

# BEST REGIONAL SELECTION DECISION SUPPORT SYSTEM FOR SHALLOTS IN WARU DISTRICT, PAMEKASAN REGENCY USING TOPSIS METHOD

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## ABSTRACT

*The location of an area greatly influences the agricultural sector, including the Waru Subdistrict, Pamekasan Regency, a geographical condition that incidentally consists of hilly plains or highlands. So it is very influential on food plants that can be developed in the area. The objective to be achieved in this final project is to make a Decision Support System application for the Best Shallot Producing Region in Waru Subdistrict, Pamekasan Regency Using the TOPSIS Method. From the results of the study it can be concluded that the application system that has been made is running well and quite User Friendly, from the five villages in the Waru sub-district which were used as experimental data, it can be concluded that the selection of the best village using the TOPSIS method recommended for shallot cultivation is Sanah Laok village. with the highest score is 0.6312.*

**Keywords:** TOPSIS Method, Decision Support System, Application.

## I. INTRODUCTION

Agriculture is the activity of utilizing biological resources carried out by humans to produce food, industrial raw materials, or energy sources, as well as to manage the environment. The activity of utilizing biological resources that are included in agriculture is commonly understood by people as plant cultivation or farming (English: crop cultivation) and raising of livestock (raising), although the scope can also take the form of the use of microorganisms and bio enzymes in processing advanced products, such as manufacturing cheese and tempeh, or just extraction. Food is one of the important basic human needs. The more developed a nation is, the greater the demands and attention to the quality of the food it will consume. The purpose of consuming food is no longer just overcoming hunger but is increasingly complex. Consumers are increasingly aware that food is a major source of fulfillment of nutrients such as protein, fat, carbohydrates, vitamins, and minerals to maintain a healthy body. Food plants are materials that enable humans to grow and can maintain their bodies and reproduce. Humans need food plants to support their life, for example, to build body cells and keep the body healthy and functioning properly.

The location of an area greatly influences the agricultural sector, including the Waru Subdistrict, Pamekasan Regency, a geographical condition that incidentally consists of hilly plains or highlands. So it is very influential on food plants that can be developed in the area. In this final project, the researcher tries to examine several areas/villages in Waru Subdistrict, Pamekasan Regency to find out food plants that can be developed in one of the villages, the food plants that are raised here are shallots which are one of the food plants for the process of managing foodstuffs. Shallots are also an alternative crop chosen by the farming community, especially those in the Waru sub-district, Pamekasan Regency. The method used in this research is in the form of ranking, where each region/village will be ranked based on priority.

DSS is a system using a model built to help solve the problems semistructured. Selection of the best areas is a type of semi-structured problem means that this process is not a routine event but an incidental occurrence. To avoid subjectivity resulting decision required a decision support system (Decision Support System / DSS) that can assist

researchers in determining areas/villages which are very suitable for growing onions in particular in the sub-Waru Pamekasan. DSS is a system using a model that is built to help solve semi structured problems. The ranking method used in this study is the TOPSIS method, collecting data related to the classification process obtained from literature and parties who understand the conditions of soil fertility with several criteria such as land area, harvest area, productivity, and production. In selecting the best area/village, the researcher designed the database and designed the user interface to be used.

Creation of this system is expected to provide good support and contribution in making the decision to be taken by stakeholders such as farmers. From the explanation above, this final project tries to make a decision support system to determine the best area for producing red onions in Waru sub-district, Pamekasan district using the TOPSIS method. With the title "Best Regional Selection Decision Support System For Shallots In Waru District, Pamekasan Regency Using Topsis Method".

## **2. RESEARCH METHODOLOGY**

### **2.1. Observation and data Collection**

Observations that we did in several villages in Waru District, Pamekasan Regency. The collection of data can be obtained from the captured data directly to the location of the land surveyed and through observation and interviews with stakeholders such as farmers in the village, Waru district office, and others.

### **2.2. Research Stages**

In this study, researchers focused on how the decision support system chose the best area according to predetermined attributes, the proposed method was the TOPSIS method, the research flow proposed in this study is shown in Figure 1.

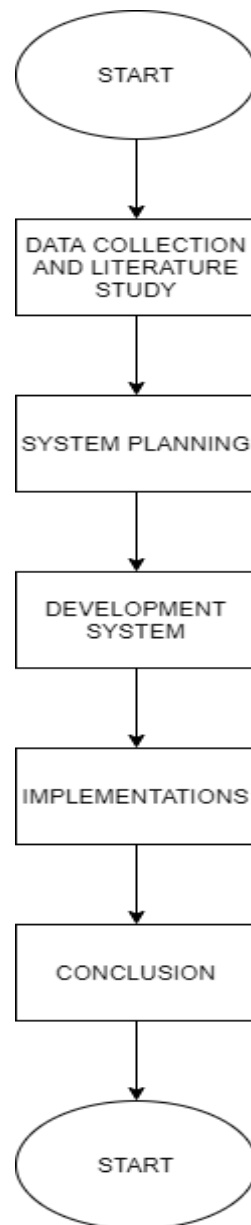


Figure 2.1. *Research Stage*

The stages used in this research are:

1. Study of literature  
The researcher conducted a literature study related to the research to be carried out. The literature studied is obtained from related books, journals, and other relevant sources such as previous research results and the internet.
2. Data Collection  
At this stage, the researchers collected all the data needed in the calculation and analysis system to be built. Data obtained by direct observation of the object under study.
3. System Planning  
After the data has been collected, the identification of the problem has been formulated, then the researcher begins to design the system to be built with due regard to the minimum requirements of the system to be built.

4. Implementation

At this stage, a test of the system that has been made is carried out whether it is running well or whether improvements are still needed.

5. Analysis of Result

The next process is to analyze the system to reexamine whether the system is running properly and give the right results by the method used.

6. Conclusion

After validation, a fact is made from the research that has been made based on the existing facts during the research.

### 3. DESIGN

#### 3.1. Context Diagram

The context diagram describes a diagram that describes the condition of the existing system, both input, and output, and includes the terminators involved in using the system.

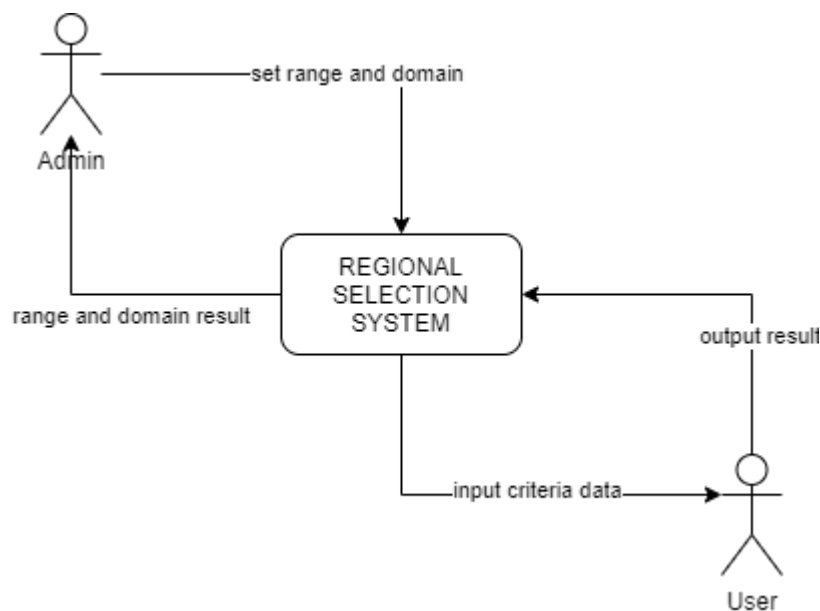


Figure 3.1. Context Diagram

In Figure 2 above, the user can only input the input variable in the form of a list of regional data/villages in Waru Subdistrict, Pamekasan Regency which will be ranked, carry out the process, and see the results obtained, while the admin is responsible for immediately managing activities in the program between another is to update input and output variables and set the rules in the system. This diagram will provide an overview of the entire system. The system is bounded by boundaries (can be represented by broken lines). In the context diagram, there is only one process. There should be no store in the context diagram. Context diagram contains an overview (in outline) of the system to be made. In a sentence, it can be said that this context diagram contains "whoever provides data (and any data) to the system, as well as to whom the information (and any information) must be generated by the system." So it can be concluded that the context diagram is a diagram that consists of a process and describes the scope of a system. A context diagram is the highest level of DFD which describes all the input to the system or the output of the system.

### 3.2 Data Flow Diagram (DFD)

Data Flow Diagrams (DFD) are diagram notations used to describe the flow of the data system, whose use is very helpful to understand the logic of the system, structured and clear. DFD is a tool in describing or explaining the work process of a system. The DFD in this study will be illustrated in Figure 3 below.

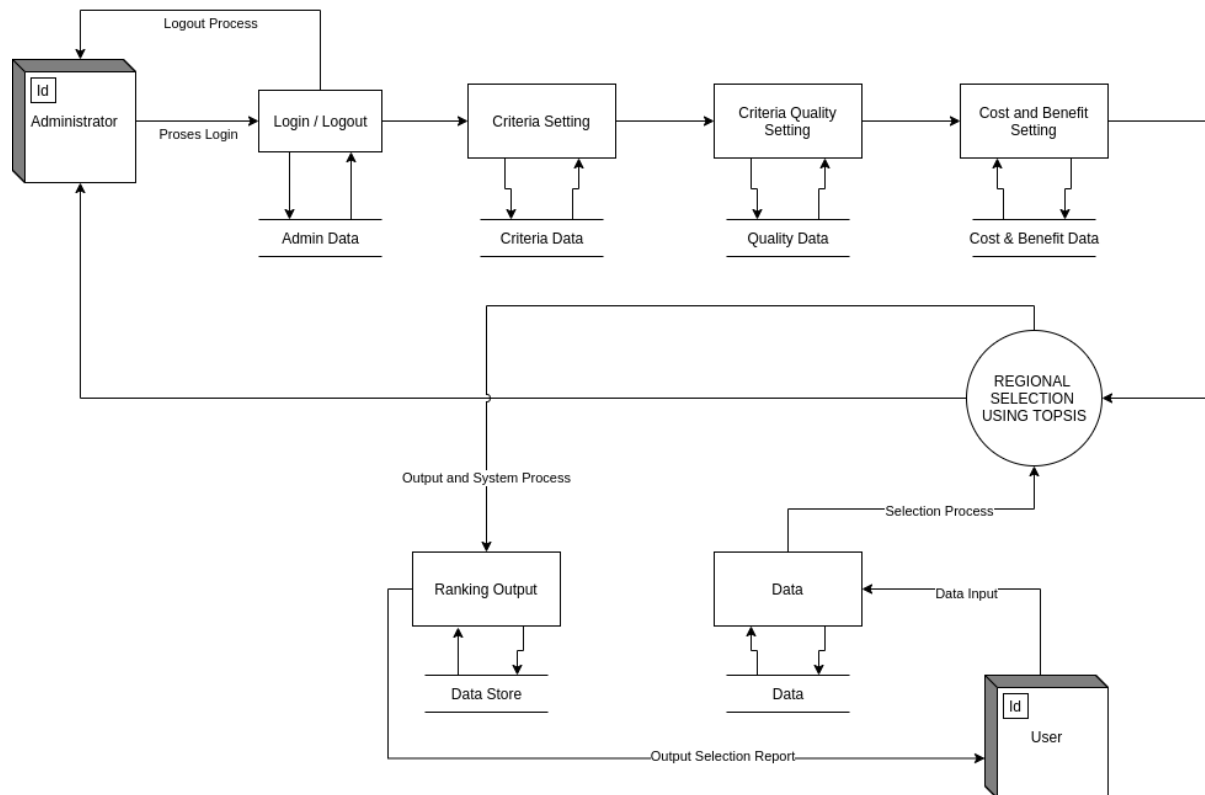


Figure 3.2. Data Flow Diagram (DFD)

In the DFD image 3 above, it can be explained that the program consists of 2 program users, namely the Admin who acts as a program manager and a user who acts as a user only, there are 6 databases, namely 1). user database which is useful for storing admin username and password data. 2). The criteria setting database functions for program input and output criteria data, 3). The weight setting database functions for weight data for each criterion 4). The cost and benefit setting database functions for cost and benefit data for each criterion. 5). The regional / village database functions to input regional / village data for each criterion. 6). The database of the best regional / village selection results in functions to accommodate the results of the selection of regional / village data on each criterion. In DFD there are also 7 processes, namely 1). User login as an administrator, login functions to verify administrator and also functions as program security, 2). Criteria setting serves as a place to enter criteria data for each input criterion, 3). Setting the weight criteria serves as a place to enter weight data for each input criterion, 4). cost and benefit settings serve as a place to enter cost and benefit data for each input criterion, 5). The best regional / village election system using the TOPSIS method is the main system in this system, 6). The regional / village data input setting functions as a place for users to enter regional / village data. 7). The report on the results of regional / village data serves as a place for the results of reports by users by selecting the best area most suitable for planting shallots in Waru sub-district, Pamekasan Regency.

### 3.3. Entity Relationship Diagram (ERD)

In figure 4 below describes the relationship that serves to describe the relationship between one table to another.

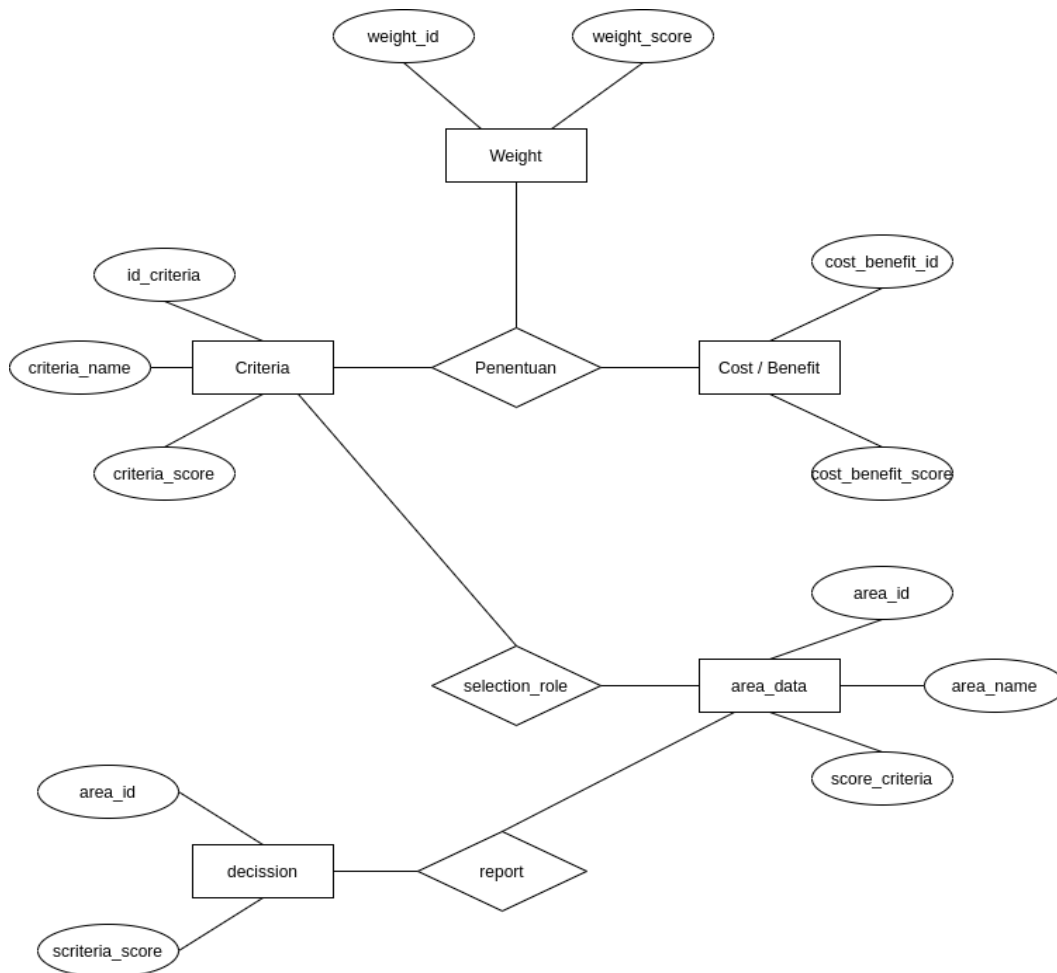


Figure 4. Entity Relation Diagram (ERD)

There are 5 Entity is important in making this program: 1). Data criteria, serve to enter data input and output criteria, 2). Data weight, serves to set the weight value data on each criterion and 3). Data costs and benefits serves to set the value data costs and benefits, 4). Data area / village serves to adjust the data input areas / villages will be selected, 5). Data reports, is used to report the results of the selection / election of the best area.

### 3.4 Flowchart Topsis System

The following is a picture of the TOPSIS System Flowchart for the selection of the best regional / village elections in Waru sub-district, Pamekasan Regency, to be made:

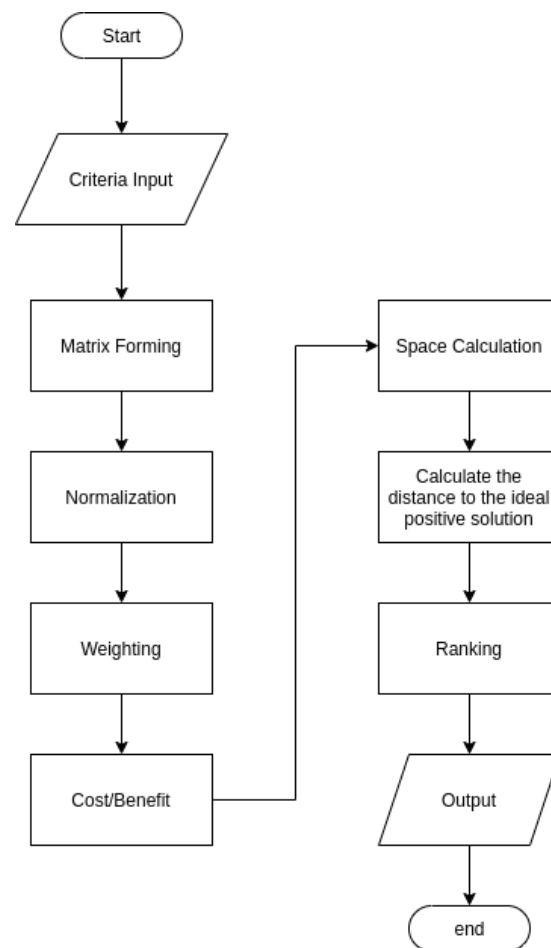


Figure 5. Flowchart

Pictured above explained groove TOPSIS method to be used in this system, while the steps are as follows:

1. Start
2. Formation of a matrix to accommodate the Input criterion value
3. Matrix Normalization
4. Give weight to each input criterion
5. Determine the value of the cost for the criteria that are detrimental and the value of the benefits for the criteria that are beneficial.
6. Calculating the Separation
7. Calculate the proximity to the ideal positive solution
8. Ranking so that it produces output in the form of names of regions/villages that can be used as alternatives.
9. Done

### 3.5 Formation on input, Weight and Cost-benefit Variables

The following are tables of input criteria, weights, and cost benefits of the system to be built.

Table 1. *Criteria Input Table.*

No	Criteria Name	Weight
1	Current	50
2	Clarity	50
3	Lighting	40
4	Depth	50
5	Salinity	40

Table 2. *Table Const & Benefit*

No	Criteria Name	Weight
1	Current	Benefit
2	Clarity	Benefit
3	Lighting	Cost
4	Depth	Benefit
5	Salinity	Benefit

## 4. RESULT AND DISCUSSION

### 4.1 Home Page

The main page has three menus, namely the Home menu, the alternative menu, and the menu displaying results, while the main page display is as follows.



Figure 6. *Home Page*



## 4.2 Alternative Page

The alternative menu is a menu to go to the page to enter alternative data in the form of village names in the Waru sub-district and data criteria consisting of five criteria, namely Flow, Clarity, Lighting, Depth, and Salinity, while the criteria input page is as follows.

TOPSIS adalah salah metode pengam keputusan multikriteria alternatif pilihan merupakan alternatif mempunyai jarak terkecil solusi ideal positif dan terbesar

Input Data Alternatif ...

Nama	Arus	Kejernihan	Pencahayaannya	Kedalaman	Salinitas
	Sangat Baik	Sangat Baik	Sangat Baik	Sangat Baik	Sangat Baik
	Sangat Baik	Sangat Baik	Sangat Baik	Sangat Baik	Sangat Baik
	Sangat Baik	Sangat Baik	Sangat Baik	Sangat Baik	Sangat Baik

Figure 7. Alternative Page

## 4.3 Result Page

This page serves to display the results of calculations or decisions generated by the TOPSIS method, this page is in the form of a table, where the contents of the table are accessed through data stored in Sql. The calculation results page picture is as follows.

Keputusan Ternormalisasi					
Nama	Arus	Kejernihan	Pencahayaannya	Kedalaman	Salinitas
Desa Bajur	5	4	4	3	3
Desa Sumber Waru	4	4	5	3	3
Desa Tampojung Guwa	3	3	4	4	4
Desa Sanah Laok	4	4	3	3	5
Desa Ragang	3	4	4	4	5
Hasil Pangkat Per kriteria	75	73	82	59	84
Akar Hasil Pangkat Per kriteria	8.6603	8.544	9.0554	7.6811	9.1652
Normalisasi					
Nama	Arus	Kejernihan	Pencahayaannya	Kedalaman	Salinitas
Desa Bajur	0.5774	0.4682	0.4417	0.3906	0.3273
Desa Sumber Waru	0.4619	0.4682	0.5522	0.3906	0.3273
Desa Tampojung Guwa	0.3464	0.3511	0.4417	0.5208	0.4364
Desa Sanah Laok	0.4619	0.4682	0.3313	0.3906	0.5455
Desa Ragang	0.3464	0.4682	0.4417	0.5208	0.5455

Figure 8. Result Page

#### 4.4 Administrator Login page

Admin Login Page is a page to enter the administrator page, while the administrator's address is localhost/topsis2/admin. The login page image is as follows.



Figure 9. Administrator Login Page

#### 4.5 Home Page (Administrator)

There are four menus on the administrator page, namely the User menu, the Data menu, the Results menu, and the admin/exit menu. The admin page image is as follows.



Figure 10. Admin Home Page

#### 4.6 User Page

User page is used for user / administrator profiles to add, delete, and edit user / administrator data. The User page is shown in the figure below.



Figure 11. User Page

#### 4.7 Data Page

The data page functions to set or edit the criteria name, weight, and Cost-Benefit value, while the data page is as follows.

Kriteria				
Arus Kejernihan Pencabayaan Kedalaman Salinitas				
<input type="button" value="edit"/>				
Bobot				
Arus Kejernihan Pencabayaan Kedalaman Salinitas				
50	50	40	50	40
Atribut				
Arus Kejernihan Pencabayaan Kedalaman Salinitas				
Benefit	Benefit	Cost	Benefit	Benefit

Figure 12. Data Page

#### 4.8 Logout Menu

The logout menu allows you to exit the application that has been created.

#### 4.9 Testing the System

Testing is done to try and test the application program that was created, whether it is by the desired or still far from desire.

#### 4.10 Determination of criteria Weight

The first is to determine the weight on each criterion, the weighting is made to explain how much of a comparison of interest between the criteria with other criteria, the problems of this thesis we give a weighting to each criterion is as follows, the current 50, Clarity 50, lighting 40, Depth 50, Salinity 40.

#### 4.11 Benefit cost Determination

After setting the weight, what needs to be done is to set the Cost-Benefit, this is done to be able to separate which criteria are favorable (Benefit) and which are not profitable (Cost), in this final project we give the value of the Cost on the lighting and Benefits on Flow, Clarity, Depth, and Salinity.

#### 4.12 Input data Criteria

Criteria input is useful for entering the criteria data that we have prepared to try this application program, while the criteria are presented in the form of a table below.

Table 3. *Input Criteria*

No	Village Name	Criteria Score				
		Current	Clarity	Lighting	Dept	Salinity
1	Bujur Village	5	4	4	3	3
2	Sumber Waru Village	4	4	5	3	3
3	Tampojung Guwe Village	3	3	4	4	4
4	Sanah Laok Village	4	4	3	3	5
5	Ragang Village	3	4	4	4	5

#### 4.13 Result

The results of the TOPSIS calculation will be explained in the image below.

Keputusan Ternormalisasi					
Nama	Arus	Kejernihan	Pencahaya	Kedalaman	Salinitas
Desa Bujur	5	4	4	3	3
Desa Sumber Waru	4	4	5	3	3
Desa Tampojung Guwa	3	3	4	4	4
Desa Sanah Laok	4	4	3	3	5
Desa Ragang	3	4	4	4	5
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Desa Ragang	0.3464	0.4682	0.4417	0.5208	0.5455

Figure 13. *Result*

From the above calculation, it can be concluded that the best-recommended village for shallot cultivation in several villages in the Waru sub-district is Sanah Laok village with a value of 0.6312.

## 5. CONCLUSION

In the experiments carried out in chapter IV, it can be concluded that the application system has been running well and is quite User Friendly, from the five villages in the Waru sub-district which were used as experimental data, it can be concluded that the best-recommended village for shallot planting is Sanah Laok village with a value of 0.6312.

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