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IMPLEMENTATION OF TOPSIS METHOD FOR DECISION SUPPORT SYSTEMS OF DIRECT CASH ASSISTANCE RECIPIENTS (BLT) IMPACT OF COVID-19 IMPACTS OF MICRO SMALL MEDIUM ENTERPRISES (UMKM) IN PAITON DISTRICT, PROBOLINGGO DISTRICT

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Abstract

Efforts Government provides social assistance in order to fulfill all the needs of the economy for the people, especially the business of Micro Small Medium Enterprises are exposed to the impact of the virus covid-19 turned out to be still considered not optimal. So many actors business who think that aid social who do not and have not been precisely targeted and The Government also recognizes the problem that, until the time of this Ministry of Social Affairs and the government is still updating the data in order to precisely target. The case is suspected to be due to data collection that is not in accordance with facts and is not real-time in each region. Inputting the data in manually in the District Paiton Probolinggo risk not the right target, the receiver doubles as well as there are elements – elements that utilize state of the. Be because the methods TOPSIS expected to be able to determine the criteria of Enterprises of Micro Small Medium Enterprises are entitled to receive the assistance of social COVID-19. Method of TOPSIS is a method that uses calculations or that provides the kinds of criteria specified which have a weight of up to the value end of the weight will be the decision final. Method of TOPSIS it refers to the benchmark Enterprises Micro Small Medium Enterprises or actors effort that deserves receive the corresponding data is relevant.



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I. INTRODUCTION

One strategy to improve and strengthen the basis of the Indonesian economy is to advance Small and Medium Enterprises. Advancing Micro SME can provide jobs and reduce inequality/poverty that

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exists in Indonesia, especially in the West Bandung regency. Sector Micro Small Medium Enterprises to be advanced through the help that is given by the government and training which can support business continuity them.

Based on data from the Department of Cooperatives and Small and Medium Enterprises province of East Java, the number of Micro, Small, and Medium Enterprises in Probolinggo district recorded 333 453 of the total 9,782,262 Micro Small Medium Enterprises in East Java. Most of the Micro, Small, and Medium Enterprises in the Regency are concentrated in the manufacturing sector, wholesale and retail trade, providing accommodation and providing food and drink, etc. The data is used to determine the priority offenders Small Medium Micro Enterprises are productive. In addition, this data can help the government carry out work programs in the development and development of Micro, Small, and Medium Enterprises. Data on Micro, Small, and Medium Enterprises is often used to analyze business development strategies from all aspects that influence it.

This research will provide how accurate the system is used to make decisions on prioritizing Micro, Small, and Medium Enterprises in Paiton District, Probolinggo Regency. This system will also provide alternatives to help the role of the government in making decisions about which Micro, Small, and Medium Enterprises actors are entitled—assisted according to predetermined criteria. Because often government staff or village officials in providing assistance to productive Micro, Small and Medium Enterprises actors are not right on target. The main problem of this research is to recommend productive Micro, Small,

and Medium Enterprises actors based on data on turnover, assets, total production, number of requests, total sales, total labor, and product quality, for each data that affects the recommendation of productive Micro, Small and Medium Enterprises, is given a weighted value. Interests so that they can provide recommendations for productive Micro, Small, and Medium Enterprises actors in direct cash assistance recipients during the Covid-19 pandemic.

The purpose of this research is to build a system that can rank productive Micro, Small, and Medium Enterprises using the TOPSIS method so that the system can provide recommendations for productive Micro, Small, and Medium Enterprises in Paiton District, Probolinggo Regency to be given Direct Cash Assistance (BLT) during the Covid-19 pandemic.

To focus on research, the scope of research is limited as follows:

- a. Manage the data of Micro, Small, and Medium Enterprises that already have a Micro Business License (IUM).
- b. Managing data for Micro, Small, and Medium Enterprises in the culinary, fashion, and handicraft sectors.

Building a decision matrix, with X referring to the alternative (m) which will be evaluated based on criteria (n), where X_{ij} is an alternative measurement of a_i with the attribute reference to X_j , as in equation (1).

$$x = \begin{matrix} a_1 \\ a_2 \\ \vdots \\ a_m \end{matrix} \begin{bmatrix} x_{11} & x_{21} & \dots & x_{1n} \\ x_{12} & x_{22} & \dots & x_{2n} \\ \vdots & \vdots & \dots & \vdots \\ x_{m1} & x_{m2} & \dots & x_{mn} \end{bmatrix} \tag{1}$$

Creating a normalized decision matrix (R), by transforming each element X_{ij} of the matrix X where r_{ij} is the element of the matrix that has been normalized.

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^m x_{ij}^2}} \tag{2}$$

Information:

r_{ij} = index of the normalized matrix X
 X_{ij} = index of the matrix X

The normalized decision matrix is weighted, where W_j is the weight of the j^{th} criterion, where V_{ij} is the normalized matrix element is weighted V, while r_{ij} is the normalized decision matrix element.

$$V_{ij} = w_j r_{ij} \tag{3}$$

Information:

V_{ij} = index of normalized matrix weighted V
 W_j = weight of column j
 R_{ij} = index of normalized matrix R.

Determine the value of the highest matrix (benefit) and the lowest value of the matrix (cost), where benefit is denoted A^+ , while cost is denoted A^- . V_{ij} is a weighted normalized decision matrix element V.

$$A^+ = (y_1^+, y_2^+, \dots, y_n^+) \tag{4}$$

$$A^- = (y_1^-, y_2^-, \dots, y_n^-) \tag{5}$$

Information:

A^+ = find the highest score
 A^- = find the lowest value

The distance for each alternative, where D^+ is the distance from each benefit value while D^- is the distance from each cost value

$$D_i^+ = \sqrt{\sum_{j=1}^n (y_{ij} - y_i^+)^2}, i = 1, 2, 3, \dots, n \tag{6}$$

$$D_i^- = \sqrt{\sum_{j=1}^n (y_{ij} - y_i^-)^2}, i = 1, 2, 3, \dots, n \tag{7}$$

Information:

A^+ = find the distance for each benefit value
 D_i^- = find the distance for each cost value
 Y_{ij} = index of each column times row
 y^- = the cost value of each row / criterion
 y^+ = benefit value from each row / criterion

Alternative preparation, the proximity to the ideal solution is calculated based on the following equation:

$$V = \frac{D_i^-}{D_i^- + D_i^+}, i = 1, 2, 3, \dots, n \tag{8}$$

Information:

V = value of preparation / weight for each alternative

D_i^- = cost value for each alternative

D_i^+ = cost value for each alternative

The highest value of V indicates that alternative V will get the first rank and will be selected.

II. RELATED WORKS

One study shows that the prioritized strategy using TOPSIS can determine the best employee in 0,9531 seconds from 300 employees [1]. Meanwhile, other research shows that employment factors, investment, production capacity, production value and raw materials can determine the priority of SME development in Central Lampung [2]. The next research is to build a system that can rank productive Micro, Small and Medium Enterprises (SMEs) using the TOPSIS method so that the system can provide recommendations for productive Micro, Small and Medium Enterprises (SMEs) to the Office of Cooperatives and Micro Small and Medium Enterprises to provide assistance in the form of funds or goods in determining the priorities of Micro Small and Medium Enterprises Intermediate in West Bandung district [3]. Several researchers they mention about the criteria for direct cash transfer[4]. @topsis method to deetrminan kesalahan [5], [6]. The implementation for TOPSIS[7].

III. METHODS

The research method used is described into several stages, namely: Needs Analysis. Data Collection, Data Processing, System Design and Implementation shown in Figure 1.

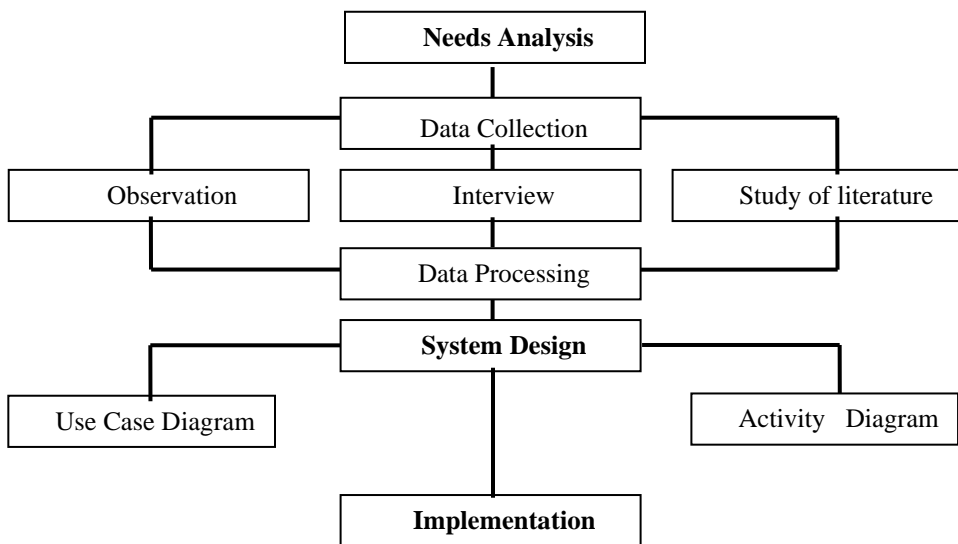


Figure 1. Research Methodology

A. Needs Analysis

The first stage is a needs analysis The process of gathering needs is carried out intensively to determine the software requirements so that the *user* can understand what software the user needs. The specification of software requirements at this stage needs to be documented. In this study, the analysis was obtained through observation, interviews, and literature studies on the problems that exist in Paiton District, Probolinggo Regency regarding the data collection process for recipients of Covid Direct Cash assistance (BLT) 19 Micro, Small and Medium Enterprises actors. The new system is expected to assist village officials in carrying out the data collection process to make it more effective and efficient.

B. System Design

The second stage is system design is a multi-step process that focuses on the design of a software program including data structures, software architectures, interface representations, and coding procedures. The software design produced at this stage also needs to be documented. At this stage, will be made the design

of the system to be built using a *Use Case Diagram*. The design process will use the design of the UML notation system which is described as a design *tool system*[8].

C. Implementation

And the next stage Implementation where design must be translated into a software program. The result of this stage is a computer program in accordance with the designs that have been made at the design stage. In this study, the coding was carried out using *Adobe Dreamweaver CS6* and *XAMPP software* to store data into *the MySQL database* [9].

IV. RESULTS AND DISCUSSIONS

In the chapter will be shown the results and discussion of the research that has been done.

A. Calculation Using TOPSIS

Before calculating using the TOPSIS method, the criteria and alternatives for each data were first determined

B. Determining Criteria

There are 4 criteria that will be used in calculating BLT (Direct Cash Assistance) recipients of the impact of Covid-19 for Micro, Small and Medium Enterprises in Paiton District, Probolinggo Regency, namely:

Table 1. Criteria Table

No.	Code	Name Criteria
1	K01	Turnover
2	K02	Total Production
3	K03	Number of Requests
4	K04	Total Sales

Next determine the weight for each existing criterion. The weights of each criterion can be seen in Table 2.

Table 2. Criteria weights

No.	Criteria	Criterion Weights
1.	Turnover	10%
2.	Total Production	30%
3.	Number of Requests	40%
4.	Total Sales	20%

C. Determining Alternatives

In this study, alternative choices to be tested were made, namely:

1. Business Actors A
2. Business Actors B
3. Business Actors C
4. Business Actors D
5. Business Actors E

D. System Design

a) Use Case Diagram of SPK for Direct Cash Assistance Recipients

Use case diagrams are used to find out what functions are in a system. The use case diagrams used to build applications in this study can be seen in Figure 2.

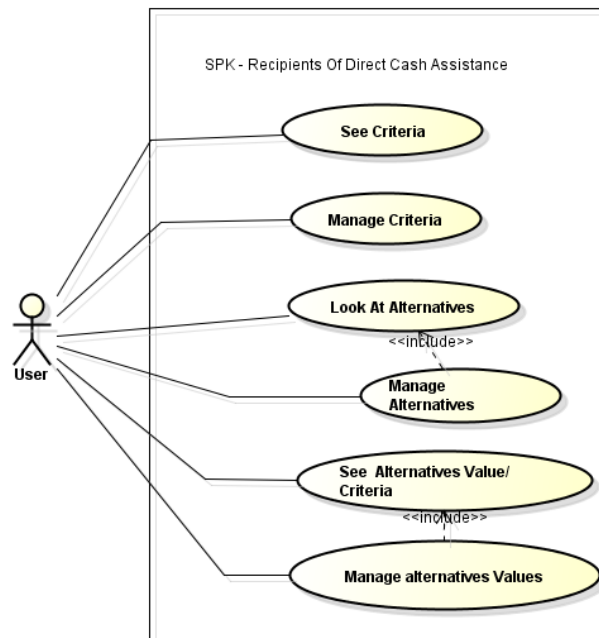


Figure 2. Use Case Diagram of SPK for Direct Cash Assistance Recipients

Based on the proposed *Use Case Diagram* image above, there are: System components have 1 system covering all decision support system activities for beneficiaries of Direct Cash Assistance Recipients for Business actors impacted by Covid-19 in Paiton District. There is 1 actor in the system component, namely the verification / survey officer as the admin. There are 6 system components carried out by actors, namely: seeing criteria, managing criteria, seeing alternatives, including alternative management, looking at alternative values, including managing alternative values.

b) Recipient Input Activity Diagram

To record the direct beneficiaries of cash for businesses Micro Small Medium Enterprises effective and therefore author proposed system more computerized. The activity diagram for the proposed beneficiary input, can be seen in Figure 3.

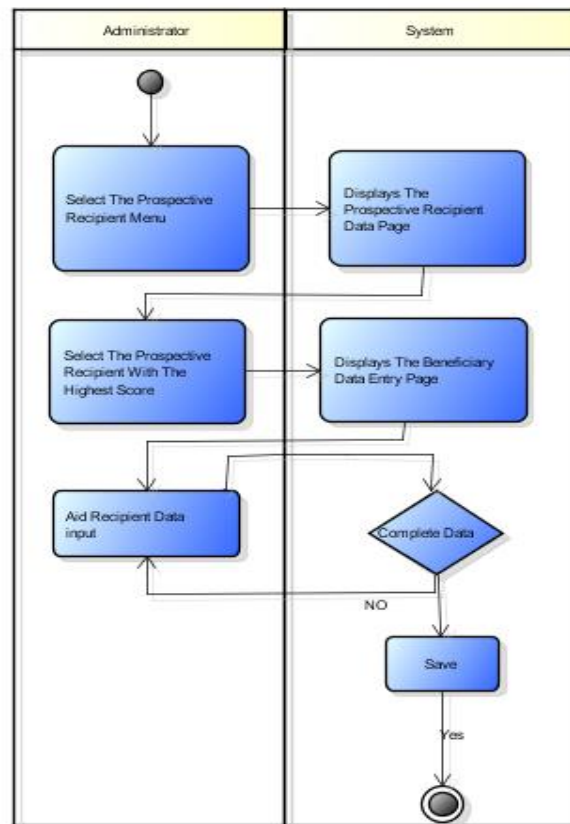


Figure 3. Recipient Input Activity Diagram

Based on the activity diagram for the beneficiary input proposed above, there are:

1. The initial node system component, the object to which it is prefixed.
2. System components have 6 activities carried out by actors
3. The system component has 2 vertical swimlanes, namely the administrator and the system
4. Initial final node system components, which are the final activities of the system
5. Siste, tidk bantu

E. Implementation and Testing

a) Dashboard page

This page consists of TOPSIS analysis in calculations, master data input weights and criteria, users or admins can be seen in Figure 4.

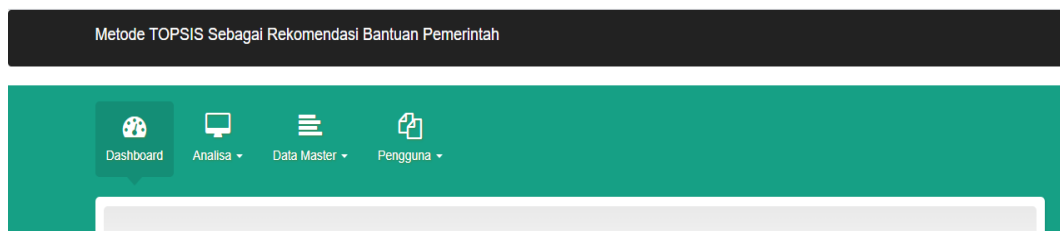


Figure 4. Dashboard page

b) Criteria and Weights List Page

On this page the admin fills in a list of criteria consisting of 5 criteria by giving a value of cost or benefit. After inputting the required values, then the admin saves the values and the results will be obtained, described in Figure 5.

No	Nama Kriteria	Kepentingan	Cost Benefit
1	Jumlah Penjualan	4	Benefit
2	Jumlah Permintaan	3	Benefit
3	Jumlah Produksi	2	Benefit
4	Omset	3	Benefit
5	Tenaga Kerja	4	Cost

Figure 5. Input criteria and weights

c) Page Choose an alternative

On this page, after filling in the value, it is necessary to choose an alternative to calculate the normalized value and then process it using the TOPSIS method [5], [10], described in Figure 6.

PILIH ALTERNATIF	
<input checked="" type="checkbox"/>	Pelaku Usaha Melati
<input checked="" type="checkbox"/>	Pelaku Usaha Anggrek
<input checked="" type="checkbox"/>	Pelaku usaha Anissa
<input checked="" type="checkbox"/>	Pelaku Usaha Arassy
<input checked="" type="checkbox"/>	Pelaku usaha ASRI
<input checked="" type="checkbox"/>	Pelaku Usaha Barakat-Tech
<input checked="" type="checkbox"/>	Pelaku usaha Anggrek
<input checked="" type="checkbox"/>	Pelaku usaha Kembar
<input checked="" type="checkbox"/>	Pelaku Usaha AA-Tech
<input checked="" type="checkbox"/>	Pelaku Usaha Mawar

Proses

Figure 6. The Selecting Alternatives page

d) Calculation Results page.

In the trial, there are 10 alternatives whose values are in accordance with the input from the research results, the system will automatically calculate the normalization value, weighting results, preference value and final value in the form of ranking and produce the greatest value 0.56631849670891 with the best alternative, namely the jasmine business actor can be seen in Figure 7.

Ranking	Alternatif	Nilai
1	Petaku Usaha Melati	0.56631849670891
2	Petaku Usaha Anggrek	0.56631849670891
3	Petaku usaha Anissa	0.56631849670891
4	Petaku Usaha Arassy	0.56631849670891
5	Petaku usaha ASRI	0.56631849670891
6	Petaku Usaha Barakat-Tech	0.56631849670891
7	Petaku Usaha Mawar	0.53890191905943
8	Petaku usaha Angrek	0.53539828746176
9	Petaku usaha Kembar	0.3612989553858
10	Petaku Usaha AA-Tech	0.34582047459613

Alternatif Lokasi Terbaik :
Petaku Usaha Melati

Dengan Nilai Terbesar :
0.56631849670891

Figure 7. Calculation Results page

V. CONCLUSIONS AND RECOMMENDATIONS

Based on the research that has been done, it can be concluded as follows:

1. Has succeeded in building a decision support system for recipients of direct cash assistance due to the impact of covid -19 for Micro, Small and Medium Enterprises with assessment criteria in Paiton sub-district, Probolinggo Regency.
2. The system generates information on alternative decisions for the selection of recipients of direct cash assistance due to Covid-19 for Micro, Small and Medium Enterprises, quickly.

The system can recommend beneficiaries with ranking results so that leaders can make appropriate and effective policies with this information.

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