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Determining Strategic Locations for MSMEs in Sario District Using SAW Ranking with AHP Weighting

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Abstract: Micro, Small, and Medium Enterprises (MSMEs) play an essential role in the Indonesian economy due to their significant contribution to national economic growth as well as their ability to create jobs for local communities. The long-term success of MSMEs is not only determined by the products or services they offer, but also by the strategic business locations they select. However, identifying strategic locations is challenging due to the lack of structured tools, objective evaluation of multiple criteria, and limited use of integrated decision-support models. This research aims to determine the most strategic location for the development of MSMEs in Sario District, Manado City, by considering several key factors, including accessibility, population density, rental costs, community income levels, and infrastructure availability. These issues highlight the need for a systematic and objective approach to support decision-making in location selection. The problem faced in determining the location is the difficulty of integrating all criteria objectively and systematically. For this reason, the Analytical Hierarchy Process (AHP) method is employed to determine the weight of each criterion. In contrast, the Simple Additive Weighting (SAW) method is utilized to rank the alternative locations. The analysis found Sario Tumpaan (A4) as the most strategic location and Sario (A3) as the least. Data were obtained from surveys, interviews, questionnaires, and agency documents. The AHP–SAW-based Decision Support System effectively provided objective and consistent recommendations, with Sario Tumpaan serving as a benchmark for future evaluations and development.
Keywords: MSMEs; strategic location; AHP; SAW; decision support system.

1. INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) play a crucial role in the Indonesian economy, given their significant presence in the national economy [1]. MSMEs not only create jobs for local communities but also make substantial contributions to national economic growth. However, the long-term success of MSMEs is not only influenced by the services or products provided; the selection of a strategic location can give a competitive advantage for the future success of MSMEs.

Sario District, as one of the areas in Manado City, has excellent potential for MSME development due to its strategic location and good access to the city center. The selection of locations in Sario District for this research considered various factors, such as accessibility to main roads, a population density of 19,847 people [2], varying rental costs depending on the location, and relatively high community income due to its proximity to campuses, hospitals, Pertamina, the regional police headquarters, and shopping centers. Additionally, infrastructure such as clean water, electricity, internet access, and parking facilities also supports the operational feasibility of MSMEs in this area.

Nevertheless, the process of selecting MSME locations in Sario District often faces various challenges, considering the many factors that need to be taken into account. This significantly impacts

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the feasibility of an area as a business hub. The inability to properly evaluate these factors can lead to suboptimal decisions and impact business sustainability. To select a strategic location by considering all existing factors as a whole, a Decision Support System (DSS) can be used [3]. A DSS is a computer technology system designed to assist and support complex decisions as a problem-solving tool in an organization [4].

To strengthen the analysis, AHP and SAW can be combined in selecting a business location, where, based on several criteria, AHP and SAW are more accurate in location ranking [5]. The SAW method, also known as the weighted sum method, excels in assessment because it considers predetermined criteria and preference weights [6]. The weakness of SAW lies in its local weighting, which does not consider the relationships between criteria [7], thus requiring the AHP method as a weighting technique. AHP is proven to be very effective in determining criteria weights because it considers the relationships between criteria through pairwise comparisons and maintains the consistency of importance levels [8].

Research by [9] proves that the AHP and SAW methods have high testing accuracy in determining ATM locations, while researchers [10] show that the two methods complement each other, where AHP is used to determine criteria weights consistently and SAW is used to rank alternatives to produce the best location recommendations. This study aims to determine strategic locations for MSME development in Sario District using a combination of the AHP and SAW methods. The AHP method is applied to assign weight values to each criterion, while the SAW method is used to rank alternative locations based on those weights. This integration is expected to produce accurate, consistent, and objective results in identifying the most strategic MSME locations.

2. RESEARCH METHODOLOGY

This study uses a descriptive quantitative method with a Decision Support System (DSS) approach to determine strategic locations for Micro, Small, and Medium Enterprises (MSMEs) in Sario District. The combination of the Analytical Hierarchy Process (AHP) and Simple Additive Weighting (SAW) methods is used to produce more objective and structured decisions. AHP is used in the initial stage to determine the weight of each criterion based on its level of importance through pairwise comparisons. After the criteria weights are obtained, the SAW method is used to rank the alternative locations based on the scores obtained from the criteria values and these weights.

2.1 Research Data

The data used in this study consists of primary and secondary data obtained through several relevant methods and sources, as summarized in Table 1. Primary data were obtained through interviews and surveys conducted directly with Micro, Small, and Medium Enterprise (MSME) actors and expert informants.

Table 1. Research Data Description

Code	Criteria Name	Data Source
C1	Accessibility	Survey
C2	Population Density	BPS
C3	Rental Cost	Interview
C4	Community Income Level	BPS/Interview
C5	Infrastructure	Survey

Accessibility data (C1) were obtained through field surveys to directly observe the number and condition of road access to MSME locations. Population density data (C2) were taken from the Central Statistics Agency (BPS) for the year 2024, which records the population in the Sario District. Rental cost data (C3) were collected through interviews with MSME actors to determine the amount of business rent. The community income level (C4) uses BPS data for the district average and interviews with sub-district officials for data per sub-district based on job types, with the Manado minimum wage as a reference. Meanwhile, infrastructure data (C5) were obtained through surveys to assess the availability of clean water, 4G internet networks, a minimum of 1,300 VA electricity, and parking facilities at MSME locations. The following are the explanations for each criterion:

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1. Accessibility: This refers to the number of road access points available to reach the MSME location.
2. Population Density: This criterion considers the number of residents living in the vicinity of MSMEs in each sub-district of Sario District.
3. Rental Cost: This assesses the level of rental fees at each designated MSME point, whether high or low.
4. Community Income Level: This data reflects the income level of residents, which is categorized based on their occupational groups.
5. Infrastructure: This includes four key aspects: access to clean water, internet connectivity, electricity supply, and availability of spacious parking areas.

2.2 Alternative Data

Multi-Criteria Decision Making (MCDM) is an objective method for determining the best alternative based on various criteria and is widely used in complex decision-making [11]. The Alternative Data contains the location points of MSMEs in the seven sub-districts of Sario District; each alternative location is given an identity code from A1 to A7. These location points are used in the analysis process using the SAW method and for regional mapping using QGIS, as shown in Table 2.

Table 2. Alternative Data

No	MSME Location	Coordinate Point
A1	Ranotana	(1.4602440, 124.8376773)
A2	Sario Kota Baru	(1.4649051, 124.8376795)
A3	Sario	(1.4654579, 124.8355051)
A4	Sario Tumpaan	(1.4669712, 124.8307167)
A5	Sario Utara	(1.4718292, 124.8353048)
A6	Titiwungen Selatan	(1.4754342, 124.8338511)
A7	Titiwungen Utara	(1.4787263, 124.8346407)

Table 2 shows the list of MSME locations in each sub-district, along with their geographical coordinates in latitude and longitude format. This coordinate data is important as a spatial representation in the strategic location mapping process. These locations were selected based on their regional distribution and the presence of active MSME activities. The coordinate data were obtained through two methods:

1. Field surveys, to ensure the accuracy of the location and to confirm that the point is bustling with MSME actors.
2. Direct acquisition through the Google Maps application, by viewing the current location point.

2.3 Research Stages

The stages in this research are as follows:

1. Identifying the problem that forms the basis of the research, namely determining the strategic location for MSMEs in Sario District.
2. Conducting a literature review to understand theories, methods, and previous research related to AHP, SAW, and strategic locations for MSMEs.
3. Determining relevant criteria to evaluate the selection of strategic alternatives (locations), which in this study uses 5 criteria: accessibility, population density, rental cost, community income level, and infrastructure.
4. Collecting criteria and alternative data through surveys, interviews, observations, and Expert Judgment.
5. Analyzing and creating a decision model using the AHP and SAW methods. The AHP method is used to calculate the criteria weights, and the SAW method is used for ranking to determine the best alternative location.
6. Presenting the analysis results in the form of a map recommending strategic MSME locations in Sario District.

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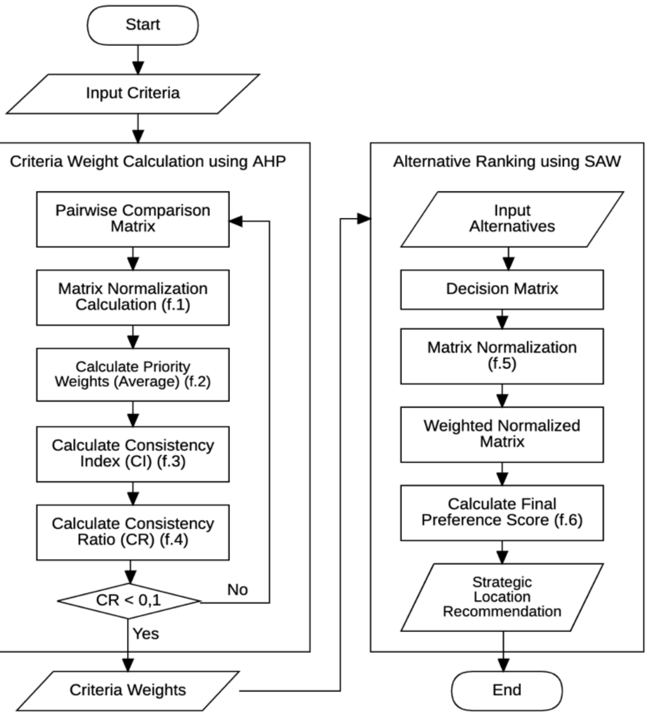

Figure 1. Flowchart of the AHP and SAW Method

2.4 Criteria Weight Calculation with AHP

AHP is a decision support model developed by Thomas L. Saaty. This method is used to break down a complex, unstructured situation into several components in a hierarchical arrangement[11]. The steps of the AHP method in this research are as follows:

1. Sum the values of each column in the matrix.
2. Divide each value in the column by the respective column total to obtain the matrix normalization.

$$a'_{ij} = \frac{a_{ij}}{\sum_{i=1}^{n} a_{ij}} \quad (1)$$

where:
a : Pairwise comparison matrix
i : Row in matrix a
j : Column in matrix a

3. Sum the values from each matrix row and divide by the number of elements to get the average value.

$$w_i = \frac{1}{n}\sum_{j=1}^{n} a_{ij} \quad (2)$$

where:
n : Number of criteria
w_i : Average of the $i-th$ row

4. Calculate the Consistency Index (CI) value.

$$CI = \frac{\lambda_{max} - N}{N-1} \quad (3)$$

where:
λ_{max} : Maximum eigen value
N : Size of the Matrix
CI : Consistency index

5. Calculate the Consistency Ratio (CR) value

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$$CR=\frac{CI}{RI} \tag{4}$$

where:
CR : Consistency rasio
CI : Consistency index
RI : Random Index

2.5 Alternative Location Assessment with SAW

Simple Additive Weighting (SAW) is a weighted sum method. The basic concept of the SAW method is to determine the weighted sum of each element for every alternative across all criteria [12]. The steps of the SAW method in this research are as follows:

1. Determine the criteria and alternatives
2. Assign preference weights to each criterion
3. Determine the suitability rating of each alternative for each criterion
4. Create a decision matrix/table
5. Perform matrix normalization

   Matrix normalization formula:

$$r_{ij} = \begin{cases} \frac{x_{ij}}{\max x_{ij}} & ; \text{if j is a benefit attribute} \\ \frac{\min x_{ij}}{x_{ij}} & ; \text{if j is a cost attribute} \end{cases} \tag{5}$$

where:
r_{ij} : Normalized performance rating
max : Maximum value from each row and column
min : Minimum value from each row and column
x_{ij} : Row and column of the matrix
benetif : If the largest value is the best
cost : If the smallest value is the best

6. Calculate the final value (Preference)

   Formula for Calculating the Final Value:

$$V_i = \sum_{j=1}^{n} w_j \ r_{ij} \tag{6}$$

where:
V_i : Final value of the alternative
W_j : Weight of the j-th criterion
r_{ij} : Normalized matrix

7. Determine the best alternative

   The alternative with the highest final value V_i is the best alternative.

3. RESULT AND DISCUSSIONS

3.1 AHP Method Implementation

The AHP method was executed through the following sequential steps:

1. Determine Criteria

The study utilized five key criteria for evaluating strategic locations: Accessibility (C1), Population Density (C2), Rental Cost (C3), Community Income Level (C4), and Infrastructure (C5) as shown in Table 2.

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2. Perform Pairwise Criteria Comparison

A pairwise comparison of the criteria was conducted to establish their relative importance. The comparison scale was established by an expert from the Manado City Office for Cooperatives and MSMEs. The resulting pairwise comparison matrix is presented in Table 3.

Table 3. Pairwise Criteria Comparison Values

	C1	C2	C3	C4	C5
C1	1	1/3	1/5	1/7	3
C2	3	1	1/3	1/5	5
C3	5	3	1	1/3	5
C4	7	5	3	1	9
C5	1/3	1/5	1/5	1/9	1

The values in the matrix are based on Saaty's 1-9 scale, where the matrix is reciprocal; for example, since C4 is considered significantly more important than C1 (a value of 7), C1 is reciprocally valued at 1/7 against C4.

3. Matrix Normalization and Priority Weight Calculation

The fractional values were converted to their decimal equivalents (Table 4). Subsequently, the matrix was normalized by dividing each cell value by its respective column total. The priority weight (eigenvector) for each criterion was then derived by averaging the values in each row of the normalized matrix. The results are shown in Table 5.

Table 4. Decimal Values

	C1	C2	C3	C4	C5
C1	1,0000	0,3333	0,2000	0,1429	3,0000
C2	3,0000	1,0000	0,3333	0,2000	5,0000
C3	5,0000	3,0000	1,0000	0,3333	5,0000
C4	7,0000	5,0000	3,0000	1,0000	9,0000
C5	0,3333	0,2000	0,2000	0,1111	1,0000
Total	16,3333	9,5333	4,7333	1,7873	23,0000

Table 5. Normalized matrix

	C1	C2	C3	C4	C5	Sum	Average
C1	0,0612	0,0350	0,0423	0,0799	0,1304	0,3488	**0,0698**
C2	0,1837	0,1049	0,0704	0,1119	0,2174	0,6883	**0,1377**
C3	0,3061	0,3147	0,2113	0,1865	0,2174	1,2360	**0,2472**
C4	0,4286	0,5245	0,6338	0,5595	0,3913	2,5377	**0,5075**
C5	0,0204	0,0210	0,0423	0,0622	0,0435	0,1893	**0,0379**
Eigen Value							1

5. Calculate Consistency Index (CI)

To get the lambda max value, the column totals from Table 4 are multiplied by the average values (eigenvectors) from Table 5 and summed up. This calculation uses equation (3) and the result shown in Table 6.

Table 6. Eigen Vector/Priority Weights

Column Total Value	**Average (eigen vector)**
K1 = 16,3333	K1 = 0,0698
K2 = 9,5333	K2 = 0,1377

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K3 = 4,7333	K3 = 0,2472
K4 = 1,7873	K4 = 0,5075
K5 = 23,0000	K5 = 0,0379

λ max = (16,33 x 0,0698) + (9,53 x 0,1377) + (4,73 x 0,2472) + (1,79 x 0,5075) + (23,00 x 0,0379) = 5,3996

Using equation (3), the CI is calculated:

$$CI= \frac{5,3996- 5}{5 -1} = 0,0999$$

6. Calculate Consistency Ratio (CR)

The calculation to obtain the CR value uses equation (4). For a matrix of size 5, the Random Index (RI) is 1.12.

$$CR=\frac{0,0999}{1,12}=0,0892$$

Since the CR value of 0.0892 is less than 0.1, the pairwise comparisons are deemed acceptably consistent.

3.2 SAW Method Implementation

The SAW method was then implemented to rank the alternatives using the weights derived from AHP

1. Determine Criteria and Weighting

The criteria and their final AHP weights used for the SAW calculation are listed in Table 7.

Table 7. Criteria and Final AHP Weights

Symbol	Criteria	Attribute	Weight
C1	Accessibility	Benefit	0,0698
C2	Population Density	Benefit	0,1377
C3	Rental Cost	Benefit	0,2472
C4	Community Income Level	Benefit	0,5075
C5	Infrastructure	Benefit	0,0379

Although C3: Rental Cost is typically treated as a 'cost' attribute, in this research, it was conceptualized as a 'benefit' because it was measured in terms of the advantages received. A cost can be considered part of a benefit if the expenditure yields advantages that are greater than the value of the cost itself [13]. Therefore, the greater the benefits derived from the rental cost, the more favorable the location's value.

2. Determine Suitability Rating and Crips Values

The crips value is the initial value of an alternative for each criterion that will be the basis for the normalization process in the SAW method. The values used are weight values determined on a 1-4 scale. Values are assigned to each alternative for each criterion; these numbers can be freely determined, for example, a range from 1-5, 1-100, or 0-1 [14]. In this case, the crips values are created based on the criteria and alternatives.

1) Crips Value for Accessibility.

The Crips value for accessibility has the sub-criterion of road access, with a value/weight scale of 1-4. MSME locations with more accessible roads receive the highest score. Accessibility is a benefit category (Table 8).

Table 8. Crips Values for Accessibility Criterion

Sub-criterion	**Weight**
4 access roads	4
3 access roads	3
2 access roads	2

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1	access road	1

2) Crips Value for Population Density

Population density data is obtained from BPS, but to input the values into the sub-criteria, an interval calculation is performed (Table 9).

Table 9. Crips Values for Population Density Criterion

Sub-criterion	Weight
≥ 3133 (families/person)	4
≥ 2666 - ≤ 3132 (families/person)	3
≥ 2199 - ≤ 2665 (families/person)	2
< 2199 (families/person)	1

The interval calculation is performed as follows:
Max value : The highest population (Sario Tumpaan)
Min value : The lowest population (Titiwungen Utara)
P : Interval range

$$P=\frac{J\ (\text{Width})}{K\ (\text{Number of Classes})}$$

$$P=\frac{3600\ (\text{max})-1734\ (\text{min})}{4}$$

$$K = 1+3{,}3 \log 7 = 1+3{,}3 \,.\, 0{,}845$$

$$= 1 + 2{,}788=3{,}788 \approx 4$$

$$K=4$$

$$P=\frac{1866}{4}=466{,}5\approx 467$$

3) Crips Value for Rental Cost

The crips value for the rental cost criterion is determined by observing how high/low the rental cost is in each sub-district for MSME actors (Table 10).

Table 10. Crips Values for Rental Cost

Sub-criterion	Weight
≥Rp. 3.875.000	4
≥Rp. 2.750.000 - ≤ Rp. 3.874.999	3
≥Rp. 1.625.000 - Rp. ≤ 2.749.999	2
< Rp. 1.625.000	1

The sub-criteria values for rental cost are determined using the interval method as follows:
Max value : Highest rental cost
Min value : Lowest rental cost
P : Interval width

$$P=\frac{J\ (\text{Width})}{K\ (\text{Number of Classes})}$$

$$P=\frac{5.000.000(\text{max})-500.000(\text{min})}{4}$$

$$K=1+3{,}3 \log 7 = 1+3{,}3 \,.\, 0{,}845$$

$$=1+2{,}788=3{,}788 \approx 4$$

$$K=4$$

$$P=\frac{4.500.000}{4}=\text{Rp. } 1.125.000$$

4) Crips Value for Community Income Level

The community income level is measured by each person's occupation, which is then categorized by income level (Table 11).

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Table 11. Crips Values for Community Income Level

Sub-criterion	Weight
≥Rp. 3.400.000	4
≥Rp. 3.000.000 - ≤ Rp. 3.399.999	3
≥Rp. 2.600.000 - ≤ Rp. 2.999.999	2
< Rp. 2.600.000	1

The crisp values for community income level are also calculated using the interval method before being entered into the sub-criteria table. The calculation is as follows:

Max Value : Highest income level
Min Value : Lowest income level
P : Interval width

$$P = \frac{\text{J (Width)}}{\text{K (Number of Classes)}}$$

$$P = \frac{3.800.000\ (\text{max}) - 2.200.000 (\text{min})}{4}$$

$$K = 1+3,3 \log 7 = 1+3,3 \ .\ 0,845$$
$$= 1+2,788 = 3,788 \approx 4$$
$$K=4$$

$$P = \frac{1.600.000}{4} = 400.000$$

5) Crips Value for Infrastructure

Finally, infrastructure is assessed based on its completeness, such as water, electricity, internet network, and large parking areas. This is very important to support the business being run (Table 12).

Table 12. Crips Values for Infrastructure

Sub-criterion	Weight
Very Complete	4
Complete	3
Less Complete	2
Incomplete	1

The "very complete" sub-criterion with a weight of 4 indicates that the business location has all essential facilities, namely clean water, electricity, internet access, and spacious parking. The "complete" sub-criterion with a weight of 3 signifies that the location has three out of the four facilities — for example, clean water, electricity, and internet access. The "less complete" sub-criterion with a weight of 2 is assigned when only two of the key facilities are available, such as electricity and parking only. Finally, the "incomplete" sub-criterion with a weight of 1 is used for locations that have only one facility, such as internet access alone.

3. Assign Suitability Rating Values to each Alternative and Criterion

The next step is to determine the suitability rating values that have been described in the form of crips values. To determine the weight for each alternative and criterion, the collected data is matched with the created crips values. For example, for Alternative 1 (Ranotana):

C1 (Accessibility)	=	3 access roads	3
C2 (Population Density)	=	= ≥ 3133 (families/person	4
C3 (Rental Cost)	=	≥Rp. 1.625.000 - Rp. ≤ 2.749.000	2
C4 (Community Income Level)	=	≥Rp. 3.400.000	4
C5 (Infrastructure)	=	Very complete	4

Each of the seven alternative locations was assigned a raw suitability rating (a "Crips" value from 1 to 4) for each criterion based on field surveys, interviews, and BPS data. For example, a location with four access roads received a rating of 4 for Accessibility (C1), while a location with a rental cost below

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Rp. 1,625,000 received a rating of 1 for Rental Cost (C3). The compiled ratings for all alternatives are presented in Table 13.

Table 13. Suitability Rating Matrix

Alternative	Criteria				
	C1	**C2**	**C3**	**C4**	**C5**
A1 (Ranotana)	3	4	2	4	4
A2 (Sario Kota Baru)	4	3	1	3	4
A3 (Sario)	4	3	1	3	3
A4 (Sario Tumpaan)	2	4	3	4	4
A5 (Sario Utara)	3	3	2	4	3
A6 (Titiwungen Selatan)	2	2	4	4	4
A7 (Titiwungen Utara)	2	1	4	4	4

5. Normalization Matrix

The suitability rating matrix was normalized using the SAW formula (equation 5), differentiating between benefit (higher is better) and cost (lower is better) attributes.

$$r11=\frac{3}{\max(3,4,4,2,3,2,2)}=\frac{3}{4}=0{,}75$$

$$. \quad . \quad .$$

$$r75=\frac{4}{\max(4,4,3,4,3,4,4)}=\frac{4}{4}=1$$

Based on these calculations, the normalized matrix, R, is obtained as shown below:

$$R = \begin{bmatrix} 0{,}75 & 1 & 0{,}5 & 1 & 1 \\ 1 & 0{,}75 & 0{,}25 & 0{,}75 & 1 \\ 1 & 0{,}75 & 0{,}25 & 0{,}75 & 0{,}75 \\ 0{,}5 & 1 & 0{,}75 & 1 & 1 \\ 0{,}75 & 0{,}75 & 0{,}5 & 1 & 0{,}75 \\ 0{,}5 & 0{,}5 & 1 & 1 & 1 \\ 0{,}5 & 0{,}25 & 1 & 1 & 1 \end{bmatrix}$$

6. Preference Score Calculation

The final preference score (V_i) for each alternative was then calculated by multiplying the normalized ratings by the AHP criteria weights (equation 6).

V1 = (0,0698 x 0,75) + (0,1377 x 1) + (0,2472 x 0,5) + (0,5075 x 1) + (0,0379x 1) = 0,8589
V2 = (0,0698 x 1) + (0,1377 x 0,75) + (0,2472 x 0,25) + (0,5075 x 0,75) + (0,0379 x 1) = 0,6533
V3 = (0,0698 x 1) + (0,1377 x 0,75) + (0,2472 x 0,25) + (0,5075 x 0,75) + (0,0379 x 0,75) = 0,6438
V4 = (0,0698 x 0,5) + (0,1377 x 1) + (0,2472 x 0,75) + (0,5075 x 1) + (0,0379 x 1) = 0,9033
V5 = (0,0698 x 0,75) + (0,1377 x 0,75) + (0,2472 x 0,5) + (0,5075 x 1) + (0,0379 x 0,75) = 0,8150
V6 = (0,0698 x 0,5) + (0,1377 x 0,5) + (0,2472 x 1) + (0,5075 x 1) + (0,0379 x 1) = 0,8962
V7 = (0,0698 x 0,5) + (0,1377 x 0,25) + (0,2472 x 1) + (0,5075 x 1) + (0,0379 x 1) = 0,8618

The final scores and resulting ranks are detailed in Table 14.

Tabel 14. Final Preference Scores and Ranking

Alternative	Location	Preference Score (V_i)	Rank
A4	Sario Tumpaan	0,9033	1
A6	Titiwungen Selatan	0,8962	2
A7	Titiwungen Utara	0,8618	3

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A1	Ranotana	0,8589	4
A5	Sario Utara	0,8150	5
A2	Sario Kota Baru	0,6533	6
A3	Sario	0,6438	7

The analysis identified Sario Tumpaan (A4) as the most strategic location, having achieved the highest preference score. Conversely, Sario (A3) was identified as the least strategic location.

3.3 Geospatial Visualization and Analysis

To provide a clear geographical representation of the findings, the final rankings (Table 15) were visualized on an administrative map of Sario District using Quantum Geographic Information System (QGIS). The coordinate points used in QGIS were taken from Table 2. As shown in Figure 2, the map employs a sequential color scheme where darker shades represent higher strategic value, visually reinforcing Sario Tumpaan's top rank.

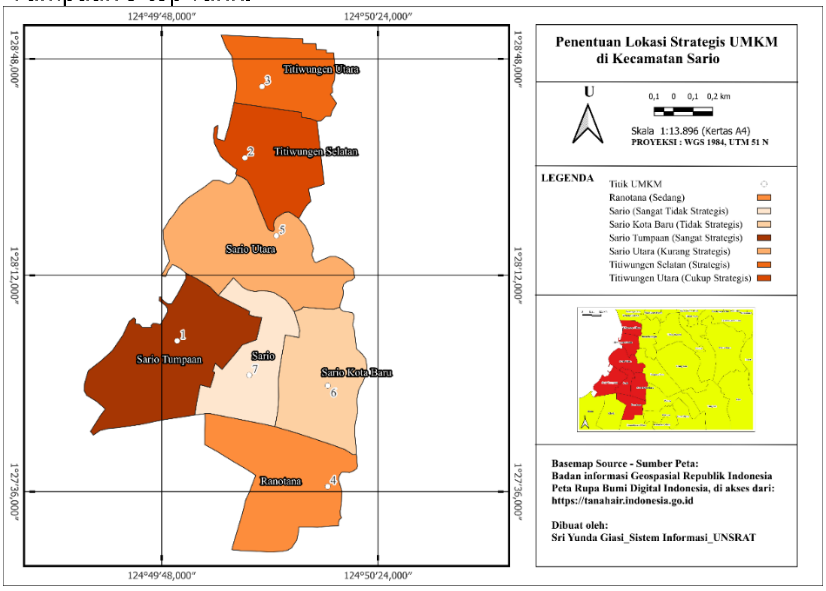

Figure 2. Strategic MSME Locations in Sario District on an Administrative Map

This map facilitates the visualization of areas within Sario District that hold greater strategic potential for MSME development. The color orange was chosen for the map's color scheme as it symbolizes what is known as the 'Orange Economy'—a term for the economic sector driven by creativity, culture, and innovation. This concept encompasses creative industries including the arts, film, music, design, advertising, fashion, culinary arts, and digital media. [14]. The term 'Orange Economy' was first popularized by the Inter-American Development Bank (IDB) in a 2013 report, which chose the color for its symbolic association with creativity and cultural expression [15].

3.4 Expert Validation

To validate the model's output, the results were presented to an expert for qualitative assessment. The expert's comments, summarized in Table 16, largely concurred with the rankings. For instance, the expert acknowledged Sario Tumpaan's prime location near key access points and Titiwungen Selatan's potential as a B2B hub, while agreeing that areas like Ranotana and Sario were less suitable due to inadequate access or environmental constraints.

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Table 16. Expert Validation of Location Recommendations

No	Recommended Location	Expert's Comment	Researcher's Comment
1	Sario Tumpaan	A prime location due to its high traffic and proximity to key access points.	This location excels in four criteria: population density, rental cost, community income level, and infrastructure.
2	Titiwungen Selatan	A designated B2B area for MSMEs, notable for its sea view.	This location offers excellent accessibility and excels in three criteria: rental cost, community income level, and infrastructure.
3	Titiwungen Utara	Also considered a B2B area due to the presence of a shopping center.	Similar to Titiwungen Selatan, but it scores lower on the population density criterion.
4	Ranotana	Inadequate road access and a less suitable business environment.	Ranked moderately due to low scores for the rental cost and accessibility criteria.
5	Sario Utara	Characterized by small-scale MSMEs primarily supported by a stadium/sports field with limited stall capacity.	This location scores high on population density but low on the rental cost criterion.
6	Sario Kota Baru	An MSME hub, but activity is concentrated in one specific point, leading to uneven economic development.	Despite being a well-known area, it scores low on the rental cost criterion but excels in accessibility and infrastructure.
7	Sario	A vital administrative area not generally designated for commercial MSME activities.	Sario scores low on the rental cost criterion, and its main roads are predominantly occupied by office buildings.

3.5 Practical Implications for MSME Stakeholders

This DSS, integrating AHP and SAW, provides MSME stakeholders with a quantitative and objective tool for location selection, minimizing reliance on intuition and fostering more strategic decision-making. By simplifying the complex evaluation process, the system enables entrepreneurs to respond more efficiently to business opportunities, saving valuable time and resources that would otherwise be spent on manual analysis.

4. CONCLUSION

This study, utilizing a hybrid AHP-SAW methodology, identified Sario Tumpaan Sub-district as the most strategic location for MSME development, achieving the highest preference score. Conversely, Sario Sub-district was identified as the least strategic, with the lowest preference score. Among the evaluation criteria, Community Income Level was determined to have the highest weight, while Rental Cost had the lowest, significantly influencing the ranking outcome.

Furthermore, this research offers actionable insights for future development. While Sario Tumpaan is the premier recommendation, this study also suggests that MSME stakeholders consider Titiwungen Selatan and Titiwungen Utara, which ranked second and third respectively, as highly viable alternative locations for investment. For other locations that did not rank as highly strategic, there remain clear opportunities for improvement. By evaluating their performance against the criteria where Sario Tumpaan excelled—namely population density, community income level, rental cost, and infrastructure completeness—lower-ranked areas can enhance their attractiveness and feasibility for future MSME development. The findings of this study contribute both theoretically and practically. Theoretically, they

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strengthen the application of hybrid multi-criteria decision-making (MCDM) models, specifically AHP-SAW in regional economic planning and location analysis. Practically, the results provide local governments and policymakers with a structured decision-support framework for formulating targeted MSME development strategies, optimizing resource allocation, and guiding future urban planning initiatives within the Sario District and beyond.

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