Assistance Decision Model for SMEs

Inayatulloh, Bachtiar Saleh Abbas , Agung Trisetyarso , Wayan Suparta, Chul-Ho Kang

Abstract: SMEs in Indonesia are one of the economic drivers of the nation. Its presence and development shows a sizeable contribution to Gross Domestic Income (GDP) each year. With this background, the Indonesian government provides stimulants in the form of financial assistance for the special SMEs for beginner SMEs. The government is encouraging the growth of SMEs by providing assistance to SMEs. During this time the process of determining the provision of assistance is done manually so that it is less effective and efficient. Therefore, the purpose of this study is to make a decision support model for the Ministry of SMEs to provide financial assistance to SMEs. The research method uses AHP and Promethee. Based on the results and discussion produced a Decision Support System model to help the Ministry of SMEs provide financial assistance to SMEs. The conclusion of this study is the suitability of SME ministry staff with the resulting model in the form of ease in the decision making process of providing assistance to SMEs.

Keywords: SMEs, DSS, AHP.

I. INTRODUCTION

The Government of Indonesia supports Small and Medium Enterprises through financial assistance and other assistance to help SMEs develop their businesses [1]. Currently, the assessment process for SMEs who deserve assistance uses a manual process that results in less effective decisions. The evaluation of the UMKM has been carried out through a manual process by considering several aspects. The assessment stage by considering several aspects without using standard methods as a basis but based on subjectivity individuals who result in inconsistent assessment resultsTherefore, this research aims to create a model using decision support systems and analytical hierarchical processing that can be used to help provide assessments for SMEs who will receive financial assistance from the government.. AHP and DSS are a system that helps in making the right decision by using several mechanisms that will result in better decisions. SMEs is a small-scale business entity using the constraints of company assets.

DSS is a method used to solve a problem by using several criteria that will be taken into consideration in producing a decision [5]. Related to AHP and DSS, several studies have been conducted using the same method, namely the selection of Leader Culling [6], then Promethee and AHP are also used in mining activities [7], other research using the same method is determining the best supplier [8]

The purpose of this research is to make a decision making model for funding assistance for SMEs in Indonesia using the Promethee and AHP methods. Of the several methods available then the Promethee and AHP are suitable for SMEs DSS because this method solves the problem into a number of parts that simpler organize parts or components into hierarchical arrangements.

The Indonesia government made a policy to help SMEs to develop their businesses by providing financial assistance and training. Government policies to provide assistance to SMEs are outlined in government regulations governing business scales included in SMEs. Criteria for small businesses according to Law no. 9 of 1995 the Republic of Indonesia is as follows:[1]

Has a net worth of at most Rp. 200,000,000.- (Two Hundred Million Rupiah) excluding land and buildings for business premises, are annual sales results of at most Rp. 1,000,000,000, - (One Billion Rupiah), Owned by Indonesian Citizens, Standalone, not a subsidiary or branch company that is not owned, controlled, or affiliated directly or indirectly with Medium Enterprises or Large Enterprises, in the form of individual businesses , business entities that are not legal entities, or business entities that are legal entities, including cooperatives`

II. LITERATURE STUDY

A. Analytical Hierarchical Processing (AHP)

1) AHP was first introduced by Dr. Thomas L. Saaty from Wharton around the 1970s by making some decision criteria and some of the most determined alternatives [9].AHP is a way to solve problems with a high level of complexity and occur in an unstructured environment which is then changed into several components. the component settings are arranged with a hierarchical arrangement. one variable will be compared subjectively to another variable. each variable will be compared with other variables and given weight according to high priority and low priority which will affect the outcome of decision making.AHP brings together several assessments such as personal judgments that are subjective.

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the next step is to determine the assessment criteria and alternative choices. criteria can be divided into several sub criteria and each subcritery has a different intensity.

2) Determine the priority of elements.

The first step is to arrange variables that have been determined before and then compared in pairs with other variables. Variables that are compared in pairs follow predetermined criteria which are compared using a matrix. The resulting matrix will be the result of work to see consistency, gather more information. This matrix can also be used to create from predetermined variables. The matrix can also be used to make a sensitivity analysis of all variables which are then used to make changes to the assessment of the variables used..

The matrices are used to compare all criteria with pairs performed at the highest level. This stage is carried out for the selection of criteria, for example C, then from the level below the element to be taken, for example A1, A2, A3, A4, A5, arranged in a matrix.

The second process is assigning numbers or scales to each criterion compared to other criteria in pairs using priority levels. This number or scale is worth one to nine which represents the lowest level for scale one and scale nine for the highest level if there are criteria that meet the same criteria in the comparison matrix then the scale is worth one. If the comparison of a criteria gets a certain value then the other criteria are the opposite value. Table 1 explains the scale of criteria from one to nine based on the importance of the criteria

Table 1 – Scale of relative importance (according to Saaty (1977; 1980)).

Intensity of importance	Definition
1	**Equal importance**
2	Weak
3	**Moderate importance**
4	Moderate plus
5	**Strong importance**
6	Strong plus
7	**Very strong or demonstrated importance**
8	Very, very strong
9	**Extreme importance**

F (.) Is a criterion of a function then P (...) is a function preference. Therefore, function preferences can be flexibly determined [10]. The preference function Pj (x, y) means an alternative to the preference, which means the alternative given to x and y.

B. Promethee

Promethee was first announced by Professor Jean Pierre Brands (Universiteit Brussels) in 1982. Promethee is a method used to compare rankings of several alternatives [10]..

C. Decision Support System (DSS)

Decision Support System (DSS) is a method commonly used to make decisions. SPK does not directly produce an alternative decision but uses another stage that will produce data analysis with the existing model (Kusrini, 2007).

III. METHODOLOGY OF RESEARCH

Ministry of SMEs Republic of Indonesia determines several main criteria that must be fulfilled by the institution, namely legality, general requirements, special requirements. Therefore, the Legality criteria have three sub-criteria, the general requirements have five sub-criteria and special requirements have two sub-criteria. Determination of criteria and aspects used based on government regulations through the law. The feasibility of the results of the assessment is based on several criteria in the table below

No	Aspect	Score	
		5	1
A1	SMEs Have a formal organization	Yes	No
A2	SMEs just started a business for at least 6 months	Yes	No
A3	SMEs engaged in production	Yes	No

General requirements

		5	1
B1	Recipient Candidates submit detailed proposals including technical data in accordance with Technical Guidelines;	Yes	No
B2	Have a legality document for the recipient;	Yes	No
B3	In the current year the budget is not being or will receive similar facilitation from APBD funds (Regional Revenue and Expenditure Budget) and / or APBN (Budget) State Revenues and Expenditures) from other Ministries / Institutions;	Yes	No
B4	The highest age is 45 years	Yes	No
B5	The lowest education is junior high school.	Yes	No

Table 2. The criteria for feasibility assessment

A. Special requirements				
			5	1
C1	SMEs have a small and medium business license or the UMKM Register Certificate from the Indonesian Ministry of Cooperatives and SMEs		Yes	No
C2	The SMEs has a business development proposal that at least contains the identity of the proposer, business information, profit / loss calculation, planned use of funds and photographs of business activities			

Based on table 1 above, an assessment of the community who submitted a request for assistance for their business development from the employer had a multi-criteria variable. We make models to make decisions with several criteria. Therefore, this model can be used by the government to determine which institutions get assistance.If the proposal requirements are incomplete, the government will provide information to the community to complete the proposal the proposal requirements are incomplete, the government will provide information to the community to complete the proposalDSS that is built and developed uses data in table 1. Ownership data and estimated data will be stored in Management data. Therefore, the AHP and PROMETHEE are references that will be used to assess the feasibility of the partnership. Eligibility of incoming proposals will be given a ranking made material can be made for analysis of DSS. Each criterion has an initial weight. Table 3 shows the weights between criteria.

Table 3 Weight comparison matrix

	Criteria 1	…	Criteria n
Criteria 1			
Criteria 2			
Criteria 3			
Criteria 4			
Criteria n			

Alternative	f1(.)	F2(.)	…	fm(.)
a1	f1(a1)		…	
a2	f1(a2)		…	
…	…	…	…	…
an			…	fm(an)

AHP produces weights from criteria that will describe the consistency test. Evaluation of SMEs proposals will use a consistency test from the results of AHP calculations. Table III illustrates the data from the initial analysis. Alternatives represent SMEs, only FM (.) Represents judgment.

The proposal that has the highest value means to be the proposal with the best alternative.

IV. RESEARCH DIAGRAM

Figure 1 shows the process of completing a proposal in accordance with predetermined requirements. This activity is carried out by examining all main documents and supporting documents as the first requirement to be able to pass to the next stage. After all documents have met the requirements, a complete proposal can be a candidate for recipient of assistance.
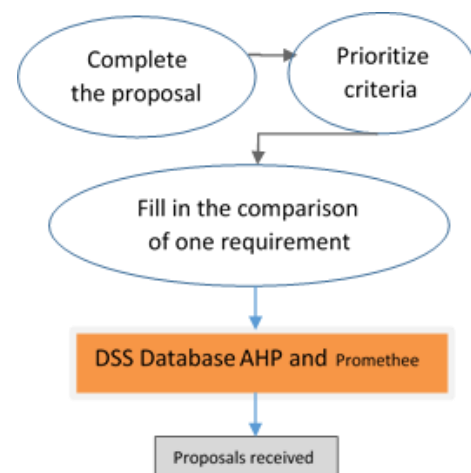

Figure 1.

Figure 2 explains the SME process that prepared the proposal. The complete proposal accompanied by supporting documents is submitted to the village government. The village government verifies and validates the SME proposal if the proposal is complete then the local government submits the SME proposal to the provincial government. If the proposal is not complete, the local government returns the proposal to the relevant SME. The provincial government has again verified and validated the SME proposal. If the results of verification and validation have been carried out, then the provincial government will make a cover letter about SMEs that have passed the verification and validation test addressed to the Ministry of SMEs of the Republic of Indonesia.

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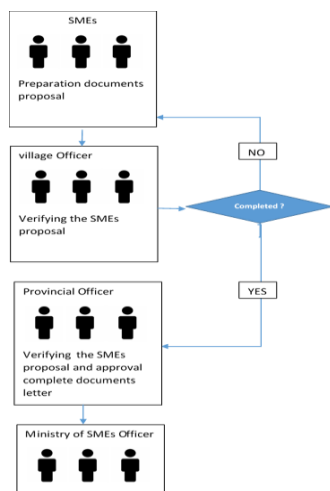| No	Criteria	Range Score	Explain
1	A1	5-Jan	Xxxxxx
2	A2	5-Jan	Xxxxxx
3	A3	5-Jan	Xxxxxx
4	B1	5-Jan	Xxxxxx
5	B2	5-Jan	Xxxxxx
6	B3	5-Jan	Xxxxxx
7	B4	5-Jan	Xxxxxx
8	B5	5-Jan	Xxxxxx
9	C1	5-Jan	Xxxxxx
10	C2	5-Jan	Xxxxxx

Figure 2

Table 4 explain the step to determine the comparison of one criterion with other criteria. Comparative values are subjective and logical based on the experience and knowledge of decision makers.

The results of the process of calculating AHP and Promethee which will produce a ranking proposal that has the highest value.
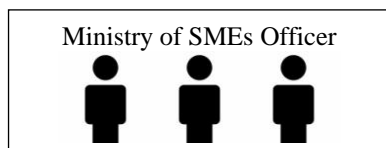
Table 4. Comparison matrix and list SMEs

No	SMEs	Explain
1	SME 1	Xxxxxx
2	SME 2	Xxxxxx
3	SME 3	Xxxxxx
4	SME 4	Xxxxxx
N	SME n...	Xxxxxx

Figure 3, 4 ,5 and 6 explain The next step by user to prioritize the criteria. Decision makers determine the criteria and scores of each criterion. For example, if SMEs have business legality supporting documents, the score is given a

score of five and if SMEs does not have business legal documents, then the score 1. The same is done for all aspects and general criteria and special criteria.
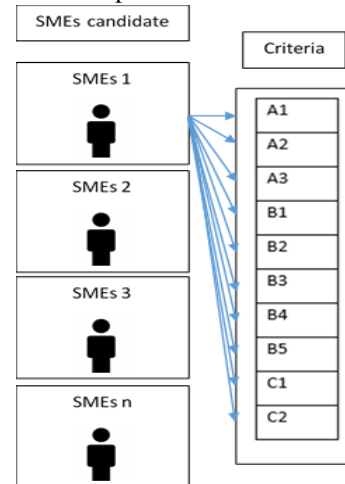
Figure 3
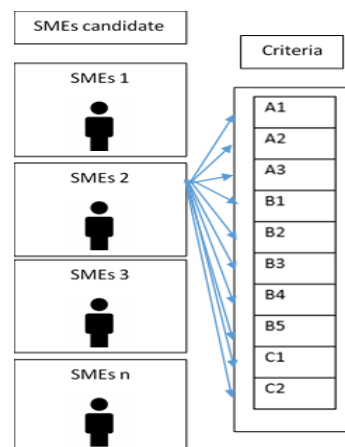
Figure 4.
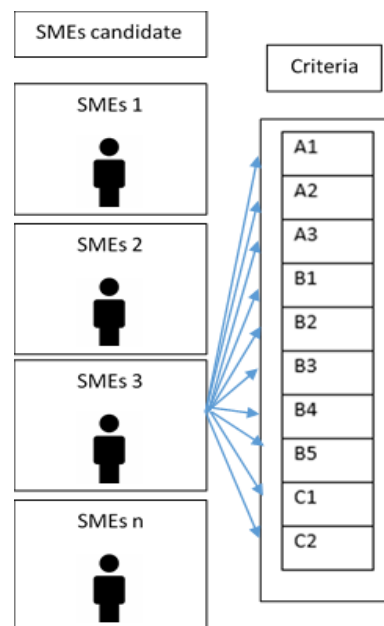
Figure 5.
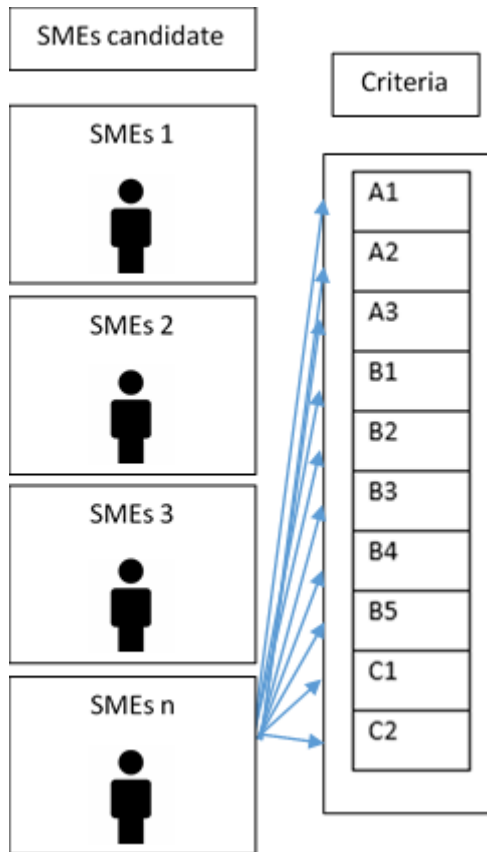
Figure 6
Comparing the criteria

The next step is to compare one criterion with another criterion and give a score on a criterion that is higher in value.

Figure 7 explain when A1 is 5 times more important than A2 then A1 has a score of 5

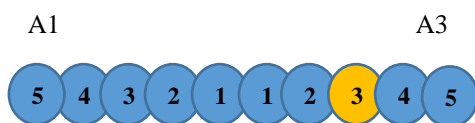Figure 7 explain when A3 is 3 times more important than A1 then A3 has a score of 3

Figure 8

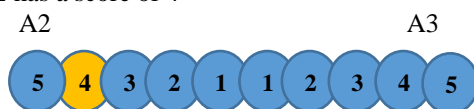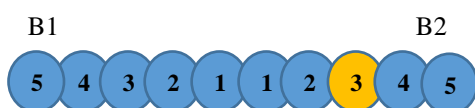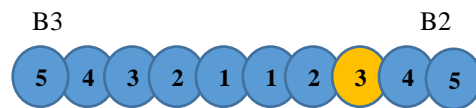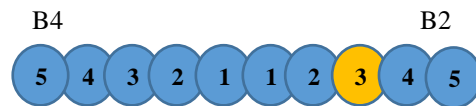Figure 8 explain when A2 is 4 times more important than A2 then A2 has a score of 4

Figure 9

Figure 9 explain when B2 is 3 times more important than B1 then B2 has a score of 3

Figure 10

Figure 10 explain when B2 is 3 times more important than B3 then B2 has a score of 3

Figure 11

Figure 11 explain when B2 is 3 times more important than B4 then B2 has a score of 3

Figure 12

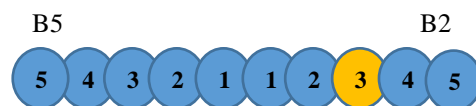Figure 12 explain when B2 is 3 times more important than B5 then B2 has a score of 3

Figure 13

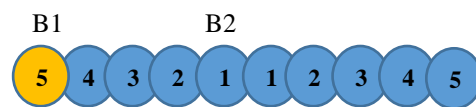Figure 13 explain when B1 is 5 times more important than B2 then B1 has a score of 5

Figure 13

Figure 14 explain when B1 is 5 times more important than B3 then B1 has a score of 5
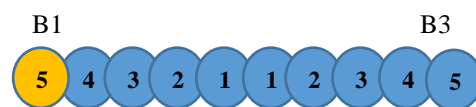

Figure 14

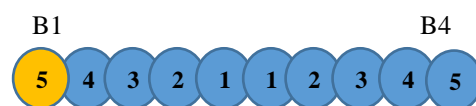Figure 15 explain when B1 is 5 times more important than B4 then B1 has a score of 5

Figure 15

Figure 16 explain when B1 is 5 times more important than B5 then B1 has a score of 5
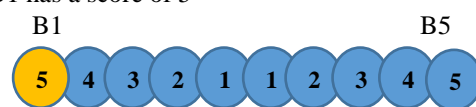

Figure 16

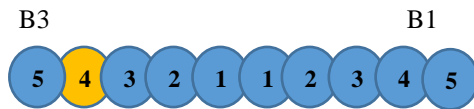Figure 17 explain when B3 is 4 times more important than B1 then B3 has a score of 4

B3   B1

Figure 17

Figure 18 explain when B3 is 4 times more important than B2 then B3 has a score of 4
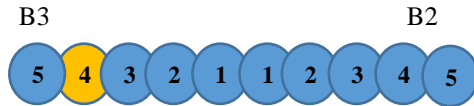
B3   B2

Figure 18

Figure 19 explain when B3 is 4 times more important than B4 then B3 has a score of 4
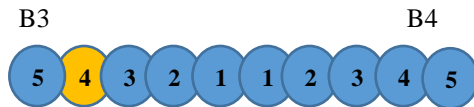
B3   B4

Figure 19

Figure 20 explain when B3 is 4 times more important than B5 then B3 has a score of 4
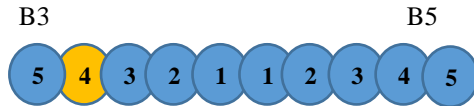
B3   B5

Figure 20

Figure 21 explain when B4 is 3 times more important than B5 then B4 has a score of 3

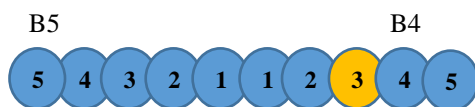B5   B4

Figure 21

Comparison of criteria is also made for criteria A against B against C and vice versa.

Comparing between SMEs base on the criteria

Figure 22 explain when **criterion A**1 as the basis for evaluating comparison between ukm1 and SME 1 and SME 2, 3 times better than SME 2 then SME 1 has a score of 3

SME1   SME2

Figure 22

Figure 23 explain when **criterion A**2 as the basis for evaluating comparison between ukm1 and SME 1 and SME 2, 3 times better than SME 2 then SME 1 has a score of 3.
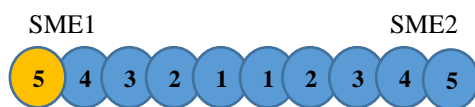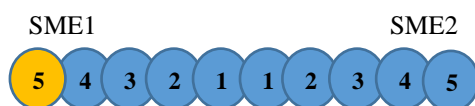
SME1   SME2

Figure 23

V. RESULT AND DISCUSSION

DSS model built for assistance for Indonesia's SMEs in the Figure 24.
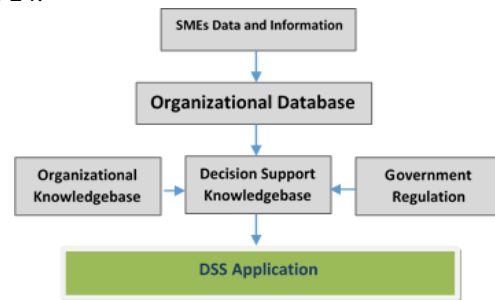

Figure 24

SMEs DSS model database which has 8 entities: Criteria, Sub Criteria, Assessment, assessement detail dan institution. Figure 25 explain Class Diagram of SMEs DSS model.
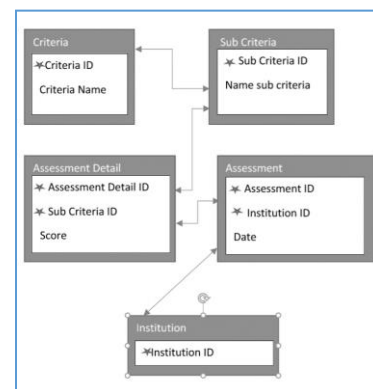

Figure 25
Evaluation Model

The model validation process was carried out using interview techniques and forum group discussion to the staff of the Ministry of SMEs. Some model validations use the following measurements:

1. Verification of input data is the activity of adjusting the data set that will be used in model validation. The use of data that is part of the DSS model that is built to adjust to the data format used by the user.
2. Verification of the process of determining the criteria is the activity of determining the criteria based on the Republic of Indonesia SMEs regulations.
3. Verification of alternative determination process is the activity of determining SMEs that have met the requirements based on proposals and other supporting documents.
4. Ease of use of the system is an assessment of the satisfaction of the activity of the use of the system by the user based on a series of processes in the SMEs DSS model.
5. Effectiveness and work efficiency is a measurement of work speed before and after using the SMEs DSS model.
6. Measurement of results is comparing the results of decisions using the SMEs DSS model and not using the SMEs DSS model.

Table 5 shows the evaluation stages of the DSS SMEs model that explains aspects that are evaluated, simulated and feedback from the user.

Evaluation	simulation	Feedback
Verification input	Users input data to the system	The system must be able to accommodate various types of data from various sources. Data obtained from SMEs submitted to the local government to the provincial government has a different form, so we need a system that can accept all types of data.
Verification proses	Users input criteria	The criteria used must be flexible which can be adjusted to changes in government regulations. Giving a score on the criteria needs to be added an explanation that will be used as a reference to determine the high and low criteria compared to other criteria
Ease of use	The user evaluates the user interface design	The user interface to be designed and the order of the processes must be adjusted to the user's convenience. A system user manual should be added that will help the user use the system.
Effectiveness and work efficiency	The user evaluates work efficiency using DSS	Users need to simulate the use of the system with real data. Where the results of the simulation can be used as material for comparison with work without using a system.
Measurement of results	The user evaluates DSS features	The system needs to be made with complete features so that the results of decision making can be compared with the results of decisions without

		using the system.

VI. CONCLUSION

The study proposed the model of DSS to determine the government assistance to the creative industry for Facilitation of Revitalizing Physical Infrastructure using AHP and Promethee methods. Therefore, this model can use to support SMEs ministry Indonesia to assess the SMEs proposals and expected to help the Indonesian government plan to increase economic growth through the development of creative industries.

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