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Analysis of Capital Budgeting Decision-Making Using the Electre Decision Support System Method (Case Study on Export-Oriented Msmes: PT. Mekar Saluyu Group)

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Abstract

The era of globalization brought about a significant transformation in international trade, allowing for greater participation of MSMEs. However, even though Indonesia has the largest number of MSMEs in ASEAN, the percentage of MSMEs involved in exports is still low. Various factors hinder the expansion of MSMEs to the international market, including financial management constraints. To overcome these challenges, strengthening strategies are needed, such as fostering a conducive business environment, increasing access to capital, and developing infrastructure. In the context of financial strengthening, it is important for MSMEs to understand capital financing strategies and financial decision-making. The capital budgeting method is crucial in determining investment projects that can increase profitability and expand business. To facilitate proper decision-making, the use of integrative techniques in capital budgeting is important. One method that can be used is the ELECTRE Decision Support System (SPK), which helps to develop investment alternatives based on certain criteria to facilitate decision-making. This study will apply the capital budgeting method and SPK ELECTRE to assist companies in choosing investment options for curly chili or sweet potato plants using five calculation criteria, this study aims to provide guidance for MSMEs in making the right financial decisions.

Keywords: MSMEs, Investment, Capital Budgeting, SPK ELECTRE

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INTRODUCTION

The era of globalization has brought many changes in various areas of life, including in the field of trade (Sjöholm, 2024). The melting of borders between countries as an effect of globalization makes trade activities between countries more possible and easier to carry out (Biagie, 2023). Accompanied by rapid technological developments, access and facilities to conduct international trade such as exporting goods are wide open, making it easier for the actors involved to carry out export activities. Starting from access to information and knowledge about exports, to access to carry out export activities itself such as finding buyers, communicating with buyers, finding forwarders, making L/Cs, and other needs to carry out exports can be accessed and carried out online. With these various conveniences, not only large companies are able to penetrate the global market, but also MSME actors (Marwanto et al., 2023).

The MSMEs that have successfully penetrated the international market are experiencing many difficulties in expanding to other countries. This is of course based on several factors. According to previous research conducted by (Suryani, 2018), the common problems faced by

MSMEs so that it is difficult to develop are (1) capital problems, (2) marketing problems, (3) raw material problems, and (4) technology problems. Meanwhile, according to (Kuncoro, 2009), some of the basic problems that are often faced by MSME actors are (1) difficulty in obtaining market opportunities and enlarging the market (2) capital structure and weak and limited access to obtain capital sources, (3) weak knowledge in the field of organization and human resource management (MSDM), (4) limited business network of cooperation between MSME entrepreneurs, (5) competition that tends to kill each other so that it makes the business climate of the MSME sector is not conducive, and (6) the lack of integrated coaching and low public trust and concern for small business actors.

From the various explanations of the problems commonly faced by MSMEs in Indonesia (Rijal et al., 2023), it can be concluded that one of the things that needs to be considered in developing MSME entrepreneurship is to carry out a strengthening strategy on the financial aspect such as carrying out capital financing (Abor, 2016), strengthening capital structure strategies, and financial decision-making (Ullah et al., 2020). So far, access to capital sources in the MSME sector is still very low and completely relies only on personal capital (full equity). This low source of capital has an impact on the limited ability of MSMEs to increase their business capacity, leading to difficulties in expanding the market (Amri, 2017). In the financial world, the change in capital structure from full equity to equity and debt is called financial leverage. According to Atmaja (2008:236), a company can be said to have exercised financial leverage if the company spends part of its assets using securities that result in fixed liabilities, such as debts to banks, selling bonds or issuing preferred shares. At the MSME level, financial leverage is generally carried out by borrowing money from banks to increase their business capabilities (Maesaroh, 2021).

In the practice of capital budgeting, a number of investment criteria and various techniques are used (Alayli, 2023). These techniques can be divided into two broad categories, namely discounted cash flow (DCF) techniques and non-discounted cash flow (Non-DCF). The DCF technique is based on the concept of cash flow by taking into account the concept of time value of money (Tarigan & Mawardi, 2024). Meanwhile, the non-DCF technique ignores the time value of money and is generally based on accounting profit which is lower in quality than the concept of cash flow because accounting profit has many meanings, such as gross profit, net profit, profit before tax, profit after tax, return on investment, return on equity, return on capital used, and so on and contains more accounting ambiguity and is easier to manipulate. According to (AlKulaib et al., 2016), there are five techniques that are currently popularly used toconduct capital budgeting analysis by considering the concept of the time value of money as an important factor. The five techniques are Payback Periods (PB), Discounted Payback Periods (DPP), Internal Rate Of Return (IRR), Modified Internal Rate Of Return (MIRR), and Net Present Value (NPV). Meanwhile, according to Anhar et al., (2021) the commonly used capital budgeting calculation techniques are Payback Periods (PB) and Accounting Rate Of Return (ARR) as calculation techniques that are included in the DCF and Net Present Value (NPV) categories, Internal Rate Of Return (IRR), Discounted Payback Method and Profitability Index (PI) as a calculation technique that falls into the Non-DCF category.

Each of these calculation techniques has a different unit of measurement as well, so it often causes the results of capital budgeting calculations to be quite difficult to interpret (Mota & Moreira, 2023). Meanwhile, if only one technique is used, the results of capital budgeting calculations will be inaccurate and unreliable (Nguyen, 2019). Therefore, in order for the results of the calculations to be interpreted more accurately and without creating ambiguity, it is necessary to use a single, integrated criterion or technique to compare and evaluate each alternative to find the best among them. The multi-criteria decision-making method of the

ELECTRE Decision Making System (SPK) (ELimination Et Choix Traduisant la REalite) can be one of the right solutions to this problem (Abbhina & Akash, 2022). According to Taherdoost & Madanchian (2023), the SPK ELECTRE method is part of Multi-criteria Decision Making (MCDM) and is a method that compiles a set of alternatives influenced by various criteria into a ranking form to facilitate decision-making.

In selecting and deciding on investment projects from the two options, a careful and critical analysis of both options is required using the capital budgeting method (Rexhepi et al., 2024). Due to the limited knowledge of PT. Mekar Saluyu Group Regarding this, the main obstacle faced is determining what things or projects must be invested so that they can increase export volume or enlarge their business. For this problem, the researcher will try to help by calculating the projected profit or loss of each option using the capital budgeting method using five techniques or calculation criteria, namely Accounting Rate of Return (ARR), Payback Period (PB), Net Present Value (NPV), Profitability Index (PI), and Internal Rate of Return (IRR). Considering that the calculation and decision-making in the capital budgeting process in the selection of investment projects involves various criteria and considerations that have been mentioned, the researcher decided to use one of the SPK Multi-criteria Decision Making (MCDM), namely the SPK ELECTRE method. The researcher's interest in solving the problems faced by PT. Mekar Saluyu Group is outlined in this Final Project Report with the title "Capital **Budgeting Decision Making Analysis Using the ELECTRE Decision Support System Method (Case Study on Export-Oriented MSMEs PT. Mekar Saluyu Group)"**

Problem Formulation

Based on the background of the problems that have been described in the previous section, the researcher focuses on several problems that arise and need to be researched to provide solutions. The formula for the problem is as follows:

1. How to use the SPK ELECTRE method in calculating the capital budgeting of the two investment project options of PT. Mekar Saluyu Group?
2. How PT. Mekar Saluyu Group chooses the right investment project by using the SPK ELECTRE method in calculating capital budgeting?

Purpose

Preparation of research on the problems faced by PT. Mekar Saluyu Group in this Final Project Report has the following objectives:

1. To find out the use of the SPK ELECTRE method in calculating capital budgeting in two investment project options of PT. Mekar Saluyu Group.
2. To be able to provide the best investment project recommendations to PT. Mekar Saluyu Group uses capital budgeting and the SPK ELECTRE method.

Research Benefits

1. For Researchers

This research is expected to expand the researcher's insight into capital budgeting which has previously been studied in the Department of International Business, Padjadjaran University and can learn the SPK ELECTRE method.

2. For Companies

This research is expected to be a reference for PT. Mekar Saluyu Group in budgeting capital and selecting projects to be invested in the hope of increasing export volume and increasing the profitability level of PT. Saluyu Group's bloom in the long term.

3. Academically

The research outlined in this Final Project Report is expected to provide benefits for the International Business study program to develop applied knowledge related to capital budgeting. This report is also expected to provide a new perspective on SPK ELECTRE as a means to improve accuracy in capital budgeting decision-making.

METHODOLOGY

Type of Research

The type of research in this writing is a combination of qualitative and quantitative approaches. Research that uses a quantitative approach is a type of research whose results are obtained from a statistical procedure or other quantification (calculation) method, while research that uses a qualitative approach seeks to understand and explain a phenomenon and/or social phenomena using a series of words that can produce a theory (V. Wiratna Sujarweni, 2014). In other words, the combination of qualitative and quantitative approaches in this study will result in research whose discussion is presented with numbers and also descriptive explanations.

Data Acquisition Techniques

In conducting a research, data collection is a very crucial process to produce credible and valid research so that the results are reliable. When taking data, researchers need to consider the need for relevant information that can be used for research needs. In this final report, the researcher used two types of data, namely primary data and secondary data. These two types of data are needed in this study to produce solutions that are in accordance with the situation in the field. Here are the data capture techniques from each type of data:

1. Primary Data

According to Sugiyono (2013:137), primary data is data obtained from the data source itself. This means that data collectors or researchers get all the information they need directly from the parties who are the source of the data. In this final project, the researcher obtained primary data through a direct interview process with the owner of PT. Mekar Saluyu Group to find out data in the form of financial information of PT. Mekar Saluyu Group. The interview method was chosen because this method allows the researcher to know more in-depth things from the respondents (Sugiyono, 2013). According to Sutrisno Hadi in Sugiyono (2013), the assumptions that should be held by researchers in using the interview method are 1) the research subject is the person who knows the most about himself (in this case, his own company), 2) that what the subject conveys to the researcher is trustworthy and is the truth, and 3) that the subject and the researcher have the same interpretation and perspective regarding the question referred to by the researcher.

In this study, the interview method chosen was an unstructured interview. In unstructured interviews, there is no need for interview guidelines that have been prepared systematically and completely to collect data, but only outline guidelines for the data to be explored. This method is suitable for digging deeper into the information of the subject being studied. In this method, the researcher does not know clearly and definitely what information or data will be obtained, so the researcher tends to listen more to the answers from the subjects being studied (Sugiyono, 2013). To obtain the data needed from PT. Mekar Saluyu Group In the research in this Final Project Report, the researcher prepared the following question guidelines:

Table 3.1 Interview Guidelines

INTERVIEW GUIDELINES	
Indicators	**Question**
Internal	How long does this investment want to take? Is there a deadline or do you want to do it for the long term?

Cost	From each commodity option, please explain the processing cost according to the experience of PT. Mekar Saluyu Group in processing these two commodities?
	What about the means of production of each commodity? Can you please explain the price of the tool used and the depreciation value?
Income	How much is produced from each commodity per hectare in a year and what about the export selling price of each commodity?
	From this investment, how long (in a year) is expected by PT. Mekar Saluyu Group to get back investment capital?
Knowledge	Is PT. Does Mekar Saluyu Group have an understanding in the field of capital budgeting and the SPK ELECTRE method?
Additional	Is PT. Mekar Saluyu Group is willing to share its financial statements when processing the two commodities for the purposes of this research?

In compiling and preparing effective interview protocols or guidelines, researchers use a Framework which was introduced by Milagros Castillo-Montoya in his journal entitled "**Preparing for Interview Research: The Interview Protocol Refinement Framework**". Framework It consists of four phases, each of which will help the researcher to develop a feasible and appropriate question instrument to be given to the research subject (James et al., 2014). The four phases described by Milagros Castill-Montoya are described as follows:

Phase 1: Ensure that the interview questions are aligned with the formulation of the problem in the study. This phase emphasizes the importance of alignment so that researchers can eliminate questions that are not correlated or not in harmony with the formulation of the problem in the research and only ask questions that are really important to be asked to the research subject.

Phase 2: Create an interview instrument with investigation-based questions. In this case, according to Rubin & Rubin (2012), building a conversation while conducting an investigation requires caution and hard work. In this second phase, researchers can develop investigation-based questions in four ways, namely 1) interview questions are written differently from the questions in the research (which are contained in the problem formulation), 2) they are carried out in a fluid manner like in everyday conversations while still following social rules, 3) they provide various questions, and 4) they provide questions that have the potential to be given impromptu follow-up questions. Researchers can also use knowledge and norms that are appropriate to the interview subject in order to be able to write questions that are easy to understand.

Phase 3: Collect feedback on the interview guidelines containing the question instruments that have been created. Feedback related to this can be obtained from asking colleagues, assistants or research supervisors to review and read the questions carefully in order to provide feedback on how to write, the structure of the questions, and the level of comprehensiveness of the questions.

Phase 4: Conduct a trial interview. After conducting the previous three phases, the last step in this framework is to test the question instruments that have been created for research interviews with research sources or research subjects.

2. Secondary data

According to Sugiyono (2019:137), secondary data is data that is not obtained directly from related parties as a source of data, such as through other people's intermediaries, documents, and so on. The secondary data in this study was obtained from various documents in the form of journals, paper, and credible news coverage as a reference. The secondary data needed in this study includes data that does not originate from or were not created by the subject being studied, but is very important to be considered into the calculation Capital budgetinglike tax ratio and inflation rate.

Location and Time of Research

The research location in this Final Project Report is in the West Java area, precisely at the location of PT. Mekar Saluyu Group which is located at Jalan Padalarang Cisarua Sidangsari 04/08, Pasirhalang, Cisarua District, West Bandung Regency, West Java 40551. Meanwhile, the research time plan is described as follows:

Table 3.2 Research Time Plan

Activity Stages	Research Time						
Moon	November	December	January	February	March	April	May
Sunday	1-4	1-4	1-4	1-4	1-4	1-4	1-4
Determining the Research Topic							
Initial Data Collection							
Creating Research Methods							
Research Proposal Seminar							
Research							
Preparation of Final Project Report							
Exam Session							

Data Processing Engineering

Data processing techniques refer to the approach or method that researchers will use when they have collected the required data. The selection of data processing techniques is adjusted to the formulation of the problem, the nature of the data to be processed, and the analysis to be

achieved. The approach to the data analysis technique in this Final Project Report is described as follows:

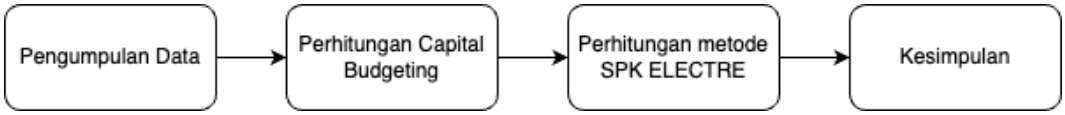

Figure 3.1 Data Processing Method

In this research, as explained in the background section, the researcher will use five calculation criteria Capital budgeting to process the data that has been collected from the research subjects, namely the PB and ARR calculation criteria as part of the calculation technique non-DCF capital budgeting and NPV, PI, and ARR criteria as calculation criteria Capital budgeting DCF technique using the discount method Cost of Debt Because the investment that wants to be made is only using debt funding. Furthermore, the data will also be processed using the SPK ELECTRE method. In the calculation using the SPK ELECTRE method, the five calculation criteria Capital budgeting need to be symbolized in order to be included in the equation as described in Chapter 2. Here is the sampler:

Table 3.3 Symbol of SPK ELECTRE Method Criteria

It	Criterion	Symbol
1.	ARR	C1
2.	PB	C2
3.	NPV	C3
4.	PI	C4
5.	IRR	C5

In addition, in the calculation using the SPK ELECTRE method, it is also necessary to have a component of the level of importance of the criteria or the weight of each criterion and sub-criteria that will be used in the calculation of the SPK ELECTRE method. In this Final Project report, the weighting of each criterion and sub-criteria is obtained from the results of opinions and calculations of experts and academics in the relevant field. In a journal written by Bhatnagar and Kumar (2022) with the title **"Decision-Making for Capital Budgeting with Using Electre and Copras Methods of Multi-Criteria",** experts and academics are asked to give a weighted assessment of each criterion used, which is further symbolized by Wc or weight of criteria and they are also asked to provide a weight assessment of each sub-criterion, namely the discount sub-criteria and the discount sub-criteria which are further symbolized by Wsc or Weitgh of sub-criteria. This weighting takes into account the expert severe weighting method, which refers to the equation

$$\sum_{j=1}^{5} W = 1 \qquad (3.1)$$

Here is the weighting:

Table 3.4 Weight of SPK ELECTRE Method Sub-criteria

Symbol	Criterion	Toilet	WSC
C1	ARR	0.3 (Non-discount	0.4
C2	PB	technical subcriteria)	0.6
C3	NPV	0.7 (Discount	0.5
C4	PI	Engineering Subcriteria)	0.2
C5	IRR		0.3

Source: Journal "Decision-Making for Capital Budgeting with Using Electre and Copras Methods of Multi-Criteria"

To get the total weight further denoted by Wj or Ultimate weight, is by the following equation:

Wj: Wsc . Toilet (3.2)

So that the results of the Wj from each criterion are presented as follows:

Table 3.5 Weights of criteria for the SPK ELECTRE Method

Symbol	Criterion	Wj
C1	ARR	0.12
C2	PB	0.18
C3	NPV	0.35
C4	PI	0.14
C5	IRR	0.21
Total		1

Source: Journal "Decision-Making for Capital Budgeting with Using Electre and Copras Methods of Multi-Criteria"

The value of the weight that has been processed can then be used in the calculation of the SPK ELECTRE method for decision-making Capital budgeting PT. Mekar Saluyu group.

RESULT AND DISCUSSION

4.1.3 Calculation of SPK ELECTRE Method

The ELECTRE Decision Support System (SPK) calculation is used to assist decision-making on decision options that have multiple criteria. In this case, the calculation of SPK ELECTRE is expected to support the results of the calculation Capital budgeting and give a more comprehensive view to PT. Mekar Saluyu Group as decision maker. To calculate the SPK ELECTRE, data such as alternative options and criteria are needed to consider decision-making. The data on the criteria and alternatives are taken from the calculation Capital budgeting which has been calculated previously and each criterion is given a symbol to facilitate the calculation of SPK ELECTRE. Here is the description:

Table 4.7 Description of SPK ELECTRE Calculation Symbols

Criterion	Symbol	Alternative	
		Sweet Potato	Curly Chili
IRR	C1	17%	22%
PB	C2	2,1	2,0
NPV	C3	IDR 479,749,000	IDR 1,407,747,000
PI	C4	1,8	1,9
ARR	C5	48%	51%

In addition, the weight of the criteria is also needed to calculate the SPK ELECTRE. Generally, the weight of the criteria is determined by the Decision Maker Because the weight of the cheritaria is a personal preference that is relative. However, because the owner of PT. Mekar Saluyu Group did not have an understanding of this, so the researcher decided to use the weighting criteria made by the experts in a journal entitled "**Decision-Making for Capital Budgeting with Using Electre and Copras Methods of Multi-Criteria"** as explained in Chapter 3. Here is the description:

Table 4.8 Criterion Weights

Symbol	Criterion	Wj
C1	ARR	0,12
C2	PB	0,18
C3	NPV	0,35
C4	PI	0,14
C5	IRR	0,21
Total		1

From the data in table 4.7 and table 4.8, the SPK ELECTRE can be calculated by the following steps:

1. Decision Matrix Normalization

To normalize the decision matrix, the following formula is required:

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m} x_{ij}^2}} untuk\ i = 1, 2, 3, \dots, m\ dan\ j = 1,2,3, \dots, n.$$

Here are the calculations:

Table 4.9 Normalization Results of Sets

	Data	Normalization
x1	$\sqrt{(+)}\mathbf{17^2 22^2}$	**27,80**
R11	17/27,80	0,61
R21	22/27,80	0,79

x2	$\sqrt{(+)2,1^2 2,0^2}$	**2,90**
R12	2,1/2,90	0,72
R22	2,0/2,90	0,69
x3	$\sqrt{(+)479749^2 1407747^2}$	**1487249**
R13	479749/1487249	0,32
R23	1407747/1487249	0,95
x4	$\sqrt{(+)1,8^2 1,9^2}$	**2,62**
R14	1,8/2,62	0,69
R24	1,9/2,62	0,73
x5	$\sqrt{(+)48^2 51^2}$	**70,04**
R15	48/70,04	0,69
R25	51/70,04	0,73

]\=Next is to arrange each of these elements into the R matrix.

$$R = \begin{bmatrix} 0.61 & 0.72 & 0.32 & 0.69 & 0.69 \\ 0.79 & 0.69 & 0.95 & 0.73 & 0.73 \end{bmatrix}$$

2. Normalization of Weighted Decision Matrix

The normalized matrix will then be multiplied by the predefined weights (w) on table Z to obtain the normalization of the weighted decision matrix. The normalization of the weighted decision matrix will be referred to as the V matrix.

Table 4.10 Weighted Normalization Results

Normalization		Weight	Weighted Normalization
R11	0,61	0,12	0,07
R21	0,79		0,09
R12	0,72	0,18	0,13
R22	0,69		0,12
R13	0,32	0,35	0,11
R23	0,95		0,33
R14	0,69	0,14	0,10
R24	0,73		0,10
R15	0,69	0,21	0,14
R25	0,73		0,15

So, here is the weighted decision matrix:

$$V = \begin{bmatrix} 0.07 & 0.13 & 0.11 & 0.10 & 0.14 \\ 0.09 & 0.12 & 0.33 & 0.10 & 0.15 \end{bmatrix}$$

3. Defining the Concordance and Discordance sets

a. Concordance

In the calculation of SPK ELECTRE, concordance refers to the level of conformity between the criteria and alternatives. A set is said to be concordance when:

Ckl = {j, vkj ≥ vlj}, for j = 1, 2, 3, ... , n.

So that the sets included in the concordance are:
C12 = {2,3}
C21 = {1, 3, 4, 5}

b. Discordance

In contrast to concordance, discordance refers to the inconsistency between criteria and alternatives. A set is said to be discordance when:

Dkl = {j, vkj < vlj}, for j = 1, 2, 3, ... , n.

So that the sets that are included in the disconcordance are:
D12 = {1,3,5}
D21 = {2}

4. Calculating the concordance and discordance matrices

After determining the condordance and discordance sets, the next step is to calculate the matrix of each group.

a. Concordance

The way to calculate concordance is to add each weight of the set included in the concordance. Here's the summation:
C12 = {2,3} = 0.18 + 0.35 = 0.53
C21 = {1, 3, 4, 5} = 0.12 + 0.35 + 0.14 + 0.21 = 0.82

So the concordance matrix is:

$$C = \begin{bmatrix} - & 0.53 \\ 0.82 & - \end{bmatrix}$$

b. Discordance

The method of calculating disaccordance is more complex compared to calculating concordance. The discordance calculation is done in the following way:

$$d_{k,l} = \frac{\max\{|v_{k,j} - v_{l,j}| \; ; j \in D_{k,l}\}}{\max\{|v_{k,j} - v_{l,j}|; \text{setiap } j\}}$$

D12 = {1,3,5}
d12 =

$$\frac{max\ \{|0.07 - 0.09|\}; \{|0.11 - 0.33|\}; \{|0.14 - 0.15|\}}{max\{|0.07 - 0.09|\}; \{|0.13 - 0.12|\}\{|0.11 - 0.33|\}; \{|0.10 - 0.10|\}; \{|0.14 - 0.15|\}}$$

d12 =

$$\frac{max\ \{0.02; 0.22; 0.01\}}{\max\{0.02; 0.01; 0.22; 0; 0.01\}}$$

d12 = $\frac{0.22}{0.22} = 1$

D21 = {2}
d21 =

$$\frac{max\ \{|0.13 - 0.12|\}}{max\{|0.07 - 0.09|\};\{|0.13 - 0.12|\}\{|0.11 - 0.33|\};\{|0.10 - 0.10|\};\{|0.14 - 0.15|\}}$$

d21 = $\frac{max\ \{0.01\}}{\max\{0.02; 0.01; 0.22; 0; 0.01\}}$

d21 = $\frac{0.01}{0.22} = 0.041$

Thus the discordance matrix is as follows:

D = $\begin{bmatrix} - & 1 \\ 0.041 & - \end{bmatrix}$

5. Determining the Dominant Matrix of Concordance and Discordance

The dominant matrix in concordance and discordance is used to evaluate the conformity or non-conformity between the alternative and the existing criteria by using the threshold value or threshold value set to determine whether a criterion or the result of an evaluation is qualified or not.

a. Concordance

Threshold concordance value:

$\underline{c} = \underline{c} = \underline{c} = \frac{\sum_{k=1}^{m}\sum_{l=1}^{m} c_{k,l}}{m(m-1)}$ $0.67\frac{0.53 + 0.82}{2(2-1)}$

After getting the threshold value, the next step is to compare the concordance matrix (C) with the threshold value ($\underline{C}$). If C ≥ $\underline{C}$ then it will be expressed as 1, but if C < $\underline{C}$ it will be expressed as 0. The dominant matrix of concordance will be expressed as the matrix F as follows:

F = $\begin{bmatrix} - & 0 \\ 1 & - \end{bmatrix}$

b. Discordance

Discord threshold value:

$\underline{d} = \frac{\sum_{k=1}^{m}\sum_{l=1}^{m} d_{k,l}}{m(m-1)}$

$\underline{d} = \frac{1+0.041}{2(2-1)} =$ 0.52

To determine the discordance dominant matrix, the same method is used as determining the concordance dominant matrix. The discordance dominant matrix is expressed with the G matrix as follows:

G = $\begin{bmatrix} - & 1 \\ 0 & - \end{bmatrix}$

6. Determining the Agregate Dominance Matrix (ADM)

ADM is obtained from the multiplication of matrix F and matrix G. ADM will be expressed as matrix E. The following is the calculation:

E_{12} = x = 0 x 1 = 0 $F_{12}G_{12}$
E_{21} = x = 1 x 0 = 0 $F_{21}G_{21}$

So the matrix is as follows:

$$E = \begin{bmatrix} - & 0 \\ 0 & - \end{bmatrix}$$

7. Less Favorable Alternative Elimination

This stage is the last stage of the SPK ELECTRE work process. From the E matrix we can interpret it as follows:

When E_{kl} = 1, then the k alternative is better than the l alternative. However, if = 0, it indicates that no alternative has been selected and the result will be determined using the C and D matrices. E_{kl}

In the ADM matrix that has been calculated previously, it can be seen that = 0 and = 0, so it can be interpreted that there is no selected alternative from this calculation and the next ranking will use the C matrix and D matrix to calculate the $E_{21}E_{12}$net inferior value and net superior value.

$$C = D = \begin{bmatrix} - & 0.53 \\ 0.82 & - \end{bmatrix} \begin{bmatrix} - & 1 \\ 0.041 & - \end{bmatrix}$$

Net Inferior Value:
C1 = 0.53 – 0.82 = -0.29
C2 = 0.82 – 0.53 = 0.29

Net Superior Value:
D1 = 1.00 – 0.041 = 0.959
D2 = 0.041 – 1.00 = -0.959

Alternative	C_{kl}		D_{kl}	Rank of the Net superior values	Rank of the Net superior values
Sweet Potato	-0.29	-	0.959	2	2
Curly Red Chili	0.29	-	-0.959	1	1

1.2. Recommendations for Making Investment Decisions Using Capital Budgeting and SPK ELECTRE

In the previous section, each investment option or alternative that PT. Mekar Saluyu Group, namely sweet potatoes and curly red peppers using the Capital budgeting which was assisted by SPK ELECTRE. The next stage is to match the calculation results Capital budgeting with the results of the calculation of SPK ELECTRE. The matching of these two calculations is carried out so that the researcher can provide accurate recommendations on the selection of investment options that have the potential to generate the most profit within the planned five-year life of the project. For this reason, the researcher summarized the results of the calculations of the two methods into a separate table as follows:

Table 4.11 Results of Capital Budgeting Calculation

Criterion	Alternative 1	Comparison	Alternative 2
	Sweet Potato		Curly Chili
IRR	17%	<	22%
PB	2,1	<	2,0
NPV	IDR 479,749,000	<	IDR 1,407,747,000
PI	1,8	<	1,9
ARR	48%	<	51%

From the following table, it can be seen that both investment options are equally profitable and feasible to implement. Each component of the results of the Capital budgeting shows positive numbers and in accordance with the criteria of PT. Mekar Saluyu Group. However, considering that the purpose of this calculation is to find the most profitable investment option, alternative two or curly chili commodity is the chosen option.

Table 4.12 Results of SPK ELECTRE Calculation

SPK ELECTRE	
Rank	**Alternative**
1	Curly Red Chili
2	Sweet Potato

Furthermore, by using SPK ELECTRE to be able to determine the ranking based on the matching of criteria with existing alternatives, it was found that the curly red chili alternative or option is better than the sweet potato option with the curly red chili ranking position being at number one and sweet potato being ranked second. From the table of the results of the two methods, it can be seen that each calculation shows that curly red chili is superior to sweet potato. The compatibility of these two methods is enough to convince the researcher to provide recommendations for decision-making on the investment plan of PT. Mekar Saluyu Group.

CONCLUSION

Based on the results of the primary and secondary data processing process to help PT. Mekar Saluyu Group determined the right investment choice, the researcher concluded that the calculation of the ELECTRE Decision Support System (SPK) had results identical to the results of the calculation Capital budgeting using the criteria of ARR, PB, NPV, PI, and IRR by both showing more positive results on curly red chili commodities compared to sweet potatoes. Therefore, the researcher recommends PT. Mekar Saluyu Group to choose to invest in curly red chili commodities compared to sweet potato commodities. In addition, this research also proves that SPK ELECTRE can help and support decision-making on various issues, including problems in the financial sector, especially Capital budgeting as presented in this Final Project Report.

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