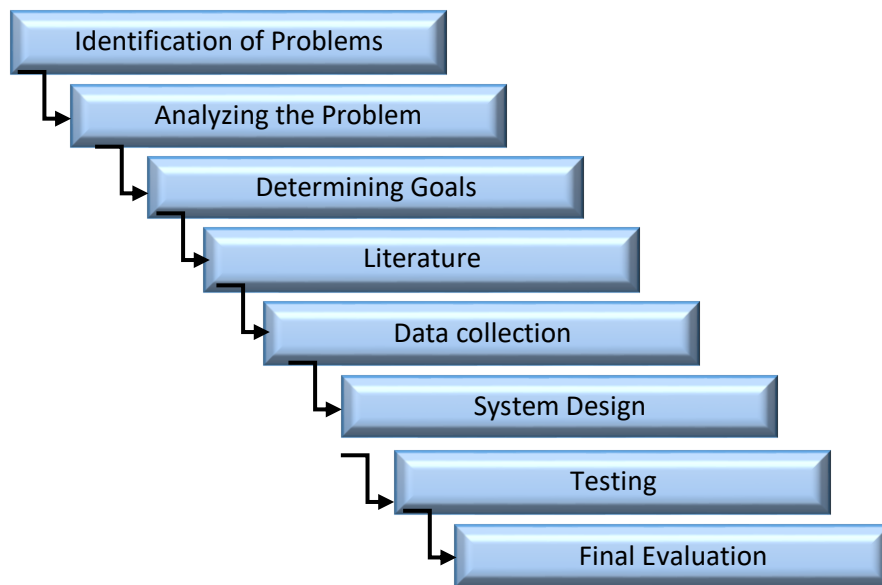


Figure 3. Research Framework

The stages carried out in this Based on the framework in Figure 3.1, each step can be explained as follows:

a. Problem Identification

Problem identification is the initial step conducted in this research. The purpose of this step is to understand the issue being investigated, ensuring that the analysis and design phases stay focused on the identified problem.

b. Problem Analysis

The problem analysis step is aimed at understanding the problem within its defined scope or boundaries. By analyzing the predetermined problem, it is hoped that the issue can be well understood.

c. Determining Objectives

Based on the understanding of the problem, objectives are set for the research. These objectives define the targets to be achieved, particularly those that can address the existing issues.

d. Studying Literature Related to the Title

To achieve the objectives, relevant literature is studied. These sources are then selected to determine which literature will be used in this research. The literature is sourced from the University of Pembangunan Pancabudi Library and books discussing decision support systems (DSS).

e. Data Collection

The necessary data include the data of residents based on family cards in Pematang Serai Village. This data is collected manually.

f. Design and Development

At this stage, the author will design the proposed new system using the Prototype model. The prototype method is a software design method commonly used by developers to interact with clients throughout the system development process, consisting of five interrelated stages.

g. Testing

System testing is conducted to trial the system that will be implemented at the Pematang Serai Village Office.

h. Final Evaluation

A research report is created, which includes findings and solutions related to the problems examined in the research.

Results

The PKH program (Family Hope Program) is a national initiative aimed at accelerating poverty alleviation. Since 2007, the Indonesian government has implemented PKH. This social protection program, also known internationally as Conditional Cash Transfers (CCT), has proven to be quite successful in addressing poverty, particularly chronic poverty, in various countries.

1. Type of Research

This research is a descriptive survey study aimed at understanding the impact of the Decision Table method analysis in determining PKH aid recipients for the community of Pematang Serai Village.

2. Results and Discussion of Data Processing

As a conditional social assistance program, PKH provides access for poor families, especially pregnant women and children, to utilize various available health service facilities (faskes) and educational service facilities (fasdik) around them. PKH benefits are also being extended to cover people with disabilities and the elderly, ensuring their social welfare by the mandate of the constitution and the Nawacita of the President of Indonesia. In 2019, PKH social assistance was divided into two types: Fixed Assistance and Component Assistance, provided under the following conditions:

- A. Fixed Assistance for Each Family
 - 1. Regular
 - 2. PKH Access

- B. Component Assistance for Each Individual in a PKH Family
 - 1. Pregnant women
 - 2. Early childhood
 - 3. Elementary school
 - 4. Middle school
 - 5. High school
 - 6. Severe disability
 - 7. Elderly

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

3. Making a Decision Table

The following are the steps in creating a decision table:

- a. Determine the conditions to be selected.
- b. Determine the number of possible events that could occur.
- c. Determine the actions to be taken.
- d. Fill in the condition entries.
- e. Fill in the action entries.

The following illustrates how to make decisions regarding the allocation of PKH funds to the community in Pematang Serai Village using the Decision Table method. The table below shows the criteria for PKH recipients in the community.

Table 2. Terms and Conditions for Providing PKH

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.

No	Code Fund	Information
1	KD1	PKH is provided to assist the underprivileged, particularly in the areas of welfare, education, and health. The amount of PKH given is directed to pregnant women and toddlers.
2	KD2	For education, the government provides assistance to elementary school children.
3	KD3	For education, the government provides assistance to middle school children.
4	KD4	For education, the government provides assistance to high school children.
5	KD5	Families with members over 60 years old and persons with disabilities.

In this assistance fund table, it is explained that the amount of assistance varies, and this fund will be provided to the underprivileged each year based on the conditions met by the participants. After the assistance fund table and the eligibility criteria table are formed, the next step is to create rules or a set of guidelines for organizing the assistance funds along with the conditions that the participants meet.

Below are the rules or the basis for the allocation of funds for eligible participants receiving assistance.

Table 3. Role Rules Table

RULE	CODE OF TERMS						FUND CODE
	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
17	Y	Y	N	N	N	N	KD5
18	Y	Y	N	Y	Y	N	KD5
19	Y	N	Y	Y	Y	N	KD5
20	Y	N	N	Y	Y	N	KD5
21	Y	N	Y	N	Y	N	KD5
22	Y	N	N	Y	N	Y	KD5
23	Y	N	Y	N	N	N	KD5
24	Y	Y	N	Y	N	Y	KD5
25	Y	Y	N	N	Y	N	KD5
26	Y	N	Y	N	N	Y	KD5

27	Y	N	Y	Y	N	N	KD5
28	Y	N	N	Y	N	N	KD5
29	Y	N	N	N	Y	N	KD5
30	Y	N	Y	Y	N	Y	KD5
31	Y	N	Y	N	Y	Y	KD5
32	Y	Y	N	Y	N	N	KD5
33	N	Y	Y	Y	Y	Y	KD5
34	N	N	Y	Y	Y	Y	KD5
35	N	N	N	Y	Y	Y	KD5
36	N	N	N	N	Y	Y	KD5
37	N	N	N	N	N	Y	KD5
38	N	N	N	N	N	N	KD5
39	N	Y	N	Y	Y	Y	KD5
40	N	Y	N	N	Y	Y	KD5
41	N	Y	N	N	N	Y	KD5
42	N	Y	N	N	N	N	KD5
43	N	Y	Y	N	Y	Y	KD5
44	N	Y	Y	N	N	Y	KD5
45	N	Y	Y	N	N	N	KD5
46	N	Y	Y	Y	N	Y	KD5
47	N	Y	Y	Y	N	N	KD5
48	N	Y	Y	Y	Y	N	KD5
49	N	Y	N	Y	Y	N	KD5
50	N	N	Y	Y	Y	N	KD5
51	N	N	N	Y	Y	N	KD5
52	N	N	Y	N	Y	N	KD5
53	N	N	N	Y	N	Y	KD5
54	N	N	Y	N	N	N	KD5
55	N	Y	N	Y	N	Y	KD5

56	N	Y	N	N	Y	N	KD5
57	N	N	Y	N	N	Y	KD5
58	N	N	Y	Y	N	N	KD5
59	N	N	N	Y	N	N	KD5
60	N	N	N	N	Y	N	KD5
61	N	N	Y	Y	N	Y	KD5
62	N	N	Y	N	Y	Y	KD5
63	N	Y	N	Y	N	N	KD5
64	N	Y	Y	N	Y	N	KD5

Based on table 3, the role rules above show that columns 17 to 64 no longer have an effect on the action of providing funds, so these columns can be deleted.

Conclusion

Based on the explanation presented in the results and discussion section regarding the decision support system for the distribution of PKH social assistance funds using the Decision Table in Pematang Serai Village, several conclusions can be drawn to achieve the desired objectives. The conclusions are as follows, (1) The system developed processes data from applicants for assistance, turning it into information that can be used by Pematang Serai Village in the decision-making process to determine the recipients of PKH assistance funds. (2) The system uses a Decision Table to establish the criteria that participants must meet, making it easier for the Pematang Serai authorities to determine which participants are eligible to receive PKH funds. (3) The system accelerates the process of determining PKH fund recipients because the selection process is carried out automatically. The operator enters participant data correctly according to the established criteria, and then the recipient data is processed using the Decision Table method, producing the results for the PKH fund recipients from the system's process.

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