ISSN 2087-3336 (Print) | 2721-4729 (Online)

TEKNOSAINS: Jurnal Sains, Teknologi dan Informatika
Vol. 12, No. 2, 2025, page. 345-356
http://jurnal.sttmcileungsi.ac.id/index.php/tekno
https://doi.org/10.37373/tekno.v12i2

Decision support system for determining the best tofu industry location using a simple multi-attribute rating technique

Julianto Lemantara

Dinamika University, Indonesia. Jl. Raya Kedung Baruk No. 98, Rungkut, Surabaya, Indonesia, 60298

Corresponding Author: julianto@dinamika.ac.id

Submitted: 27/04/2025 Revised: 15/05/2025 Accepted: 20/06/2025

ABSTRACT

The tofu industry has significant potential in Indonesia, particularly as a staple food rich in protein. However, many entrepreneurs face challenges in determining the optimal location to build a tofu industry. Suboptimal locations often cause various problems, including high operational costs, difficult access to raw materials, and negative environmental impacts due to production waste. Factors such as raw material availability, waste management, distance to residential area, land cost, and accessibility are the main challenges that must be considered in determining the optimal location of the tofu industry. This study used the Simple Multi-Attribute Rating Technique (SMART) method to support objective decision-making in determining the best location for the tofu industry. Using this method, the determination of the best alternative location for the tofu industry is evaluated based on the weight of the specified criteria. The research results indicated that the Decision Support System (DSS) application that implemented the SMART method could provide the best location recommendations. The accuracy of the SMART method calculation on the DSS application is 100% correct and can be trusted. In addition, the DSS application was also able to accommodate criteria modeling with dynamic assessment scales according to user needs.

Keywords: Decision support system; SMART method; industry location; tofu industry

1. INTRODUCTION

The tofu industry has very good prospects in Indonesia, considering that tofu is a popular food among the people. As one of the providers of soy-based foods that are rich in protein and affordable, tofu has become a staple food, especially for people with middle to low purchasing power. In addition to its high nutritional value, tofu also has an economical price, making it the main choice for daily consumption [1]. However, despite the great opportunities, the tofu industry faces complex challenges, especially in terms of choosing the right location. Factors such as the availability of raw materials, waste management, distance to residential areas, land cost, and accessibility are crucial elements that must be considered. Suboptimal locations often cause various problems, including high operational costs, difficult access to raw materials, and negative environmental impacts due to production waste [2].

In Surabaya, there are at least 10 tofu industries with varying production capacities, ranging from 40 kg to 880 kg per day. Most of these industries are classified as small to medium enterprises with limited capital and technology [2]. Unfortunately, many business actors have not made the location a strategic element in their business planning. As a result, the great potential of the tofu industry often cannot be maximized. In the business world, choosing a business location has a significant impact on the sustainability and success of a business. A strategic location can increase operational efficiency, reduce distribution costs, and facilitate access to raw materials and customers [3]. The tofu industry, choosing the right location is very important to ensure the availability of high-quality soybean raw materials, accessibility to the market, and good waste management.

One of the main challenges in the tofu industry is high waste production. The tofu production process produces organic waste, both liquid and solid, with a Chemical Oxygen Demand (COD) level reaching 14,000 mg/L and Biological Oxygen Demand (BOD) up to 8,000 mg/L. This waste has the potential to pollute the environment if not managed properly. Locations that do not support waste treatment installations can worsen environmental impacts and hinder business sustainability. In addition, locations that are far from traditional markets or main customers can increase transportation costs and distribution times, which ultimately reduce the competitiveness of the tofu industry in meeting operational cost efficiency needs [4].

Decision Support System (DSS) is a system that has the capacity to solve semi-structured problems [5]. Previous research has shown that DSS can help business actors determine business locations based on predetermined criteria. Common methods used in DSS for business location selection include Weighted Product (WP) and Simple Multi-Attribute Rating Technique (SMART), which allow alternative rankings based on the weight given to each criteria. However, most previous researchers have only applied the SMART theory to solve certain problems, not to the point of creating a website-based application for a computerized DSS. There was research that only applied the SMART theory to tourist destinations in North Sumatra [6]. There is also research that only applied the SMART theory to determine the location of a bakery [7]. These researchers had not produced a computerized DSS. There was previous research that has produced a DSS with SMART method but has not modeled the value of each criteria with a flexible and dynamic scale. This study has modeled the assessment of criteria with a scale that can be adjusted to user needs flexibly and dynamically.

In the context of the tofu industry, location selection must also consider environmental aspects, especially in waste management. A study emphasized that selecting the right raw material supplier and effective waste management greatly affect production quality [8]. Therefore, a DSS based on the SMART method can be used to evaluate factors such as distance to suppliers, operational costs, and the environmental impact of a business location. Given these problems, this study aims to develop a DSS based on the SMART method that can help tofu entrepreneurs in determining the optimal industrial location in Surabaya. By adopting a multi-criteria approach, this system will provide location recommendations based on main criteria.

Based on these problems, a DSS is needed that can help tofu industry business actors in determining the optimal business location. This system must be able to identify and evaluate a number of criteria in a structured manner, so that the resulting decisions are objective and accountable. The criteria used in this DSS cover various important aspects such as: Availability of raw materials, Waste management, Distance to residential area, Land cost, and Accessibility. This DSS has modeled the assessment of criteria with a scale that can be adjusted to user needs flexibly and dynamically so this has added value compared to previous research. This DSS application was built with the PHP programming language and MySQL database because this application was website-based and was still being tested locally.

2. METHOD

Phases of Decision Support System (DSS)

This study uses 4 phases in the decision-making system, namely intelligence, design, choice, and implementation. For more details, each phase can be explained as follows:

A. Intelligence phase

As the first phase in decision-making, the intelligence phase is the stage of identifying problems and collecting information related to what will be decided [9]. In this phase, problem identification is carried out, namely determining the optimal location for the tofu industry. Data related to potential locations will be collected, in the context of the tofu industry, choosing a strategic location is a crucial factor in determining business sustainability [10]. Inappropriate decisions in determining the location can cause various problems, such as limited access to raw materials, increased distribution costs, and environmental problems due to suboptimal waste management [11]. Therefore, this study attempts to identify the main factors that need to be considered in selecting a tofu industry location using the Simple Multi-Attribute Rating Technique (SMART) method.

B. Design phase

This phase focuses on designing an assessment model to evaluate and compare each alternative location of the tofu industry based on predetermined criteria [12]. With the SMART method, each criteria is given a weight according to its level of importance. The weight of each criteria is determined in Table 1.

Table 1. List of criteria

Criteria	Type	Weight
Availability of Raw Materials (K01)	Benefit	25%
Waste Management (K02)	Benefit	20%
Distance to Residential Areas (K03)	Benefit	20%
Land Costs (K04)	Cost	15%
Accessibility (K05)	Benefit	20%

Calculation and comparison of alternatives are done using the SMART method to determine the best location. The assessment for each criteria uses a Likert scale with a value range of 1 (very bad) to 5 (very good). More details, the criteria assessment scale can be seen in Table 2.

Table 2. Criteria assessment scale

Criteria Assessment	Scale
Very Good	5
Good	4
Good Enough	3
Bad	2
Very Bad	1

The results of the criteria modeling in the DSS for determining the location of the tofu industry can be seen in Table 3.

Table 3. Criteria modeling

Criteria	Description	Scale
Availability of Raw Materials (K01)	Supply capacity > 200 kg/hari	5
	Supply capacity 150 - 200 kg/day	4
	Supply capacity 100 - 149 kg/day	3
	Supply capacity 50 - 99 kg/day	2
	Supply capacity 0 - 49 kg/day	1
Waste Management (K02)	Wastewater Treatment Plant system (WTPS) capacity > 10.000 L/hari	5
	WTPS capacity 5.000 - 10.000 L/hari	4
	WTPS capacity 2.000 - 5.000 L/hari	3
	WTPS capacity < 2.000 L/hari	2
	There is no WTPS	1
Distance to Residential Areas (K03)	> 5 km	5
	3 – 5 km	4
	2 – 3 km	3
	1 – 2 km	2
	< 1 km	1
Land Costs (K04)	Land purchase price < Rp 7.000.000,00/m²	1
	Land purchase price: Rp 7.000.000,00 - Rp 7.499.000,00/m²	2
	Land purchase price: Rp 7.500.000,00 - Rp 7.999.999,99/m²	3
	Land purchase price: Rp 8.000.000,00 - Rp 8.499.999,99/m²	4
	Land purchase price: Rp 8.500.000,00 - Rp 9.000.000,00/m²	5
Accessibility (K05)	The asphalt road condition is very good, 2 lanes, road width > 8 meters	5
	The asphalt road condition is good, 2 lanes, road width > 6-8 meters	4
	The asphalt road condition is quite good, 1 lane, road width > 4-6 meters	3
	The road condition is not good, the road width is 3-4 meters	2

Criteria	Description	Scale
	The road condition is poor, road width < 3 meters	1

C. Choice Phase
In the choice phase, calculations will be carried out on each alternative using the SMART method, producing a score for each location. Then it will sort the location alternatives from the highest to the lowest score, and users can choose the best location based on the recommendations from the system.

D. Implementation Phase
After the decision is made, the implementation steps are carried out and will produce a complete report or recommendation regarding the best location [13]. This information can then be submitted to related parties, such as the industrial development team or management, for the realization steps of selecting the tofu industry location.

Simple Multi-Attribute Rating Technique (SMART) Method

In this study, the method used to create a DSS in selecting the best tofu industry location is SMART. The SMART method is one of the techniques in DSS that is used to assist the decision-making process by considering various criteria. This multi-criteria decision-making technique is based on the theory that each alternative consists of several criteria that have values and each criteria has a weight that describes how important it is compared to other criteria [14]. This method is widely used in selecting business locations because of its ability to optimize various factors that influence business decisions. The model used in SMART has several stages that must be carried out, as follows: a) perform normalization of criteria weight with formula (1); b) perform normalization of criteria value, where the benefit criteria use formula (2) and the cost criteria use formula (3); c) the result of the criteria normalization is multiplied by the weight normalization; and finally d) Sort the best alternatives based on the largest sum of the multiplication of the normalized criteria weights by the normalized criteria values.

$$Weight\ Normalization = \frac{Weight\ Value}{Total\ Weight\ Value} \quad (1)$$

$$Benefit\ Criteria = \frac{out - min}{max - min} \quad (2)$$

$$Cost\ Criteria = \frac{max - out}{max - min} \quad (3)$$

Note:
out = criteria value for a particular alternative
min = highest value on the criteria
max= highest value on the criteria

3. RESULT AND DISCUSSION

Results of problem analysis

Based on the research problems, the solution offered to tofu industry players is the creation of a DSS application equipped with the functions of sign up, login, alternative data maintenance, criteria data maintenance, criteria assessment scale data maintenance, and alternative ranking as a recommendation for determining the best tofu industry location. To use the application, hardware is required to be able to run the operating system and web browser smoothly. In this research, several alternative data were used as samples in determining the Best Tofu Industry Location in Surabaya Using the SMART Method. The alternative assessment data for each criteria in this study can be seen in Table 4. There are 5 criteria used in this study, namely: Availability of Raw Materials (K01), Availability of Raw Materials (K02), Distance to Residential Areas (K03), Land Costs (K04), and Accessibility (K05). A more detailed explanation of the criteria can be seen in Table 4.

Table 4. Alternative assessment of each criteria

Alternative	K01	K02	K03	K04	K05
Jl. Kalilom Lor Indah (A01)	4	3	5	2	3
Jl. Mulyosari Surabaya (A02)	3	3	4	2	2
Jl. Gunung Anyar (A03)	3	3	4	3	4
Jl. Medokan Ayu Utara (A04)	4	5	4	1	3

Alternative	K01	K02	K03	K04	K05
Jl. Medokan Ayu, Tambak (A05)	1	4	4	4	2

Implementation of SPK Components Using SMART Method

A. Data management

This component stores all data related to alternative locations, assessment criteria, and the weight of each criteria [15]. Data related to potential locations will be collected, such as raw material availability, waste management, distance to residential area, land costs, and location and accessibility. The system also supports structured data storage to facilitate decision-making and further analysis. For database design, the tool used was Power Designer.

Figure 1 is a design of the Physical Data Model, where there are 5 tables. The first table is an alternative with the attributes id_alternatif as the primary key, alternative_name, alternative_address, alternative_district, and alternative_city. The second table is a criteria table with the attributes id_criteria as the primary key, criteria_name, criteria_type, and criteria_weight. Then there is a criteria_scale table with the attributes id_slala as the primary key, definition, scale, and criteria_id as the foreign key that refers to the criteria table. There is an assessment table with the attributes id_penilaian as the primary key, id_alternatif as the foreign key that refers to the alternative table, id_scale as the foreign key that refers to the criteria_scale table, and id_criteria as the foreign key that refers to the criteria table. Finally, there is a user table with the id attribute as the primary key, email, and password. These tables are related to each other, the assessment table is related to the alternative, criteria, and criteria_scale tables. While the scale_criteria table is related to the criteria table.

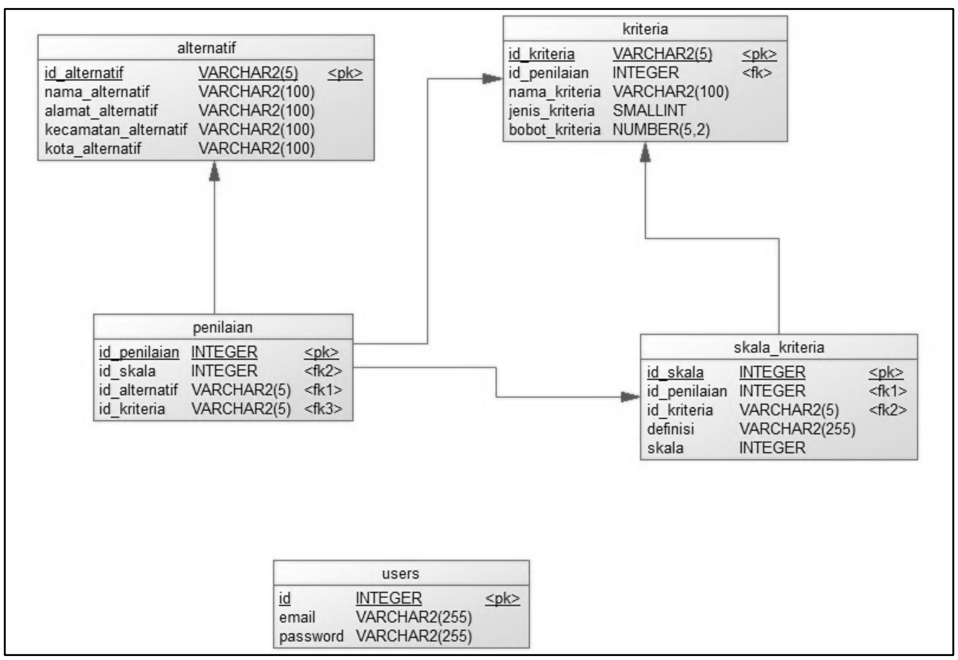


Figure 1. Physical data model

B. Model management

This component manages the SMART calculation model. There is a module that functions to calculate the value of each alternative based on the weight and criteria that have been set [16]. This model also allows users to adjust the criteria weights if necessary, so that they can be adjusted to user preferences or needs. SMART method calculation steps: Weight Normalization, Criteria Normalization, Criteria normalization results multiplied by weight normalization, and Ranking

C. Knowledge management

This component stores information about the effective decision-making process, including knowledge of the SMART method and guidelines for determining criteria weights. Knowledge Management can help users understand how the system works and the basis for the decisions made, so that users can make relevant adjustments [17]. The following are the results of implementing the SMART method: The results of the normalization of the criteria weights can be seen in Table 5.

Table 5. Weight Normalization

Criteria	Weight of Interest	Criteria	Weight of Interest
K01	$\frac{0,25}{0,25+0,20+0,20+0,15+0,20} = \frac{0,25}{1} = 0,25$	K04	$\frac{0,15}{0,25+0,20+0,20+0,15+0,20} = \frac{0,15}{1} = 0,15$
K02	$\frac{0,20}{0,25+0,20+0,20+0,15+0,20} = \frac{0,20}{1} = 0,2$	K05	$\frac{0,20}{0,25+0,20+0,20+0,15+0,20} = \frac{0,20}{1} = 0,2$
K03	$\frac{0,20}{0,25+0,20+0,20+0,15+0,20} = \frac{0,20}{1} = 0,2$		
Total Weight of Interest		**1**	

The results of the criteria normalization with formula (2) can be described in more detail in the paragraph below. Meanwhile, the results of the multiplication between the normalization of the criteria values and the normalization of the criteria weights can be seen in Table 6.

K01: Benefit $= \frac{out-min}{max-min}$

A01: $\frac{4-1}{4-1} = 1$ A02: $\frac{3-1}{4-1} = 0,67$ A03: $\frac{3-1}{4-1} = 0,67$ A04: $\frac{4-1}{4-1} = 1$ A05: $\frac{1-1}{4-1} = 0$

K02: Benefit $= \frac{out-min}{max-min}$

A01: $\frac{3-3}{5-3} = 0$ A02: $\frac{3-3}{5-3} = 0$ A03: $\frac{3-3}{5-3} = 0$ A04: $\frac{5-3}{5-3} = 1$ A05: $\frac{4-3}{5-3} = 0,5$

K03: Benefit $= \frac{out-min}{max-min}$

A01: $\frac{5-4}{5-4} = 1$ A02: $\frac{4-4}{5-4} = 0$ A03: $\frac{4-4}{5-4} = 0$ A04: $\frac{4-4}{5-4} = 0$ A05: $\frac{4-4}{5-4} = 0$

K04 : Cost $\frac{max-out}{max-min}$

A01: $\frac{4-2}{4-1} = 0,67$ A02: $\frac{4-2}{4-1} = 0,67$ A03: $\frac{4-3}{4-1} = 0,33$ A04: $\frac{4-1}{4-1} = 1$ A05: $\frac{4-4}{4-1} = 0$

K05: Benefit $= \frac{out-min}{max-min}$

A01: $\frac{3-2}{4-2} = 0,5$ A02: $\frac{2-2}{4-2} = 0$ A03: $\frac{4-2}{4-2} = 1$ A04: $\frac{3-2}{4-2} = 0,5$ A05: $\frac{2-2}{4-2} = 0$

Table 6. Weight normalization x criteria normalization

Criteria	Calculation Results	
K01	A01: (1 x 0,25) = 0,25	A04: (1 x 0,25) = 0,25
	A02: (0,67 x 0,25) = 0,1675	A05: (0 x 0,25) = 0
	A03: (0,67 x 0,25) = 0,1675	
K02	A01: (0 x 0,2) = 0	A04: (1 x 0,2) = 0,2
	A02: (0 x 0,2) = 0	A05: (0,5 x 0,2) = 0,1
	A03: 0 x 0,2) = 0	
K03	A01: (1 x 0,2) = 0,2	A04: (0 x 0,2) = 0
	A02: (0 x 0,2) = 0	A05: (0 x 0,2) = 0
	A03: (0 x 0,2) = 0	
K04	A01: (0,67 x 0,15) = 0,1005	A04: (1 x 0,15) = 0,15
	A02: (0,67 x 0,15) = 0,1005	A05: (0 x 0,15) = 0
	A03: (0,33 x 0,15) = 0,0495	
K05	A01: (0,5 x 0,2) = 0,1	A04: (0,5 x 0,2) = 0,1
	A02: (0 x 0,2) = 0	A05: (0 x 0,2) = 0
	A03: (1 x 0,2) = 0,2	

The results of the ranking of the best alternative tofu industry locations can be seen in Table 7. The final result is obtained by adding up all the values obtained by each alternative on all criteria. For example, the final value for alternative A04 is obtained with the following details: 0,25 + 0,2 + 0 + 0,15 + 0,1 = 0,7.

Table 7. Ranking results

Alternative	Final Result	Ranking
Jl. KaliLom Lor Surabaya (A01)	0,6505	2
Jl. Mulyosari surabaya (A02)	0,268	4
Jl. Gunung Anyar (A03)	0,417	3
Jl. Medokan Ayu Utara (A04)	0,7	1
Jl. Medokan Ayu, Tambak (A05)	0,1	5

D. Communication

This component is responsible for conveying the analysis results information to the user, including visualization of results and easy-to-understand reports [18]. For example, the system can present the calculation results in the form of graphs or comparison tables to facilitate location selection. This feature ensures that the results of the system are easily accessible and understood by those who need them.

Figure 2 is a display of the Alternative Table which functions to view alternative data, starting from Alternative ID (Id Alternatif), Name (Nama), Address (Alamat), District (Kecamatan), City (Kota), and Action (Aksi). In the action column, there are edit and delete buttons that function to replace and remove data. If the user wants to add alternative data, press the Add Alternative (+Tambah Alternatif) button.

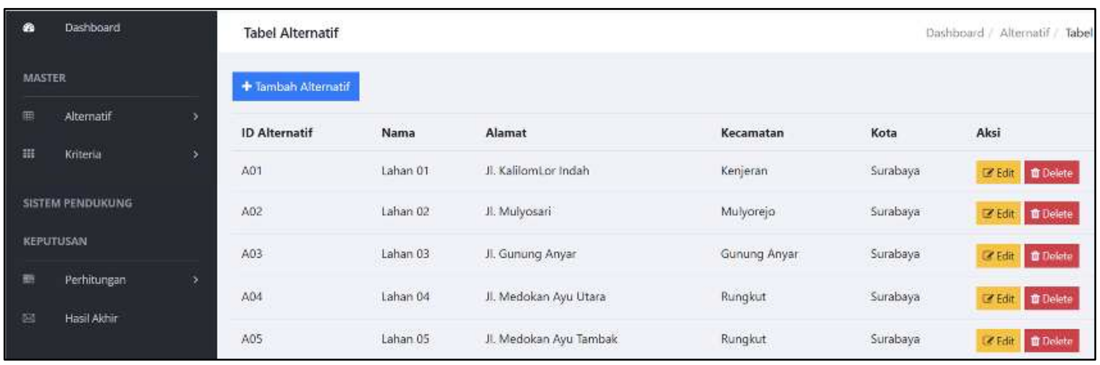


Figure 2. Display of the alternative table

Figure 3 is a display of the Criteria Data Addition Form which functions to input the required criteria data, namely Criteria ID (ID Kriteria), Criteria Name (Nama Kriteria), Criteria Type (Jenis Kriteria), and Criteria Weight (Bobot Kriteria). The criteria weight is filled in on a scale of 0 to 1, where 0 is equivalent to 0% and 1 is equivalent to 100%. If all the data has been filled in, the data can be saved with the InsertData button and there is a Reset button if you want to repeat filling the data. There is also a Criteria Type Dropdown which functions to provide 2 criteria type options, namely Benefit or Cost.

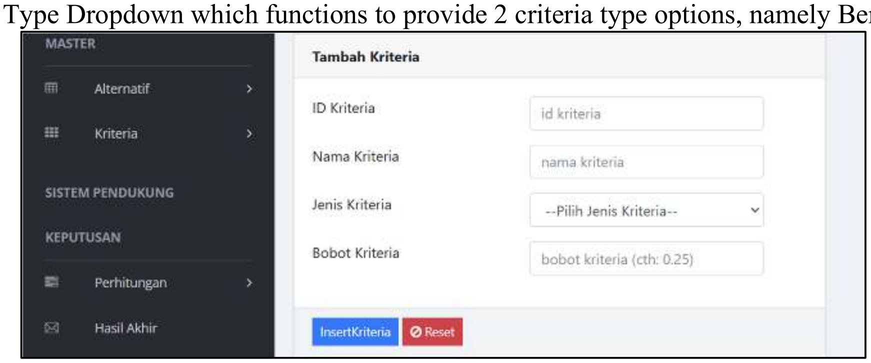


Figure 3. Display of the criteria data addition form

Figure 4 is a display of the Criteria Table which functions to view criteria data starting from Criteria ID (ID Kriteria), Criteria Name (Nama Kriteria), Criteria Type (Jenis Kriteria), Criteria Weight (Bobot

ISSN 2087-3336 (Print) | 2721-4729 (Online)
DOI 10.37373/tekno.v12i2.1603

Kriteria), and Action (Aksi). In the action column, there are edit and delete buttons that function to change or remove data.

Figure 5 is a display of the Criteria Scale Table which functions to view information related to criteria scale modeling. In the action column, there are edit and delete buttons that function to replace or delete data. An example of criteria scale modeling is: if the supply capacity is > 200 kg/day, then the scale value is 5. This feature is a superior compared to similar research because with this feature, criteria assessment can be carried out with a dynamic assessment scale, according to user needs.

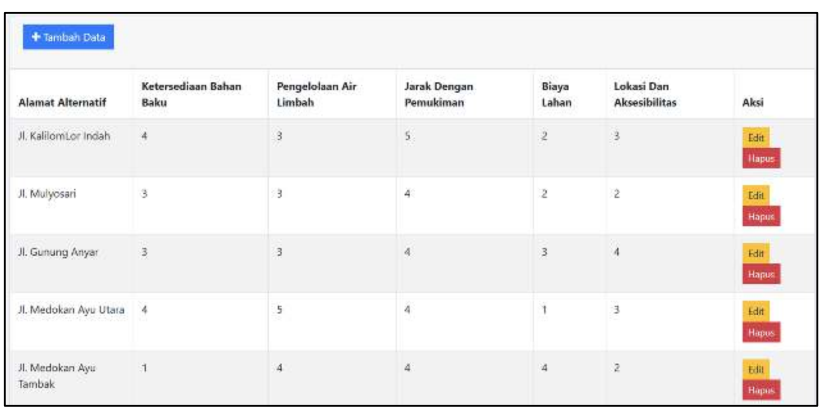
ID Kriteria	Nama Kriteria	Jenis Kriteria	Bobot Kriteria	Aksi
K01	Ketersediaan Bahan Baku	Benefit	0.25	Edit Delete
K02	Pengelolaan Air Limbah	Benefit	0.20	Edit Delete
K03	Jarak Dengan Pemukiman	Benefit	0.20	Edit Delete
K04	Biaya Lahan	Cost	0.15	Edit Delete
K05	Lokasi Dan Aksesibilitas	Benefit	0.20	Edit Delete

Figure 4. Display of The Criteria Table

Definisi	Skala	Aksi
Kapasitas supply > 200 kg/hari	5	Edit Delete
Kapasitas supply 150-200 kg/hari	4	Edit Delete
Kapasitas supply 100-149 kg/hari	3	Edit Delete
Kapasitas supply 50-99 kg/hari	2	Edit Delete
Kapasitas supply 0-49 kg/hari	1	Edit Delete

Figure 5. Display of on the criteria assessment scale table

Figure 6 is a display of the Assessment Table which functions to view assessment data, starting from Alternative Address (Alamat Alternatif), Availability of Raw Material (Ketersediaan Bahan Baku), Wastewater Management (Pengelolaan Air Limbah), Distance to Residential Area (Jarak dengan Pemukiman), Land Cost (Biaya Pemukiman), Accessibility (Aksesibilitas), and Action (Aksi). In the action column, there are edit and delete buttons that function to change/remove data. This form displays alternative values for each criteria.

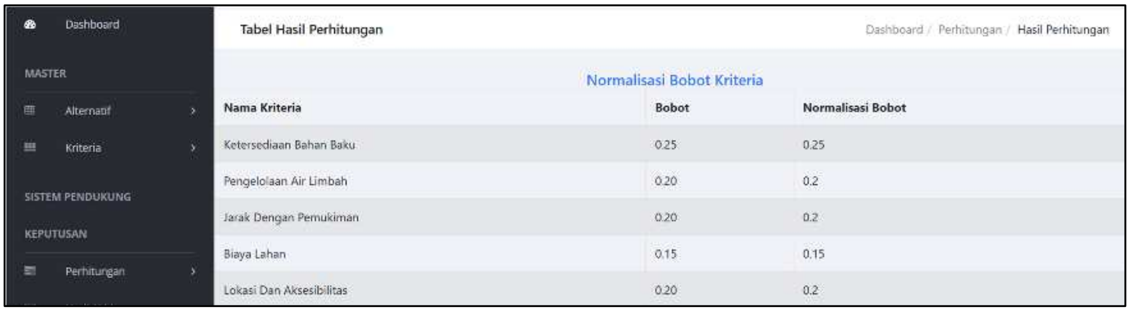


Alamat Alternatif	Ketersediaan Bahan Baku	Pengelolaan Air Limbah	Jarak Dengan Pemukiman	Biaya Lahan	Lokasi Dan Aksesibilitas	Aksi
Jl. KalilomLor Indah	4	3	5	2	3	Edit Hapus
Jl. Mulyosari	3	3	4	2	2	Edit Hapus
Jl. Gunung Anyar	3	3	4	3	4	Edit Hapus
Jl. Medokan Ayu Utara	4	5	4	1	3	Edit Hapus
Jl. Medokan Ayu Tambak	1	4	4	4	2	Edit Hapus

Figure 6. Display of the assessment table

Figure 7 is a display of the Weight Normalization Results which functions to present the normalized criteria weight values in the decision calculation process. The data displayed will be used in the final score calculation to determine the best alternative.

ISSN 2087-3336 (Print) | 2721-4729 (Online)
DOI 10.37373/tekno.v12i2.1603



Normalisasi Bobot Kriteria

Nama Kriteria	Bobot	Normalisasi Bobot
Ketersediaan Bahan Baku	0.25	0.25
Pengelolaan Air Limbah	0.20	0.2
Jarak Dengan Pemukiman	0.20	0.2
Biaya Lahan	0.15	0.15
Lokasi Dan Aksesibilitas	0.20	0.2

Figure 7. Display of the weight normalization results

Figure 8 is a display of the Criteria Normalization Results which functions to present the normalized criteria values in the decision calculation process. The data displayed in this table shows a comparison of each alternative based on the specified criteria. The normalization result values are used in the final score calculation process to determine the best alternative.

Normalisasi Kriteria per Alternatif

Alternatif	Ketersediaan Bahan Baku	Pengelolaan Air Limbah	Jarak Dengan Pemukiman	Biaya Lahan	Lokasi Dan Aksesibilitas
Jl. KalilomLor Indah	1	0	1	0.67	0.50
Jl. Mulyosari	0.67	0	0	0.67	0
Jl. Gunung Anyar	0.67	0	0	0.34	1
Jl. Medokan Ayu Utara	1	1	0	1	0.50
Jl. Medokan Ayu Tambak	0	0.50	0	0	0

Figure 8. Display of the criteria normalization results

Figure 9 is the Final Result display that functions to present the final score of each alternative based on the calculation of the normalized criteria weights. The data displayed in the table shows a comparison of the total scores of each alternative, which is used to determine the best alternative. The final score value is obtained from the calculation results of all criteria considered in the decision-making process.

Hasil Perhitungan Akhir

Alternatif	Ketersediaan Bahan Baku	Pengelolaan Air Limbah	Jarak Dengan Pemukiman	Biaya Lahan	Lokasi Dan Aksesibilitas	Total Skor
Jl. KalilomLor Indah	0.25	0	0.2	0.1005	0.1	0.6505
Jl. Mulyosari	0.1675	0	0	0.1005	0	0.268
Jl. Gunung Anyar	0.1675	0	0	0.051	0.2	0.4185
Jl. Medokan Ayu Utara	0.25	0.2	0	0.15	0.1	0.7
Jl. Medokan Ayu Tambak	0	0.1	0	0	0	0.1

Figure 9. Display of the final result

Figure 10 is a display of the Ranking Results in the image above which functions to present the final score of each alternative based on the calculation of the normalized criteria weights. The data displayed in the table shows a comparison of the total scores of each alternative, which is used as a basis for determining the best alternative. The final score value is obtained from the calculation of all criteria considered in the decision-making process, thus providing an objective picture of the ranking of each alternative. With the SMART method in Figure 30, the results obtained are that Jl. Medokan Ayu Utara is the best alternative for the location of the tofu industry in Surabaya. The results of the SMART calculation on the website in Figure 30 are also the same as the results of the manual calculation in Table 7. This proves that the accuracy of the SMART calculation on the website is 100% correct and can be trusted.

Ranking Alternatif Berdasarkan Skor

Alternatif	Total Skor	Ranking
Jl. Medokan Ayu Utara	0.7000	1
Jl. KalilomLor Indah	0.6505	2
Jl. Gunung Anyar	0.4185	3
Jl. Mulyosari	0.2680	4
Jl. Medokan Ayu Tambak	0.1000	5

Figure 10. Display of the ranking results

4. CONCLUSION

Based on the research conducted, the Simple Multi-Attribute Rating Technique (SMART) method has proven effective in assisting decision-making to determine the best location for the tofu industry in Surabaya. The analysis results showed that the location area of Jl. Medokan Ayu Utara has the highest score (0.7) compared to other alternatives, making it the most optimal location. Besides, this DSS was also able to accommodate criteria modeling with dynamic assessment scales according to user needs. The development that can be done for further research is the need to add more criteria in determining the location of the tofu industry so that the results are more comprehensive. A combination of DSS methods can also be done, for example, a combination with the AHP method in order to determine a more objective criteria weight based on the scale of weight importance.

REFERENCE

[1] C. Sudaryantiningsih and Yonathan Suryo Pambudi, "Optimalisasi Proses Produksi Tahu di Pabrik Dele Emas Krajan Mojosongo Surakarta: Analisis Kelayakan dan Implementasi Good Manufacturing Practice (GMP)," *Intelektiva*, vol. 6, no. 2, pp. 376–383, 2024.

[2] D. Herdhiansyah, R. Reza, S. Sakir, and A. Asriani, "Kajian Proses Pengolahan Tahu: Studi Kasus Industri Tahu Di Kecamatan Kabangka Kabupaten Muna," *Agritech J. Fak. Pertan. Univ. Muhammadiyah Purwokerto*, vol. 24, no. 2, p. 231, 2022, doi: 10.30595/agritech.v24i2.13375. https://doi.org/10.30595/agritech.v24i2.13375

[3] A. Triayudi, M. Faizal, and R. T. Aldisa, "Implementasi Metode Weighted Product dan SMART Dalam Menentukan Lokasi Usaha Strategis Bagi Pelaku UMKM," *J. Inf. Syst. Res.*, vol. 4, no. 2, pp. 569–578, 2023, doi: 10.47065/josh.v4i2.2947. https://doi.org/10.47065/josh.v4i2.2947

[4] S. Suhendra, E. Suwondo, D. Ismoyowati, and M. Matsuoka, "Perancangan Sistem Pendukung Keputusan Pemilihan Lokasi Agroindustri: Studi Industri Tahu di Daerah Istimewa Yogyakarta," *agriTECH*, vol. 42, no. 1, p. 10, 2022, doi: 10.22146/agritech.54043. https://doi.org/10.22146/agritech.54043

[5] J. Nainggolan, J. A. P. Sirait, Muhammad Fadlan Ikromi, P. A. Lubis, and Debi Yandra Niska, "Decision Support System for Selection of The Best Teacher at SD Muhammadiyah 18 Medan Using The Analytical Hierarchy Process Method," *TEKNOSAINS J. Sains, Teknol. dan Inform.*, vol. 11, no. 1, pp. 13–20, 2024, doi: 10.37373/tekno.v11i1.569. https://doi.org/10.37373/tekno.v11i1.569

[6] Taufik Abdullah, J. J. Sihombing, Maulana Malik Fajri, and Debi Yandra Niska, "The Intelligent Approach is Used by Decision Support Systems for Tourist Destinations in North Sumatra," *TEKNOSAINS J. Sains, Teknol. dan Inform.*, vol. 11, no. 1, pp. 41–48, 2024, doi: 10.37373/tekno.v11i1.594. https://doi.org/10.37373/tekno.v11i1.594

[7] R. Andri Agus, M. Ardiansyah Sembiring, M. Istaufa Arif Sinaga, and S. Royal, "Penerapan Metode Smart Dalam Menentukan Lokasi Toko Roti," *J. Sci. Soc. Res.*, vol. 4307, no. 2, pp. 442–449, 2022, [Online]. Available: http://jurnal.goretanpena.com/index.php/JSSR.

[8] H. R. P. Nugraha and H. Mustafidah, "Sistem Pendukung Keputusan Pemilihan Pemasok Tahu Untuk Industri Tahu Bakso Menggunakan Metode Simpleadditive Weighting," *J. Teknol. Inf.*, vol. 1, no. 1, pp. 1–9, 2020, doi: 10.32546/jutech.v1i1.845.

https://doi.org/10.32546/jutech.v1i1.845

[9] S. Oktoriana and A. Suharyani, "Peran Wanita Tani Dalam Pengambilan Keputusan Usahatani," *SEPA J. Sos. Ekon. Pertan. dan Agribisnis*, vol. 18, no. 1, p. 18, 2021, doi: 10.20961/sepa.v18i1.44150. https://doi.org/10.20961/sepa.v18i1.44150

[10] E. Santoso, E. N. Hakimah, and S. Ratnanto, "Perspektif Pelaku Umkm Dalam Upaya Meningkatkan Kualitas Produk Untuk Menciptakan Kepuasan Dan Loyalitas (Studi Kasus Usaha Tahu Bapak Matnuri)," *Semin. Nas. Manajemen, Ekon. dan Akunt.*, vol. 8, pp. 591–600, 2023.

[11] R. D. Rahmadani and W. T. Subroto, "Analisis Strategi Pengembangan UMKM Kabupaten Sidoarjo di Masa Pandemi Covid-19," *J. Pendidik. Adm. Perkantoran*, vol. 10, no. 2, pp. 167–181, 2022, doi: 10.26740/jpap.v10n2.p167-181. https://doi.org/10.26740/jpap.v10n2.p167-181

[12] A. Sirojuddin, K. Amirullah, M. H. Rofiq, and A. Kartiko, "ZAHRA: Research And Tought Elmentary School Of Islam Journal Peranan Sistem Informasi Manajemen dalam Pengambilan Keputusan di Madrasah Ibtidaiyah Darussalam Pacet Mojokerto," *ZAHRA Res. Tought Elmentary Sch. Islam J.*, vol. 3, no. 1, pp. 19–32, 2022. https://doi.org/10.37812/zahra.v3i1.395

[13] R. Nuari, "Penentuan Tempat Lokasi Usaha Baru Menggunakan Simple Multi Attribute Rating Technique Method," *Chain J. Comput. Technol. Comput. Eng. Informatics*, vol. 2, no. 2, pp. 57–66, 2024, doi: https://doi.org/10.58602/chain.v2i2.114. https://doi.org/10.58602/chain.v2i2.114

[14] N. Thoyibah, L. Latipah, and A. Muchayan, "Sistem Pendukung Keputusan Penerimaan Siswa Baru Menggunakan Metode SMART," *J. SISFOKOM (Sistem Inf. dan Komputer)*, vol. 10, no. 2, pp. 232–240, 2021, doi: 10.32736/sisfokom.v10i2.940. https://doi.org/10.32736/sisfokom.v10i2.940

[15] R. F. Ramadhan and A. A. Widodo, "Penilaian Mahasiswa Berprestasi Menggunakan Metode Simple Additive Weighting Berbasis Decision Support System," *J. Sist. Inf. dan Inform.*, vol. 1, no. 2, pp. 90–97, 2022, doi: 10.33379/jusifor.v1i2.1695. https://doi.org/10.33379/jusifor.v1i2.1695

[16] M. R. Amrullah, E. Haerani, F. Wulandari, and S. Ramadhani, "Sistem Pengukuran Tingkat Kepuasan Terhadap Kualitas Kinerja Sekolah Menggunakan Metode SMART (Simple Multiple Attribute Rating Technique)," *J. Nas. Komputasi dan Teknol. Inf.*, vol. 5, no. 2, pp. 205–215, 2022, doi: 10.32672/jnkti.v5i2.4183. https://doi.org/10.32672/jnkti.v5i2.4183

[17] M. S. Ariantini, R. Belferik, O. H. Sari, M. Munizu, E. F. Ginting, and M. Mardeni, *SISTEM PENDUKUNG KEPUTUSAN : Konsep,Metode, dan Implementasi*. Jambi: PT. Sonpedia Publishing Indonesia, 2023.

[18] N. Norhikmah *et al.*, *Buku Ajar Sistem Pengambilan Keputusan*. Jambi: PT. Sonpedia Publishing Indonesia, 2024.