MAPPING OF POTENTIAL BUSINESS ZONES FOR MSMEs IN SOUTH KEMBANGAN USING THE ANALYTICAL HIERARCHY PROCESS (AHP) METHOD

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ABSTRACT

This study emphasizes the importance of determining locations for MSMEs through a more scientific framework, with the goal of increasing MSME revenue. The Technology Readiness Level (TKT) in this study demonstrates the concept of the Analytical Hierarchy Process (AHP), which has been used in other studies for mapping research objects. Therefore, it has direct relevance to this study, as this concept can help researchers create a map of potential business zones for MSMEs. MSMEs in South Kembangan use the Analytical Hierarchy Process (AHP) to determine business locations, supported by expert judgment. This is then processed and calculated based on five criteria/zones: housing, offices, schools, recreation, and infrastructure. The area is divided into three clusters, each estimated to have similar area but with different zone combination characteristics.
The final calculation results are divided into the most potential, namely cluster III with a total score of 0.43467, neutral, namely cluster I with a total score of 0.28525 and less potential, namely cluster II with a total score of 0.27037.

Keywords: Zone, Potential, MSME, AHP.

1. INTRODUCTION

The large number of Micro, Small, and Medium Enterprises (MSMEs) in Indonesia certainly leads to a high level of competition. In a tight competitive climate, each MSME player needs to take appropriate steps to ensure that their business can provide maximum profits.
Nationally, MSMEs, according to BPS data, are the largest and main contributors to Gross Domestic Product (GDP), accounting for more than 60% of GDP from MSMEs. Additionally, MSMEs also provide jobs for around 100 million people, making them the backbone of Indonesia's economy.
Maintaining the existence of MSMEs in Indonesia to ensure sustainability, development, and advancement is a program that is also a key policy of the Indonesian Government in ensuring national economic stability.
The importance of the role of MSMEs in the Indonesian economy requires support from all interested parties. From the bureaucratic side, various incentives and conveniences are provided by the Indonesian Government for MSME players. Furthermore, to contribute to the MSME world, researchers, as part of the educational/academic sector, need to share their knowledge and ideas for the benefit of MSMEs in the future.
Based on the economic census conducted by BPS, the number of MSMEs in West Jakarta is the largest in DKI Jakarta, with a percentage of over 25% or around 300 thousand that are recorded and operating. The number is certainly less than the actual amount because there are still many MSME actors who have not been recorded or whose data has not been updated. The large number of MSME actors in West Jakarta causes competition to become increasingly tight; in a competitive environment, the battle for market share becomes narrower, which will certainly affect the turnover or income of the business, and in turn, the profit of the business.
A classic problem often encountered in running a business is related to location determination, as location directly impacts business income. When the chosen location is appropriate, it has the potential to increase business income, whereas if the location chosen is inadequate and/or inappropriate, it may potentially decrease business income.
It is natural in the business world that the sustainability of a business greatly depends on the income and profit generated. If the business being run provides sufficient income and profit, it can support the continuity of the business; conversely, if the income and profit obtained are inadequate, the business being run may come to a halt.
The cessation of MSME activities is due to inadequate income and profits resulting from location factors; specifically, it becomes the object, attention, and focus of research so that MSME actors and stakeholders can find solutions to determine good business locations so that the businesses run can also provide adequate income and profits for the sustainability and continuity of the business, especially for MSME actors in the Kembangan Selatan area, West Jakarta.

Another issue faced in relation to the government of a region is related to regional governance, which can lead to negative impacts on the growth of that area; among these are related to heavy traffic, cleanliness, security, and others. Thus, this research will not only benefit MSME actors but will also contribute and be useful for the local government, namely Kembangan Selatan, to gain an overview and later create better and more organized regional governance.
Based on the description above, the formulation of the research problem is:
1. How to determine the location of MSMEs in Kembangan Selatan?
2. What are the potential business zones for MSMEs in Kembangan Selatan?

2. METHOD

Stages of Implementation
The implementation of the research is divided into 3 (three) main stages as shown in the following figure:

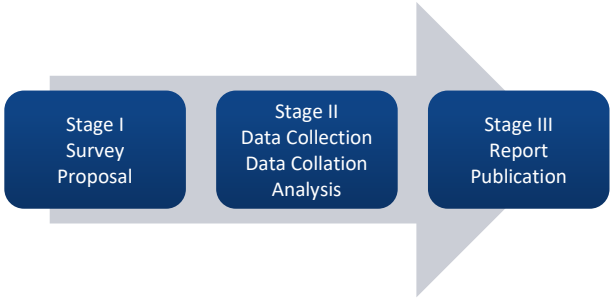

Figure 1. Research Flowchart
"Self-Processed"

This research is a continuation of several training activities that have been conducted by the researcher related to MSMEs previously, so the results of the research become a complement, especially in enriching the knowledge that is a flagship topic in the roadmap, namely “business sustainability; strengthening the MSME model”.

Partner Participation in Research Implementation
The partner from Kembangan Selatan, West Jakarta, DKI Jakarta participates directly and actively in the research; especially helping to provide supporting research facilities in the form of meeting places and equipment, in addition, the partner also becomes a source of various data and/or information related to MSME actors around Kembangan Selatan.

Theoretical Foundation
The Analytical Hierarchy Process (AHP) was first introduced by Thomas L. Saaty in 1971–1975 while at Wharton School; it is a way to achieve goals through a weighting method (heuristic) with mathematical calculations on criteria and/or problem factors arranged in a structured and systematic hierarchical form from the results of the analysis process; a method for assessing an action, related to the comparison of the weight of importance among factors with the comparison of several other alternatives.
The flow of the AHP process is as follows:

1. Determine objectives;
2. Determine criteria;
3. Design hierarchy;
4. Perform pairwise comparison;
5. Calculate criteria weights;
6. Check consistency;
   If the consistency check result is not valid, repeat to step 4; If the consistency check result is valid, then continue;
7. Aggregate criteria values;
   Apply the aggregated criteria values to alternatives.

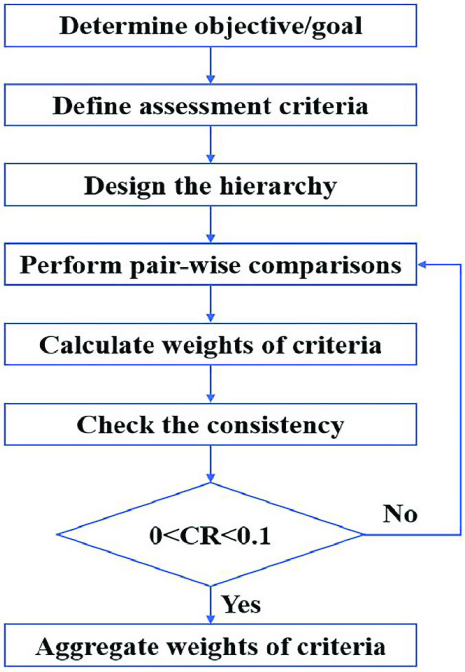

Figure 2. The Flow of the AHP Process
Source: https://www.researchgate.net

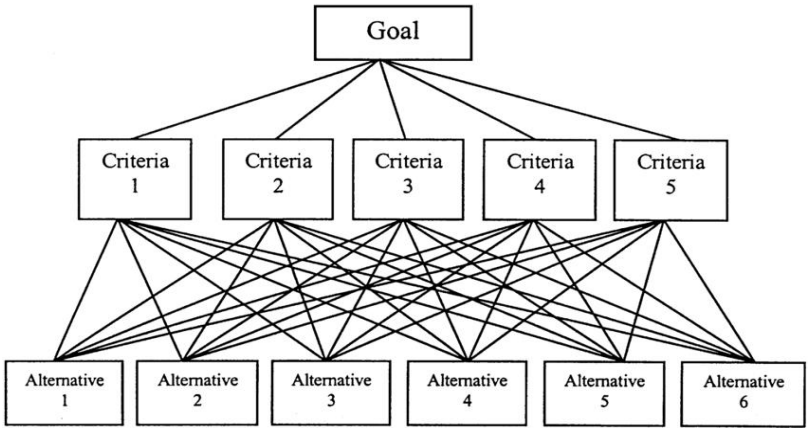

Figure 3. Model (Structure) AHP
Source: https://www.researchgate.net

Analytical Hierarchy Process (AHP) or Proses Hirarki Analitik (PHA) is a concept, tool, technique, or method in making and taking decisions for complex, unstructured, and multi-attribute problems by ranking the existing decision alternatives and then selecting the best one based on criteria determined through a numerical value.
This decision support model breaks down complex multi-factor or multi-criteria problems into a hierarchy. AHP is widely used in decisions for many criteria, planning, resource allocation, and determining the priorities of strategies held by players in conflict situations. With AHP, a complex problem can be broken down into its groups, which are then organized into a hierarchical form so that the problem appears more structured and systematic.
AHP is a measurement method used to find the best ratio scale of both discrete and continuous pairwise comparisons. AHP is very suitable and flexible for determining decisions that help a person make efficient and effective decisions based

on all aspects they have. AHP was developed to organize a problem into a hierarchy, which is then weighted (determining priorities) based on the perceptions of decision-makers to choose the best decision.
In the conclusion of recent research conducted by Rini and Rusnandari (2024); it is mentioned that the business location significantly affects business success; location plays a very important role in accelerating the economic growth of a region, thus developed in this research with Emphasis on the way to determine the location of a business based on the assessment of a region; in this research, it is Kembangan Selatan.
Based on theory, the 'Goal' of this research is potential, the 'Criteria' include residential zones, office zones, school zones, recreation/entertainment zones, infrastructure zones, and/or others, the 'Alternative' is the area in the Kembangan Selatan sub-district which will be divided into several clusters.

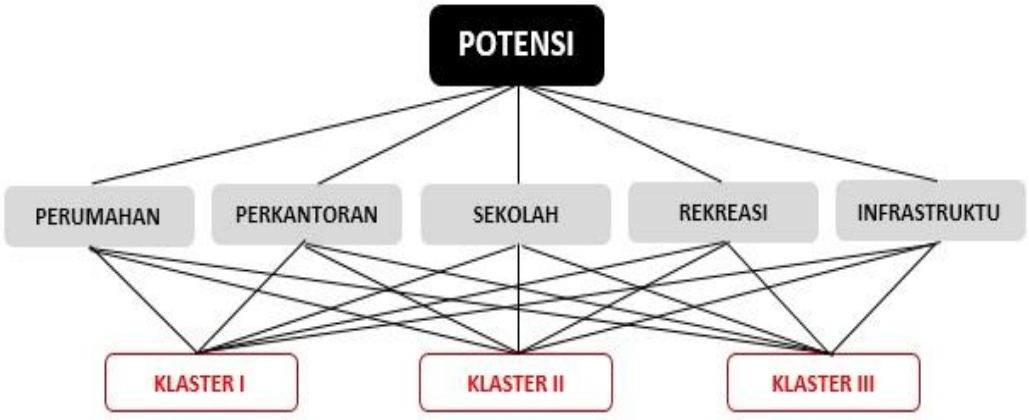

Figure 4. Illustration of AHP Research
Mapping of Potential Business Zones for MSMEs in Kembangan Selatan
Source: "Self-processed"

This analysis will rely on objectivity regarding the assessment of criteria, particularly concerning pairwise comparisons, because the importance and influence of each criterion require a good understanding of the relationships among the specified criteria; and this is entirely the role and main responsibility of the researcher. Other assessments are mathematical calculations that are standardized; thus, they only require precision in inputting values.
Data and/or information collection will focus on criteria that are primary data and/or information sourced from data and/or information held by partners through interviews and/or documentation, in addition to being supplemented by direct observation and/or surveys conducted by the researcher in the field to see the real conditions of MSMEs and the environment in Kembangan Selatan.

3. RESULTS AND DISCUSSION

Zoning Map of Kembangan Selatan
DKI Jakarta through the Regional Regulation of the Special Capital Region of Jakarta Number 1 of 2014 concerning Detailed Spatial Planning and Zoning Regulations issued the Zoning Map, and in the map image section with image code-19A is the zoning map for Kembangan District which includes Kembangan Selatan.

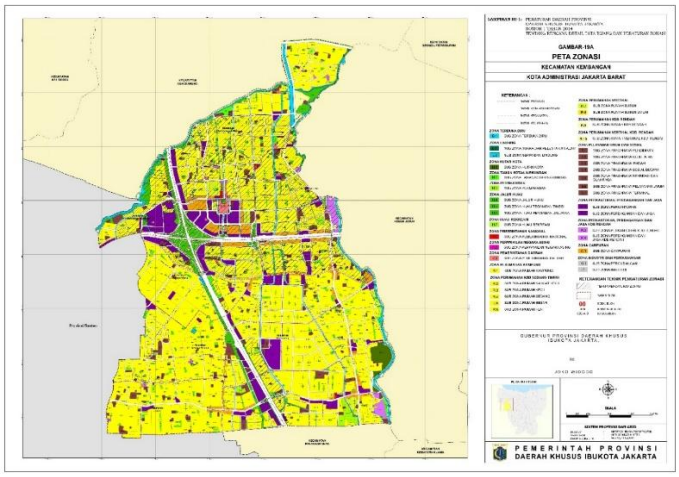

Figure 5. Zoning Map of Kembangan
Source: https://konsultangue.com/wp-content/uploads/2019/10/JBZONASIKEMBANGAN.pdf

From the zoning map of Kembangan, an Overlay process was conducted which is used to analyze the map according to the area that is the object of research, this process is a process to produce a specific thematic map from the overlay and/or arrangement of various thematic maps by forming a new layer with a new polygon from the intersection of fields.

Perkantoran (PK) Perumahan (PR) Sekolah (SK) Rekreasi (RK) Infrastruktur/Hijau (IF)

Figure 6. Overlay Map of Kembangan Selatan
Source: "Processed by myself"

Based on the zoning map from the overlay results, with consideration to facilitate a series of dynamic research; in the sense of further research needs, clusters that can change and/or be modified are created; thus, the Kembangan Selatan area is divided into 3 (three) clusters that are visually estimated to have approximately the same area size.
The 3 (three) clusters are based on the existing zoning, visually represented in the percentage of the zones it possesses (Office; Residential; School; Recreation; Infrastructure) which can also be seen from the coloring of the area on the map; the percentage of zones in the 3 (three) clusters is as follows:
Cluster I: 35% Residential, 35% Office, 10% School, 10% Recreation, 10% Infrastructure
Cluster II: 25% Residential, 60% Office, 5% School, 5% Recreation, 5% Infrastructure
Cluster III: 75% Residential, 10% Office, 5% School, 5% Recreation, 5% Infrastructure

Calculation: Analytical Hierarchy Process (AHP)
According to the standard process flow, the steps of AHP application in this research are:

1. Determine the ObjectiveCalculation of potential business zones for MSMEs

2. Determine the assessment criteriaThe selection of assessment criteria is determined based on data sufficiency and data relevance, however, the selection of criteria may change (increase, decrease, and/or modification) adjusted to the needs based on considerations from users, for now, the selected assessment criteria are:
    - Residential (PERUMAHAN: PR);
    - Office (PERKANTORAN: PK);
    - School (SEKOLAH: SK);
    - Recreation (REKREASI: RK);
    - Infrastructure (INFRASTRUKTUR: IF).

    After the criteria are established, it is supplemented by determining sub-criteria with classification as supporting calculations for the potential of these criteria for MSME business activities, the classification of sub-criteria uses 3 (three) classifications that have been in place, namely (1) less, (2) normal, (3) potential which will later become the basis for the aggregate value.
3. Design the Hierarchy

    The hierarchy design is arranged in the form of a tree diagram of potential levels with the objective at the top of the tree, with the selected criteria in the body of the tree, against the areas in the zones as alternatives at the bottom of the tree.

    Trees of potential levels as a visual reflection of the overall AHP analysis, so that it can help the parties reading the results of the AHP analysis to gain understanding more easily and better.

    Lastly, in the arrangement of alternatives, it consists of clusters that are established divided into 3 (three) clusters with the consideration that it will facilitate calculations because it becomes simpler.
4. Pairwise Comparison

    The next step is to perform calculations in the form of a matrix in the form of pairwise comparison; that is, measuring the level of importance between criteria so that the results of the criteria that are interconnected, especially related to the importance and influence between the criteria towards potential, are obtained. Pairwise comparison uses a reference measurement value that has been established (standard) with various levels, pairwise comparison is carried out and completed based on the assessment of users and/or experts who have sufficient ability and knowledge regarding objectives, criteria, and alternatives.

    In practice, pairwise calculations use expert judgment from users or assistance from other parties or cooperation between users and other parties, pairwise calculations are dynamic, meaning they can change at any time to adjust to current conditions and developments. The expert judgment in this research is the assessment from selected MSME actors with the consideration that they have been running their business for more than 5 years as a basis for assumption so that they can be considered as experts.

    It is important to note that the pairwise calculation process is the initial part of the overall assessment stage of the AHP analysis; it has a central role because if the results of the comparison are not done well and correctly, it will affect the results in the next stage, causing the final results to be inconsistent and invalid.

    The reference measurement value from the pairwise comparison calculations in the following table:

Table 1. Reference measurement value of pairwise comparison

1	Both elements are equally important
3	One element is slightly more important than the other element
5	One element is more important than the other element
7	One element is slightly more absolutely important than the other element
9	One element is more absolutely important than the other element
2, 4, 6, 8	Values between two consideration values are closer

Pairwise comparison of the established criteria was obtained from converting the questionnaire results with sources (selected MSME actors) as primary research information, as seen in the following table:

Table 2. Questionnaire Recap

ANTARA ZONA-ZONA BERIKUT, LOKASI YANG DIPILIH	
PERUMAHAN	PERKANTORAN
22 (63%)	13 (37%)
PERUMAHAN	SEKOLAH
26 (74%)	9 (26%)
PERUMAHAN	REKREASI
32 (91%)	3 (9%)
PERUMAHAN	INFRASTRUKTUR
33 (94%)	2 (6%)
PERKANTORAN	SEKOLAH
22 (63%)	13 (37%)
PERKANTORAN	REKREASI
22 (63%)	13 (37%)
PERKANTORAN	INFRASTRUKTUR
22 (63%)	13 (37%)
SEKOLAH	REKREASI
22 (63%)	13 (37%)
SEKOLAH	INFRASTRUKTUR
27 (77%)	8 (23%)
REKREASI	INFRASTRUKTUR
22 (63%)	13 (37%)

The results of the questionnaire which are a comparison between 2 (two) variables are converted into a reference value for pairwise comparison calculations, the researcher uses percentage weights, 1=50%, 2=51%-60%, 3=61%-65%, 4=66%-70%, 5=71%-75%, 6=76%=80%, 7=81%-85%, 8=86%-90%, 9=91%-100% so that the results of the conversion are inputted in the following matrix:

Table 3. Pairwise Comparison Matrix

Matriks	PR	PK	SK	RK	IF
PR	1	3	5	9	9
PK	0.333	1	3	3	3
SK	0.2	0.333	1	3	5
RK	0.111	0.333	0.333	1	3
IF	0.111	0.333	0.2	0.333	1
TOTAL	**1.755**	**4.999**	**9.533**	**16.333**	**21**

Explanation of the pairwise comparison matrix is as follows:

- Arranged as a comparison matrix between the criteria;
- In the intersection column/row of the same criteria, a value of 1 is given, for example: column PR and row PR;
- Criteria are assessed sequentially between criteria by comparing rows and columns, the relationship assessment is based on the reference measurement value from the pairwise comparison calculation with

whole numbers (2,3,4,5,6,7,8,9) on the criteria in the column/row, then converted into fractional values (divisor numbers) of the criteria in the opposite column/row, for example:

- Row PR against column PK with a value of 3, then in row PK against column PR a value of 1/3 (0.333) is given.
- Row PR against column SK with a value of 5, then in row SK against column PR a value of 1/5 (0.2) is given.

➢ If all columns/rows of the matrix have been filled with values, then a total sum is performed for each column.

5. Calculating Criteria Weights

The next step is to perform calculations in the form of a criteria weight matrix; this is done to find the weight (priority) of each criterion against the vulnerability calculation, or sometimes also referred to as the normalization matrix of criteria values because the results of the pairwise comparison matrix values are normalized into new values in the criteria weight matrix, in this matrix there are also eigen calculations that will be used for the consistency check stage.

Table 4. Priority Calculation (Matrix)

Matriks	a.PR	b.PK	c.SK	d.RK	e.IF	f.TOTAL (a+b+c+d+e)	g.PRIORITAS f/n	EIGEN g x total pwc
1.PR	0.57	0.601	0.524	0.551	0.428	2.674	**0.5348**	0.938580156
2.PK	0.19	0.201	0.315	0.184	0.143	1.031	**0.2062**	1.030808074
3.SK	0.114	0.066	0.105	0.184	0.238	0.707	**0.1414**	1.348432679
4.RK	0.063	0.066	0.035	0.061	0.143	0.369	**0.0738**	1.204968249
5.IF	0.063	0.066	0.021	0.020	0.048	0.219	**0.0438**	0.919162269
TOTAL (1+2+3+4+5)	1	1	1	1	1	5	1	5.441951427

Explanation and method for normalizing the pairwise comparison matrix into a criteria weight matrix, as follows:

➢ Complete the criteria weight matrix, by dividing the pairwise comparison matrix in rows in each column by the total in each column, for example:

- Column PR, Row PR, the value of 1 divided by the total of Column PR is 1.755;
  The result is input into the criteria weight matrix in Column PR, Row PR: 1/1.755 = 0.57
- Column PK, Row PR, divide the value of 3 by the total of 4,999 from the column PK;
  The result is input into the criteria weight matrix in Column PK, Row PR: 3/4,999 = 0.601
- The same way until all columns/rows are filled.

➢ If all the columns/rows of the matrix have been filled with values, then the total is added up for each row, for example:
PR line: 0.57 (PR) + 0.601 (PK) + 0.524 (SK) + 0.551 (RK) + 0.428 (IF) = 2.674

➢ Calculate the Priority Value by adding the total in each row divided by the number of criteria, for example:
Total PR rows / Number of Criteria = 2.674/5 = 0.5348

➢ Calculate the Eigenvalue by multiplying the priority value of the criteria in the row of the criteria weight matrix multiplied by the total of the same criteria column in the pairwise comparison matrix, for example:
priority value of PR row criteria in the criteria weight matrix x total PR column in the pairwise comparison matrix
0.5348 x 1.755 = 0.938580156 (Eigen value of PR row in the criteria weight matrix)

➢ Calculate the Total Eigenvalue by adding all the values in the eigenvalue column.
EIGEN: (PR) + (PK) + (SK) + (RK) + (IF) = 5.441951427

6. Checking the consistency

The calculations from the comparisons and weighting above requires checking whether the obtained values are consistent or not. This consistency becomes the validity of the analysis in the comparison and weighting stage, as a condition for the priority values to receive confirmation; whether they can be used or not.
Consistency is understood as the grouping of similar objects according to uniformity and relevance; and as an indicator of the level of relationship between objects based on certain criteria.
Decision-making must consider how good the existing consistency is because it is certainly undesirable to make decisions based on poor considerations with low consistency.
To check consistency, the reference is the random consistency index that has been established (standard) in AHP, whose value will be used as a divisor with the expected result < 0.1 in order to be said to be consistent and the results valid so that the results of the comparisons and weighting can be used in the value aggregation stage.

The reference measurement value of the random consistency index is shown in the following table:

Table 5. Random Consistency Index

1	0.00
2	0.00
3	0.58
4	0.90
5	1.12
6	1.24
7	1.32
8	1.41
9	1.45

Results of the consistency check:

Consistency Index (CI)	0.110487857
Random Index (RI)	1.12
Consistency Ratio (CR=CI/RI)	0.098649872

Explanation and Method for Checking Consistency, as Follows:

- Calculating the Consistency Index (CI)
  = (Total Eigen Value – Number of Criteria) / (Number of Criteria – 1)
  = (5.441951427 – 5) / (5 – 1)
  = 0.441951427 / 4
  = 0.110487857
- Determining the Random Index (RI) for 5 criteria refers to the random consistency index
  = 1.12
- Calculating the Consistency Ratio (CR = CI/RI)
  = 0.110487857 / 1.12
  = 0.098649872

0.098649872 < 0.1
comparison and weighting = VALID;
therefore, the priority value can be used

Table 6. Priority Values of Potential Criteria for MSME Zones

PERUMAHAN (PR)	**0.5348**
PERKANTORAN (PK)	**0.2062**
SEKOLAH (SK)	**0.1414**
REKREASI (RK)	**0.0738**
INFRASTRUKTUR (IF)	**0.0438**

These priority values become multiplication factors against the number of criteria in each cluster to find their potential, and the potential ranking for 3 (three) clusters is also made in 3 (three) categories, namely:

- Most potential; the highest multiplication result is cluster III
  PR: 75% x 0.5348 = 0.4011
  PK: 10% x 0.2062 = 0.02062
  SK: 5% x 0.1414 = 0.00707
  RK: 5% x 0.0738 = 0.00369
  IF: 5% x 0.0438 = 0.00219
  Total Score: 0.4011 + 0.02062 + 0.00707 + 0.00369 + 0.00219 = 0.43467
- Neutral; median multiplication result is cluster I

PR: 35% x 0.5348 = 0.18718
PK: 35% x 0.2062 = 0.07217
SK: 10% x 0.1414 = 0.01414
RK: 10% x 0.0738 = 0.00738
IF: 10% x 0.0438 = 0.00438
Total Score: 0.18718 + 0.07217 + 0.01414 + 0.00738 + 0.00438 = 0.28525

- Less Potential; the lowest multiplication result is cluster II

PR: 25% x 0.5348 = 0.13370
PK: 60% x 0.2062 = 0.12372
SK: 5% x 0.1414 = 0.00707
RK: 5% x 0.0738 = 0.00369
IF: 5% x 0.0438 = 0.00219
Total Score: 0.13370 + 0.12372 + 0.00707 + 0.00369 + 0.00219 = 0.27037

Illustration of AHP calculation results can be seen from the following image:

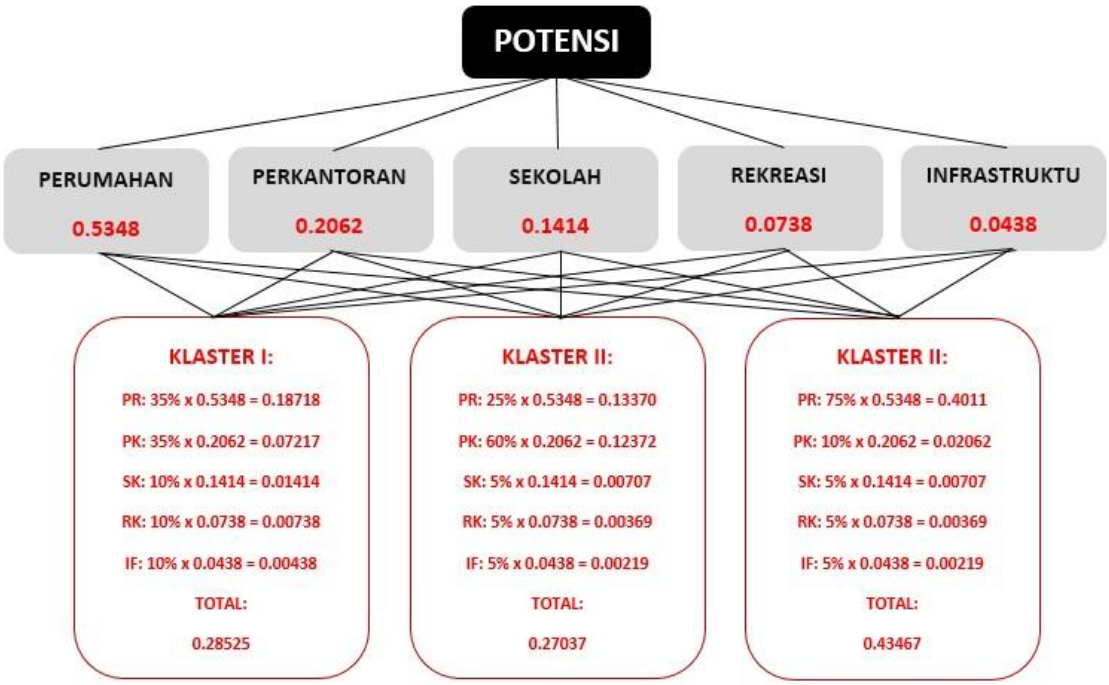

Figure 7. AHP Calculation
Mapping of Potential Business Zones for MSMEs in Kembangan Selatan
Source: "Processed by myself."

From the results of the calculations above, the argument or explanation, particularly regarding cluster III as the most potential area for MSME business activities, is among others because this cluster is dominated by residential areas, which create very high market opportunities and demand from a sales perspective. In addition, residential areas are also more feasible from an operational perspective because they are very flexible for doing business and will be cheaper in terms of rental/purchase costs compared to other areas (especially office/commercial areas).
In general, it can also be concluded that, for MSMEs, one of the considerations or potential choices for running a business, referring to the results of the calculations in this study, is that residential areas become the first and main option to be considered. Residential areas have quite a few advantages, including longer activities or it can also be said that activities are always alive throughout the time, both during the day and at night, this makes the opportunity to do business greater and longer.

Furthermore, the next consideration after residential areas is office areas, the explanation for this is more due to the fact that office areas are also associated with high economic activity intensity which simultaneously creates business opportunities, as well as high demand that will arise from workers who indeed depend part of their consumption on MSME actors.

4. CONCLUSION

Thus, from this research, it is concluded:

1. Determining the location of MSMEs in Kembangan Selatan can use the Analytical Hierarchy Process (AHP) to facilitate the determination and decision-making of potential business locations
2. The potential business zones for MSMEs in Kembangan Selatan based on the clustering created this time are cluster III as the most potential with a total score of 0.43467, cluster I neutral with a total score of 0.28525, cluster II less potential with a total score of 0.27037.

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