

DECISION MAKING MODEL OF DETERMINING CANDIDATES FOR CORPORATE SOCIAL RESPONSIBILITY OF AGRICULTURAL SEEDS USING WEIGHTED PRODUCTS

Ferry Susanto¹, M Abu Jihad Plaza R²

^{1,2}Study Program of Informatics Engineering, STMIK Surya Intan, Kota Bumi, North Lampung

^{1,2}Jend. Sudirman Street, Kota Gapura, Kotabumi, North Lampung Regency, Lampung 34517

Email: ferrysusanto80@gmail.com¹, abujihad83@gmail.com²

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Abstract

Corporate Social Responsibility is a business commitment to act ethically, operate legally and contribute to economic improvement simultaneously with improving the quality of life of employees and their families, the local community and society at large. Social responsibility or Corporate Social Responsibility (CSR) is a concept which organizations, especially companies, have a responsibility to consumers, employees, shareholders, communities and the environment in all aspects of the company's operations such as issues which have an impact on the environment such as pollution, waste, product and labor safety. CSR is not only limited to the concept of providing financial assistance to the social environment, but also how companies treat their employees non-discriminatory and maintain good relationships with suppliers. Government obligation requires companies to carry out social responsibility as a form of company concern for the community. This research is conducted with the aim of determining prospective recipients of CSR for agricultural seeds using the Weighted Product (WP) method. The Weighted Product method is used because this method relates the attribute value where the value must be raised to the power of the weight value of the attribute in question. In determining the candidate for receiving CSR for agricultural seeds, there are many criteria which must be owned by the Farmer Group as a condition for obtaining CSR for agricultural seeds. The criteria used are submitting a proposal, land area, land survey and prospective farmers receiving assistance, status of farmer groups, number of members, and farmer groups established for at least 1 year. From the research conducted, there are 20 alternatives. From the analysis of research results from manual tests and application tests, the preference for similarity of calculation results is obtained. From the calculation results through manual testing and application testing, the highest alternative results is 0.063470478 for Sidomakmur Farmer, and the lowest alternative results is 0.034660601 for Sidoluhur Farmer as the alternative chosen as the highest indicator to obtain 3 types of agricultural crops.

I. INTRODUCTION

The rapid development of science allows us to continue to make good decisions. Decision making which is carried out quickly, thoroughly, on target, and can be accounted for is the key to successful decision making in the future. This is the problem faced by companies and the government in determining prospective recipients of CSR in the form of agricultural seeds to farmers. CSR is the commitment of the business world to continuously act ethically, operate legally and contribute to economic improvement, along with improving the

quality of life of employees and their families as well as improving the quality of the local community and society at large (Gilar Cahya Nirmala, et al, The World Business Council for Sustainable Development (WBCSD), referred to in Wibisono, 2007) [1]. CSR (Corporate Social Responsibility) is one of the obligations which must be carried out by companies in accordance with the contents of article 74 of the Limited Liability Company Law (UUPT) and the latest, Law Number 40 of 2007. Through this law, industry or corporations are required to implement it but this

obligation is not a burdensome [2]. In providing assistance to farmers, the government and the company concerned must be more selective so that there are no complaints from the community about assistance which does not meet expectations and is not on target.

Based on research conducted by Ardiyansyah, et al (2016), the results of the calculation show that the alternative location which is the main priority to be used as a recipient of CSR funding is Sungan Perigi Hamlet as the first rank is 0.389 or 38.9%, using the Analytical Hierarchy Process (AHP) method [3]. Based on the results of research from Erfit (2017), the results of the study show that the potential for CSR partnership funds is quite large for Jambi Province [4]. In the research of Gilar Cahya Nirmala, et al (2014), the results showed that more than three quarters of respondents considered CSR programs to be very positive.

Based on the research above, the authors conclude that it is necessary to make a decision support system to determine the acceptance of the assistance, so that it can help related parties to record and determine it quickly and accurately. This research offers a different problem solving technique using the Weighted Product method in determining prospective recipients of CSR for agricultural seeds because in the use of the weighted product method multiplication is used to connect attribute ratings where each attribute rating must be raised to the first rank with the weight of the attribute concerned. This method is needed to obtain satisfactory results which are expected to be able to solve the problems faced by researchers. This can benefit the company in determining prospective CSR recipients so that the assistance is right on target.

The problem faced is the number of food mafias that deviate from aid and the provision of assistance which is not right on target because the company does not conduct a survey and review it. Making a Decision Support System is good to use to deal with this problem because it can take into account all the criteria used. In DSS, the solutions given and displayed are suggestions in the form of ratings. The method used by researchers in this study is the Weighted Product (WP) method. This method can be used to determine decisions because this can produce the greatest value to be selected as a candidate for CSR assistance. Decision making can be easier and can be an alternative in determining the CSR assistance. Based on the background of these problems, this research will create a Decision Support System which can help make decisions. This Decision Support System is expected to be able to reduce the misuse of seed aid so that the delivery of aid can be right on target. In providing assistance, a decision is made first. This assistance is also expected to improve the welfare of the farmers so

that they are able to produce good agricultural products. With this system, the company will find it easier to calculate the appropriate beneficiaries so that this assistance can improve the welfare of the farmers.

II. THEORETICAL BASIS

2.1. Decision Support System

Decision Support System (DSS) was first described in the early 1970s by Michael S. Scott Morton with the term Management Decision System. The system is a computer-based system which is intended to help make decisions by utilizing certain data and models to solve various unstructured problems [5].

According to McLeod, Decision Support System is a computer-based system which produces various alternative decisions to assist management in dealing with structured or unstructured problems using data and models. Decision Support System is an information-generating system aimed at a particular problem which must be solved by managers in decision making [5][6], [7].

2.2. Stages of Decision Making in Decision Support System

According to Herbert A. Simon (Kadarsah, 2002:1516), the stages which must be passed in the decision-making process are as follows:

1. Intelligence Phase

This stage is the process of tracing and detecting the scope of the problem and the process of identifying the problem. Input data is obtained, processed and tested in order to identify problems.

2. Design Phase

This stage is the process of developing and searching for alternative actions/ solutions which can be taken. This is a simplified representation of real events, so validation and verification processes are needed to determine the accuracy of the model in examining the existing problems.

3. Selection Phase/ Choice Phase

At this stage, the selection of among the various alternative solutions which are raised at the planning stage is carried out so that it is determined by taking into account the criteria based on the objectives to be achieved.

4. Implementation Phase

This stage is carried out on the implementation of the system design which has been made at the design stage as well as the implementation of alternative actions which have been selected at the election stage [8].

2.3. Weighted Product (WP)

The Weighted Product method is one method of solving the MADM problem. This method evaluates several alternatives to a set of attributes or criteria, where each attribute is independent of one another [9][10][11]. Weight improvement for $\sum W_j = 1$ using Equation (1).

$$W_j = \frac{w}{\sum w} \quad (1)$$

The variable W is a positive power for the profit attribute and negative for the cost attribute. The preference for the S_i alternative is given by Equation (2).

$$S_i = \prod_j^n x_{ij}^{w_j} \quad (2)$$

With $i = 1, 2, \dots, m$ and $j = 1, 2, \dots, n$ as attribute Information:

- Π : product
- S_i : score/ value of each alternative
- X_{ij} : alternative value of i to attribute j
- W_j : the weight of each attribute or criterion
- n : number of criteria

To find the best alternative, it is done by Equation (3).

$$V_i = \frac{S_i}{\prod_{j=1}^n (X_j^i)^{w_j}} \quad (3)$$

Where:

- V : Alternative preferences are analogous to vector V
- X : Criteria Value
- W : Criteria/ sub-criteria weight
- i : Alternative
- j : Criteria
- n : Number of criteria
- * : The number of criteria which have been assessed on the vector S

According to Sri Kusumadewi (2013), the largest V_i value indicates the chosen alternative A_i . The steps in calculating the WP (Weighted Product) method are as follows:

1. Multiplying all attributes for all alternatives with W (weight) as a positive power for the benefit attribute and a negative power for the cost attribute.
2. The multiplication results are added together to produce a value for each alternative.
3. Divide the value of V for each alternative by the total value of all alternative values.
4. The best alternative sequence is found which will be the decision [12][13][15].

2.4. Corporate Social Responsibility (CBR)

Liliwari, in Nurjanah, et al (2017), The World Business Council for Sustainable Development (WBCSD) which is an international institution which was founded in 1955 and consists of 120 multinational companies from 30 countries in the world, through its publication "Making Good Business Sense" defines that CSR is corporate social responsibility which is a form of action which departs from the company's ethical considerations directed at improving the economy, which together with improving the quality of life for employees and their families, as well as improving the quality of life of the surrounding community and society at large (Cutlip & Center and Canfield) [16].

CSR (Corporate Social Responsibility) is one of the obligations which must be carried out by companies in accordance with the contents of article 74 of the latest Limited Liability Company Law, Law Number 40 of 2007. Through this law, industries or corporations are obliged to carry it out, but this obligation is not something which is burdensome. It should be remembered that the development of a country is not only the responsibility of the government and industry, but every human being has a role to play in realizing social welfare and managing the quality of life of the community [2].

2.5. Agricultural Seed CSR

Indonesia is an agrarian country where the livelihoods of the population mostly come from agriculture and plantations. In an agricultural country such as Indonesia, agriculture has an important contribution to both the economy and the fulfilment of the basic needs of society. Therefore, the company provides CSR assistance in the form of agricultural seeds to farmers as stated in Article 74 of the latest Limited Liability Company Law (UUPT), Law Number 40 of 2007 concerning obligations which must be carried out by companies [2].

Community empowerment in the form of CSR assistance, especially for agricultural seeds, is very good for the welfare of the community that at the same time make a living as farmers. Long-term oriented community empowerment has an effective strategy and involves the participation of all stakeholders in CSR activities because agricultural development in Indonesia is currently being built by adopting a model which is developing in the world where the traditional agricultural model is considered unfeasible because what is needed is the availability of food in large quantities and in a fast period of time [17].

2.6. Criteria of CSR Agricultural Seeds

According to the Indonesian Minister of Agriculture, the criteria for agricultural or plantation seeds have considerations [18]:

- a. In order to develop plantation crops, it is necessary to provide superior seeds produced from varieties which have been released.
- b. Provision of superior seeds of plantation crops can only be done for certain types of plants and cannot be done for other types of plants because there are no released varieties yet.
- c. For plant species for which there are no released varieties, the fulfillment of seed needs can take advantage of local superior varieties available around the development site.
- d. The condition of high-yielding variety seeds for certain plants is difficult to provide in certain development areas due to location, time and distance constraints which make it impossible to use superior variety seeds from available seed sources so that local superior seeds can be used.
- e. In conditions of plantation crop development in specific areas which are not in accordance with the available superior varieties, local superior seeds can be used.
- f. Based on the considerations as referred to in letter a, b, c, d and e, as well as to implement the provisions of Article 31 paragraph (3) of Law Number 39 of 2014 concerning Plantations, it is necessary to stipulate a Regulation of the Minister of Agriculture concerning Production, Certification, Distribution and Supervision of Plantation Seeds.

III. RESEARCH METHODS

3.1. Method of collecting data

3.1.1. Interview

The interview method is a method of collecting data with one-sided oral questions and answers which are carried out systematically and based on the research objectives. The authors collect data by conducting direct interviews and obtaining data in the form of several farmer groups that still have not received CSR assistance. In North Lampung Regency, there are 35 farmer groups that still have not received assistance. Interviews were conducted to explore sources of supporting knowledge in conducting the analysis.

3.1.2. Literature review

Literature review was conducted by linking research with existing literature such as research results, journals on CSR (Corporate Social Responsibility), and Weighted Products and books on CSR (Corporate Social Responsibility) related to the research being conducted. Through a literature review, a review of the laws and regulations related to the company's obligations and responsibilities regarding CSR is carried out.

3.1.3. Observation

Observation is a data collection technique by conducting direct observations of the object under study with the aim of getting a clear picture of the determination of recipients of CSR for agricultural seeds given directly to farmers or through farmer groups. In this case, researchers focus on providing assistance provided through farmer groups.

3.2. Weighted Product (WP) Method

3.2.1. Criteria and Values Weight

It starts with determining the criteria and the value of the recipient's weight in the form of CSR agricultural seeds to farmer groups. The beneficiary must be as determined by the aid provider.

Table 1. Weighting Criteria

Code	Criteria	Benefit	Cost
C1	Submit Proposals	✓	-
C2	Land Area (ha)	✓	-
C3	Land surveys and prospective farmers that receive assistance	✓	-
C4	Farmer Group Status	✓	-
C5	Number of Members	✓	-
C6	Group Formed Minimum 1 Year	✓	-

Source: Data processed in 2019

From each of these weighting criteria, the weight values of each alternative on each criterion are determined to show the suitability rating. From each alternative on each criterion is assessed with 1 to 5.

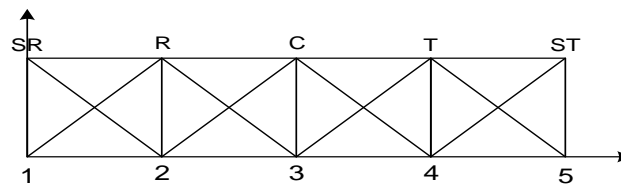


Figure 1. Value of weight or criteria

3.3. Research Framework

The research framework is a temporary explanation of a symptom of the object of the problem being faced. The research framework in the Decision Making System for Determining Candidates for CSR Recipients of Agricultural Seeds uses the Weighted Product method.

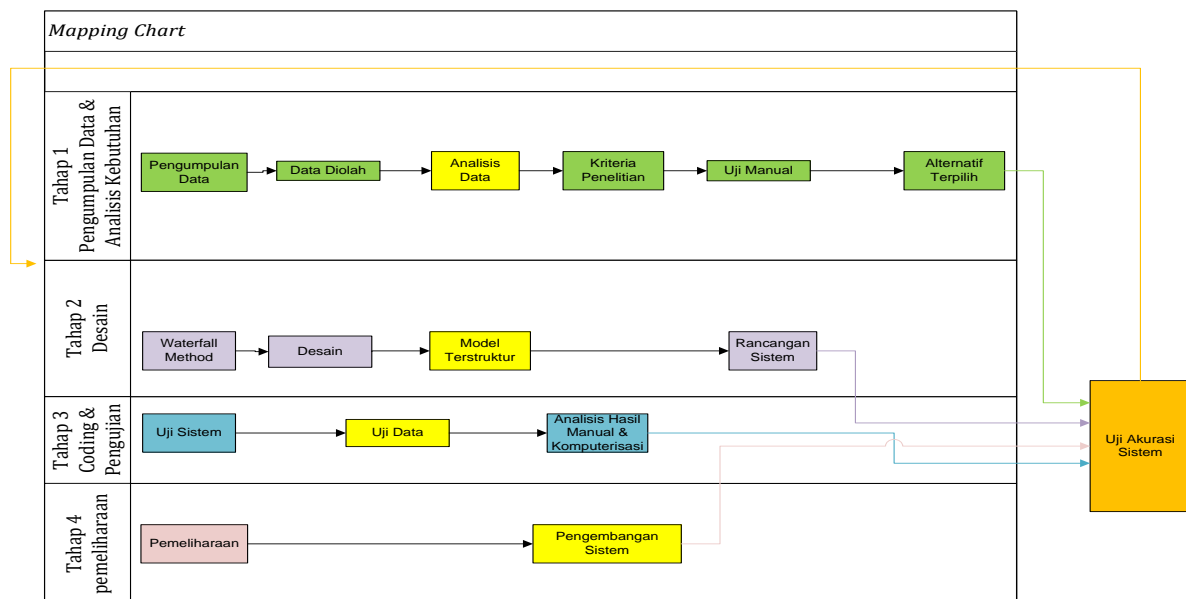


Figure 2. Research Framework

Mapping Chart

1. Stage 1

The first stage is analyzing the needs of software, hardware, brainware and collecting data using observation, interviews, documentation, literature studies and questionnaires to find deficiencies in the current system. After analyzing and collecting data and knowing the weaknesses of the current system, a new system is proposed.

2. Stage 2

The second stage is the system design using the waterfall method and structured diagrams and the system design process to build with Context diagrams and DFD, and specify the appearance. The design process produces drawings of the proposed new system design in order to cover the weaknesses of the current system.

3. Stage 3

The third stage is writing coding and testing. At this stage, the criteria weights are entered into the new system by translating the description of the system which has been designed in the second stage. After the input is complete and data validation is complete, the system will be tested whether the system which has been designed is in accordance with the design and there are still errors or not, and whether the system can be used by stakeholders.

4. Stage 4

The fourth stage is maintenance on a system which has been run. Maintenance also includes fixing errors not found in the previous step. After an error is found, an update process will be carried out until the system can meet user needs.

Table 2. Alternative Data

No	Farmer Group Name	Criteria					
		Company	Land Area	Land	Farmer	Number of	Long

	(Alternative)	Feedback (C1)	(C2)	Ownership (C3)	Group Status (C4)	Members (C5)	Formed (C6)
1	Sidomakmur Farmer	3 Standard Feedback to company fulfilled	21-25 Hectares	Rented land	Have Certificate	26-30 People	> 10 Years
2	Tunas Bangsa Farmer	2 of 4 Standard Feedback to company fulfilled	16-20 Hectares	Land Not In Dispute	Have Certificate	16-20 People	4-6 Years
3	Prima Jaya Farmer	3 Standard Feedback to company fulfilled	16- 20 Hectares	Own Land	Incorporated	21-25 People	7-9 Years
4	Sejahtera Farmer	2 Standard Feedback to company fulfilled	21-25 Hectares	Rented land	Have Certificate	16-20 People	1-3 Years
5	Sido Luhur Farmer	2 of 4 Standard Feedback to company fulfilled	21-25 Hectares	Rented land	Incorporated	10-15 People	< 1 Years
6	Srikandi Farmer	2 Standard Feedback to company fulfilled	16-20 Hectares	Own Land	Have Certificate	16-20 People	4-6 Years
7	Subur Makmur Farmer	2 of 4 Standard Feedback to company fulfilled	26-30 Hectares	Rented land	Have Certificate	16-20 People	7-9 Years
8	Mitra Jaya Farmer	4 Standards of Feedback to the company fulfilled	10-15 Hectares	Land Not In Dispute	Incorporated	21-25 People	> 10 Years
9	Sido Mukti Farmer	3 Standard Feedback to company fulfilled	21-25 Hectares	Land Not In Dispute	Incorporated	26-30 People	4-6 Years
10	Langgeng Jaya Farmer	2 of 4 Standard Feedback to company fulfilled	16-20 Hectares	Rented land	Have Certificate	10-15 People	1-3 Years
11	Maju Jaya Farmer	3 Standard Feedback to company fulfilled	10-15 Hectares	Rented land	Have Certificate	10-15 People	7-9 Years
12	Langgeng Makmur Farmer	3 Standard Feedback to company fulfilled	21-25 Hectares	Land Not In Dispute	Incorporated	21-25 People	> 10 Years
13	Tunas Jaya Farmer	2 Standard Feedback to company fulfilled	16-20 Hectares	Land Not In Dispute	Have Certificate	26-30 People	7-9 Years
14	Ngawiti Farmer	3 Standard Feedback to company fulfilled	26-30 Hectares	Own Land	Have Certificate	16-20 People	4-6 Years
15	Jaya Makmur Farmer	2 of 4 Standard Feedback to company fulfilled	26-30 Hectares	Rented land	Incorporated	16-20 People	1-3 Years
16	Arjuno Farmer	2 Standard Feedback to company fulfilled	16-20 Hectares	Own Land	Incorporated	21-25 People	4-6 Years
17	Mega Makmur Farmer	4 Standards of Feedback to the company fulfilled	21-25 Hectares	Land Not In Dispute	Incorporated	21-25 People	7-9 Years
18	Tunas Makmur	2 of 4 Standard	10-15	Rented land	Have	16-20 People	4-6 Years

	Farmer	Feedback to company fulfilled	Hectares		Certificate		
19	Tanjung Makmur Farmer	3 Standard Feedback to company fulfilled	16-20 Hectares	Land Not In Dispute	Incorporated	10-15 People	> 10 Years
20	Marga Jaya Farmer	2 Standard Feedback to company fulfilled	21-25 Hectares	Rented land	Have Certificate	26-30 People	7-9 Years

In solving the problem with the Weighted Product method, then determine the criteria which will be used as a reference in making a decision on the criteria used to determine prospective recipients of CSR agricultural seeds to farmer groups.

Table 3. Code and Weighting Criteria

Code	Criteria	Weight Value
C1	Company Feedback	5
C2	Land Area (ha)	4
C3	Land ownership of prospective farmers that receive assistance	3
C4	Farmer Group Status	4
C5	Number of Members	3
C6	How long the group was formed	3

Table 4. Feedback to the company

a	Beneficial
b	Sustainable
c	Near Operation Area
d	Support Prepare Company

Table 5. Submitting a Proposal (C1)

Sub Criteria	Weight	
A1	If the a, b, c, d sub criteria are Fulfilled	5
A2	If 3 Sub Criteria Are Fulfilled	4
A3	If Sub Criteria 2 is Fulfilled	3
A4	If Sub Criteria 1 is Fulfilled	2

Table 6. Land Area (C2)

Sub Criteria	Weight
10 – 15 Hectares	2
16 – 20 Hectares	3
21 – 25 Hectares	4
26 – 30 Hectares	5

Table 7. Land Ownership of Prospective Farmers Recipients of Assistance (C3)

Sub Criteria	Weight
Privately Owned Land	5
Land Not In Dispute	4
Rented Land	3
Group Owned Land	1

Table 8. Status of Farmer Groups (C4)

Sub Criteria	Weight
Incorporated	3
Have Certificate	4
Registered in the Regent's Decree	5

Table 9. Number of Members (C5)

Sub Criteria	Weight
10 – 15	2
16 – 20	3
21 – 25	4
26 – 30	5

Table 10. Length of Group Formed (C6)

Sub Criteria	Weight
≥ 10 Years	5
7 – 9 Years	4
4 - 6 Years	3
1 - 3 Years	2
< 1 Years	1

IV. DISCUSSION

4.1. Manual Test

In this study, the first step in solving the problem is to determine an alternative with a predetermined criterion value. In this study, 20 alternatives are used.

Table 10. Alternative Weighting of Each Criteria

No	Farmer Group Name (Alternative)	Criteria					
		Company Feedback (C1)	Land Area (C2)	Land Ownership (C3)	Farmer Group Status (C4)	Number of Members (C5)	Long Formed (C6)
1	Sidomakmur Farmer	5	4	3	4	5	5
2	Tunas Bangsa Farmer	2	3	4	4	3	3
3	Prima Jaya Farmer	4	3	5	3	4	4
4	Sejahtera Farmer	3	4	3	4	3	2
5	Sido Luhur Farmer	2	4	3	3	2	1
6	Srikandi Farmer	3	3	5	4	3	3
7	Subur Makmur Farmer	2	5	3	4	3	4
8	Mitra Jaya Farmer	5	2	4	3	4	5
9	Sido Mukti Farmer	4	4	4	3	5	3
10	Langgeng Jaya Farmer	2	3	3	4	2	2
11	Maju Jaya Farmer	4	2	3	4	2	4
12	Langgeng Makmur Farmer	4	4	4	3	4	5
13	Tunas Jaya Farmer	3	3	4	4	5	4
14	Ngawiti Farmer	4	5	5	4	3	3
15	Jaya Makmur Farmer	2	5	3	3	3	2
16	Arjuno Farmer	3	3	5	3	4	3
17	Mega Makmur Farmer	5	4	4	3	4	4
18	Tunas Makmur Farmer	2	2	3	4	3	3
19	Tanjung Makmur Farmer	4	3	4	3	2	5
20	Marga Jaya Farmer	3	4	3	4	5	4

Before performing the calculations, the weighting of each criterion is carried out first. The initial weight $W = (5, 4, 3, 4, 3, 3)$, which will be corrected so that the total weight is $\sum w_j = 1$, in the following way:

$$W_j = \frac{w}{\sum w} \quad (4)$$

$$W_1 = \frac{5}{5 + 4 + 3 + 4 + 3 + 3} = \frac{5}{22} = 0.2272$$

$$W_2 = \frac{4}{5 + 4 + 3 + 4 + 3 + 3} = \frac{4}{22} = 0,1818$$

$$W_3 = \frac{3}{5 + 4 + 3 + 4 + 3 + 3} = \frac{3}{22} = 0,1363$$

$$W_4 = \frac{4}{5 + 4 + 3 + 4 + 3 + 3} = \frac{4}{22} = 0,1818$$

$$W_5 = \frac{3}{5 + 4 + 3 + 4 + 3 + 3} = \frac{3}{22} = 0,1363$$

$$W_6 = \frac{3}{5 + 4 + 3 + 4 + 3 + 3} = \frac{3}{22} = 0,1363$$

4.2. Determining the Value of the Vector S and V

The next step is to determine the value of the vector S, by multiplying the data for each alternative value of the suitability rating which has a positive rank from the weight improvement results, with the following equation:

$$S_i = \prod_j^n x_{ij}^{w_j} \quad (5)$$

$$S_1 = (5^{0.2272})(4^{0.1818})(3^{0.1363})(4^{0.1818})(5^{0.1363})(5^{0.1363}) = 4,300093485$$

$$S_2 = (2^{0.2272})(3^{0.1818})(4^{0.1363})(4^{0.1818})(3^{0.1363})(3^{0.1363}) = 2,998152701$$

$$S_3 = (4^{0.2272})(3^{0.1818})(5^{0.1363})(3^{0.1818})(4^{0.1363})(4^{0.1363}) = 3,714007062$$

$$S_4 = (3^{0.2272})(4^{0.1818})(3^{0.1363})(4^{0.1818})(3^{0.1363})(2^{0.1363}) = 3,15167247$$

$$S_5 = (2^{0.2272})(4^{0.1818})(3^{0.1363})(3^{0.1818})(2^{0.1363})(1^{0.1363}) = 2,348238555$$

$$S_6 = (3^{0.2272})(3^{0.1818})(5^{0.1363})(4^{0.1818})(3^{0.1363})(3^{0.1363}) = 3,389139857$$

$$S_7 = (2^{0.2272})(5^{0.1818})(3^{0.1363})(4^{0.1818})(3^{0.1363})(4^{0.1363}) = 3,289954447$$

$$S_8 = (5^{0.2272})(2^{0.1818})(4^{0.1363})(3^{0.1818})(4^{0.1363})(5^{0.1363}) = 3,629536228$$

$$S_9 = (4^{0.2272})(4^{0.1818})(4^{0.1363})(3^{0.1818})(5^{0.1363})(3^{0.1363}) = 3,762892044$$

$$S_{10} = (2^{0.2272})(3^{0.1818})(3^{0.1363})(4^{0.1818})(2^{0.1363})(2^{0.1363}) = 2,581022313$$

$$S_{11} = (4^{0.2272})(2^{0.1818})(3^{0.1363})(4^{0.1818})(2^{0.1363})(4^{0.1363}) = 3,084896654$$

$$S_{12} = (4^{0.2272})(4^{0.1818})(4^{0.1363})(3^{0.1818})(4^{0.1363})(5^{0.1363}) = 3,913441617$$

$$S_{13} = (3^{0.2272})(3^{0.1818})(4^{0.1363})(4^{0.1818})(5^{0.1363})(4^{0.1363}) = 3,665757162$$

$$S_{14} = (4^{0.2272})(5^{0.1818})(5^{0.1363})(4^{0.1818})(3^{0.1363})(3^{0.1363}) = 3,970276878$$

$$S_{15} = (2^{0.2272})(5^{0.1818})(3^{0.1363})(3^{0.1818})(3^{0.1363})(2^{0.1363}) = 2,840692377$$

$$S_{16} = (3^{0.2272})(3^{0.1818})(5^{0.1363})(3^{0.1818})(4^{0.1363})(3^{0.1363}) = 3,345110414$$

$$S_{17} = (5^{0.2272})(4^{0.1818})(4^{0.1363})(3^{0.1818})(4^{0.1363})(4^{0.1363}) = 3,993639511$$

$$S_{18} = (2^{0.2272})(2^{0.1818})(3^{0.1363})(4^{0.1818})(3^{0.1363})(3^{0.1363}) = 2,677935148$$

$$S_{19} = (4^{0.2272})(3^{0.1818})(4^{0.1363})(3^{0.1818})(2^{0.1363})(5^{0.1363}) = 3,379038814$$

$$S_{20} = (3^{0.2272})(4^{0.1818})(3^{0.1363})(4^{0.1818})(5^{0.1363})(4^{0.1363}) = 3,714007062$$

The last step is to determine the value of the vector V. The value of the vector V is used to get the highest alternative value from each vector. V vector search process is done manually.

$$V_i = \frac{S_i}{\prod_{j=1}^n (X_j^{w_j})} \quad (6)$$

$$V_1 = \frac{4,300093485}{67,7495048} = 0,063470478$$

$$V_2 = \frac{2,998152701}{67,7495048} = 0,0442535$$

$$V_3 = \frac{3,714007062}{67,7495048} = 0,054819693$$

$$V_4 = \frac{3,15167247}{67,7495048} = 0,046519491$$

$$V_5 = \frac{2,348238555}{67,7495048} = 0,034660601$$

$$V_6 = \frac{3,389139857}{67,7495048} = 0,05002457$$

$$V_7 = \frac{3,289954447}{67,7495048} = 0,048560568$$

$$V_8 = \frac{3,629536228}{67,7495048} = 0,053572882$$

$$V_9 = \frac{3,762892044}{67,7495048} = 0,055541248$$

$$V_{10} = \frac{2,581022313}{67,7495048} = 0,038096549$$

$$V_{11} = \frac{3,084896654}{67,7495048} = 0,045533863$$

$$V_{12} = \frac{3,913441617}{67,7495048} = 0,057763398$$

$$V_{13} = \frac{3,665757162}{67,7495048} = 0,054107512$$

$$V_{14} = \frac{3,970276878}{67,7495048} = 0,058602301$$

$$V_{15} = \frac{2,840692377}{67,7495048} = 0,041929345$$

$$V_{16} = \frac{3,345110414}{67,7495048} = 0,049374684$$

$$V_{17} = \frac{3,993639511}{67,7495048} = 0,05894714$$

$$V_{18} = \frac{2,677935148}{67,7495048} = 0,039527007$$

$$V_{19} = \frac{3,379038814}{67,7495048} = 0,049875476$$

$$V_{20} = \frac{3,714007062}{67,7495048} = 0,054819693$$

From the results of calculations to determine farmer groups with suitable criteria to be recommended to receive CSR assistance for agricultural seeds, which is seen in the calculation results above, the largest value found in V1 with a value of 0.063470478 is the chosen alternative by fulfilling all the criteria which become the benchmark for providing CSR seed assistance.

Table 11. Table of Determination Results of Candidates for CSR Seeds

Code	Alternative	Results	Farmer Groups That Meet the Conditions for Giving 3 Types of Seeds	Farmer Groups That Meet the Conditions for Giving 2 Types of Seeds	Farmer Groups That Meet the Conditions for Giving 1 Type of Seed	Farmer Groups That Don't Meet the Conditions for Giving Seeds
V1	Sidomakmur Farmer	0,063470478	✓			-
V2	Tunas Bangsa Farmer	0,0442535			✓	-
V3	Prima Jaya Farmer	0,054819693		✓		-
V4	Sejahtera Farmer	0,046519491			✓	-
V5	Sido Luhur Farmer	0,034660601			✓	-
V6	Srikandi Farmer	0,05002457		✓		-
V7	Subur Makmur Farmer	0,048560568		✓		-
V8	Mitra Jaya Farmer	0,053572882		✓		-
V9	Sido Mukti Farmer	0,055541248	✓			-
V10	Langgeng Jaya Farmer	0,038096549			✓	-
V11	Maju Jaya Farmer	0,045533863			✓	-
V12	Langgeng Makmur Farmer	0,057763398	✓			-
V13	Tunas Jaya Farmer	0,054107512		✓		-
V14	Ngawiti Farmer	0,058602301	✓			-
V15	Jaya Makmur Farmer	0,041929345			✓	-
V16	Arjuno Farmer	0,049374684		✓		-
V17	Mega Makmur Farmer	0,05894714	✓			-
V18	Tunas Makmur Farmer	0,039527007			✓	-
V19	Tanjung Makmur Farmer	0,049875476		✓		-
V20	Marga Jaya Farmer	0,054819693		✓		-
Number of Farmer Groups			5	8	7	0

Table 12. Indicator Value of Requirements for Seed Recipients

Farmer Groups That Meet the Conditions for Giving 3 Types of Seeds	Farmer Groups That Meet the Conditions for Giving 2 Types of Seeds	Farmer Groups That Meet the Conditions for Giving 1 Type of Seed
>0,055	0,049-0,054	0,046-0,048

Analysis of the results of prospective CSR recipients based on the weight value can be described as follows:

1. Based on the results of the manual test carried out, it is found that 5 farmer groups are entitled to receive seed assistance from CSR with three types of seeds. Farmer groups which receive 3 types of seeds are selected based on the highest weight value with a value above 0.055.

2. Based on the test results of farmer groups, there are 8 farmer groups which are entitled to receive 2 types of agricultural seeds. This is based on the results of a vulnerable value of 0.049-0.054.
3. Based on the test results of the table above, the recommended farmer groups to get 1 type of seed are 7 farmer groups with a vulnerable value of 0.046-0.048.

From the results of trials and recommendations obtained, all farmer groups tested received recommendations for obtaining agricultural seeds. The difference is that the amount obtained by farmer groups varies based on the range of values determined by table 12.

4.3. Program Design

The design stage is the stage of changing the needs which are still in the form of a concept into a real system description specification. According to Hanif Al Fatta (2007), the design stage is the stage where the complete project specifications are made [19]. According to (Muhamad Muslihudin 2016), the benefit of system design is to provide a complete blueprint, as a guideline for programmers in making applications. [20][21].

a. Context Diagram

Context diagram is the highest level in the data flow diagram and contains only one process which shows the system as a whole.

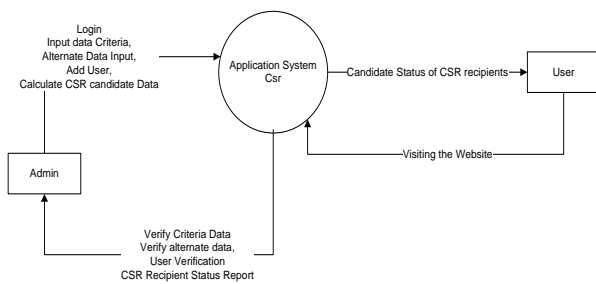


Figure 1. Context Diagram

b. DFD Level 0

Data Flow Diagram or commonly called DFD is one way to model the process of analysis and software design, especially with a structured approach. At DFD level 0, there is a more detailed description of the Context Diagram where the DFD Level 0 has included the data store needed by the system and an overview of how the system interacts with external entities.

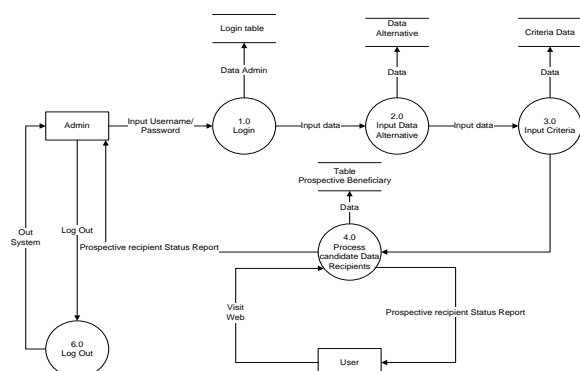


Figure 2. DFD Level 0 of Application System Design of CSR determination

Based on the calculations and rankings through the system test, a graph of the results of the prospective recipients of CSR seed assistance is obtained. The system graph is formed based on the final calculation value based on the data of prospective recipients of CSR seed assistance. Determination of prospective recipients of CSR seed assistance using the system can be done quickly and with accurate results.

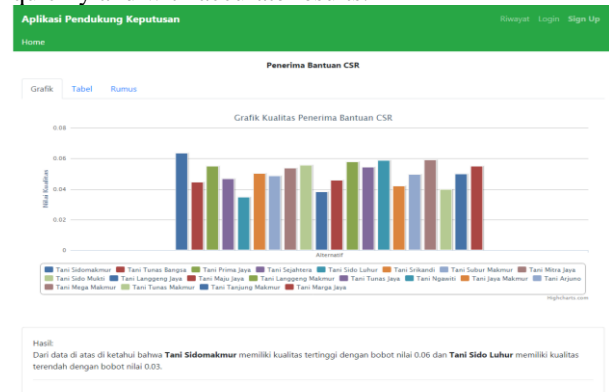


Figure 3. Application System Test Results in Graphical Form

From the analysis of research results with manual testing and application testing, it is obtained that the preference for the similarity of the calculation results is obtained. From the results of calculations through manual tests and application tests, the highest alternative results with a value of 0.063470478 is for Sidomakmur Farmer, and the lowest alternative with a value of 0.034660601 is for Sidoluhur Farmer.

V. CONCLUSION

Based on research conducted by a decision support system for determining prospective recipients of CSR for agricultural seeds using the weighted product method, the conclusion which can be drawn is that the results of the calculation of determining candidates for CSR recipients for agricultural seeds are the priorities needed as consideration for determining farmer groups that are entitled to receive CSR agricultural seeds. From the calculation results, the ranking results obtained and the highest score is obtained for the Sidomakmur Farmer Group with a value of 0.063470478, and the lowest value for Sidoluhur Farmer Group with a value of 0.038096549. Analysis of the results of prospective CSR recipients based on the weight value can be described as follows:

1. The results of the tests conducted that the farmer groups entitled to receive seed assistance from CSR with three types of seeds are as many as 5 farmer groups.
2. Farmer groups which received 3 types of seeds are selected based on the highest weight value with a value above 0.055.
3. Based on the results of the farmer group test, there are 8 farmer groups which are entitled to receive 2 types of agricultural seeds. This is

based on the results of a vulnerable value of 0.049-0.054.

4. Based on the results of the trial table above, the recommended farmer groups to get the number of seeds as much as 1 type are 7 farmer groups with a vulnerable value of 0.046-0.048.

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