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Simple additive weighting for online platform evaluations in small business

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ABSTRACT

Choosing the appropriate online selling platform as a small or medium-sized firm (SME) can help grow sales and expand customer base. Using decision-making approaches with the Simple Additive Weighting (SAW) method, you can select the greatest option among multiple alternatives while selecting the best sales platform. This research aims to assist MSMEs in evaluating and assessing online sales platforms based on the assessment criteria of Average transactions (C1), Unsuccessful transactions (C2), Transaction time (C3), Ease of use of the application (C4), Application errors (C5), and Satisfaction in usage features (C6). The results indicated that alternative A4, Instagram, was the greatest alternative online sales platform, followed by alternative A2, Go Food, as the second-ranking alternative, alternative A3, Grab Food, as the third-ranking alternative, and alternative A1, WhatsApp, as the fourth-ranking alternative. Analysis of the final results can be explained by the tendency of the most prioritized criteria with high criteria weight values, namely the average transaction criteria (C1), ease of use (C4), and application user feature satisfaction (C6), to influence the final results of alternative ranking; the final results of ranking can certainly serve as an alternative option for MSME decisions regarding the selection of online sales platforms.

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1. INTRODUCTION

In today's digital era, online selling platforms are crucial for small and medium-sized businesses (SMBs) to expand their market and increase sales. When selecting an e-commerce platform, SMBs must examine a variety of criteria, including pricing, reach, and the capacity to attract potential clients (Fauzi et al., 2023). One of the reasons it is essential for MSMEs to identify the best online selling platform is that it may help grow

their business's reach. With the correct online selling platform, micro, small, and medium-sized enterprises (MSMEs) can reach clients worldwide without needing physical locations in every area. This might improve exposure and create new sales opportunities (Muhammad Wali et al., 2023; Sanusi et al., 2020; Sutrisno, Jodi, et al., 2023).

As a small and medium business (MSMEs) owner, choosing the right online sales platform can have a significant impact on business success. In choosing an online sales platform, MSMEs must consider various factors such as costs, features, and the ability to reach potential customers(Suprianto et al., 2022). To assist in this process, decision-making techniques can be used to make more informed and wiser decisions. In addition, choosing the right online sales platform can also help MSMEs save costs. Several online sales platforms, such as marketplaces and social platforms, allow MSMEs to open online stores at relatively lower costs compared to opening physical stores(Astaginy, 2019). This can help MSMEs save on operational costs and focus their resources on developing their products and services. Online sales platforms also enable MSMEs to reach potential customers more effectively(Astaginy, 2017; Nurdiani & Alie, 2022). In contrast to traditional platforms such as print or radio advertising, online sales platforms allow MSMEs to target more specific customers based on their preferences, location or online shopping behavior.(Sutrisno et al., 2022). This can help MSMEs create more effective marketing campaigns and generate more sales.

The various advantages of using an online sales platform for MSMEs can certainly provide significant benefits for MSMEs in carrying out business operations, but the problem that occurs is determining an online sales platform that is in accordance with the characteristics of the MSME business. decision-making techniques are needed to support decision makers to produce the best alternative sales platforms. several studies have tried to help the online platform selection process for SMEs by(Wati et al., 2018)which applies the Fuzzy method in an online promotion platform for MSMEs, with a decision-making technique, each assessment criterion is needed by MSMEs in determining the online platform(Alfaridzi et al., 2020; Sudipa et al., 2020)can be adjusted to the alternative online platform assessment that will be selected(Prayudi et al., 2021), further research by(Sofyawan & Fernandes, 2018)which applies the TOPSIS method in determining the best e-commerce, in order to obtain a ranking of e-commerce options that can be recommended from the results of decision making(Muqtadir et al., 2022; Wijaya et al., 2022).

One of the decision-making techniques that can be applied in the selection of online sales platforms is the Simple Additive Weighting (SAW) method. In the SAW method, each factor that is relevant in choosing an online sales platform is given a weight based on its level of importance. Then, each platform is evaluated based on these factors, and the total value of each platform is calculated(Ahlamiyah et al., 2022). The platform with the highest rating can then be selected as the best. So that this study aims to assist MSMEs in conducting evaluations and assessments, especially for online sales platforms that are in accordance with the assessment criteria.

2. RESEARCH METHOD

2.1. Management Decision Making

The management decision-making process consists of the stages managers take to make sound business judgments. Numerous variables and aspects, such as risks, costs, resources, and corporate objectives, are frequently involved in management decisions(Shortliffe & Sepúlveda, 2018).The management decision-making process aids managers in making sensible and effective judgments in pursuit of organizational objectives(Daheri et al., 2022; Sululing et al., 2018). Several steps can be involved in the decision-making process, including: Problem recognition: Identifying the problem or circumstance that demands a decision is the first step in the management decision-making process. These challenges or scenarios might originate from a variety of factors,

including financial issues, market competition, or the necessity for product development. Collecting information: After identifying the issue or condition, the following stage is to collect pertinent data(Astaginy et al., 2022; SONO, 2020). This data can be gathered from a variety of sources, including financial accounts, market data, and staff interviews. Consider the information: Once the data has been obtained, the subsequent stage is to review the data(Astuty & Udin, 2020; Sutrisno, Karyono, et al., 2023). This data should be reviewed and compared in order to make the best conclusion possible. Consider other options: After evaluating the information, the following stage is to examine alternative options. These options should be chosen depending on organizational objectives, values, and preferences. After evaluating the choices, the last step is to select the optimal solution. This decision should be founded on the analysis and evaluation of relevant data, as well as examination of other options.

The management decision-making process can help managers make successful and efficient choices(Nurdiani, 2022). However, this procedure is not always straightforward and frequently involves numerous complex variables and elements. Therefore, it is essential for managers to take their time during the decision-making process and collect the appropriate data in order to make the optimal choice. To ensure long-term success, managers should evaluate the company's business objectives and core values when selecting the optimal solution.

2.2. Simple Additive Weighting (SAW) Method

Multi Attribute Decision Making uses SAW to choose several alternatives and find the best value against the evaluation criteria(Kaliszewski & Podkopaev, 2016; Yanti et al., 2021). The SAW technique sums up each alternative's weighted performance rating and normalizes the choice matrix depending on the criteria(I Gede Iwan Sudipa, 2018). Summarizing the normalized matrix multiplied by each criterion weight yields the final value. The SAW method calculates a 0–1 value(Wang, 2015)Stages include:

1. Determination of alternative values on each criterion

The calculation is shown in equation (1):

$$NK = \sum(SK * X) \quad (1)$$

Information :
NK : The total value of each criterion
SK : Sub-criteria value
X : The preference weight

2. Create a decision matrix

The decision matrix is made based on the number of elements (n) criteria and the number of alternatives.

3. Matrix Normalization

The matrix normalization process is intended to change the alternative suitability rating value to a value scale of 0 to 1 according to the nature of the attribute. Calculations for normalizing the matrix are shown in equation (2).

rij = if the nature of the attribute includes profit $\frac{Xij}{MaxXij}$ (2)

rij = if the nature of the attribute includes costs $\frac{MinXij}{Xij}$

Information :
rij = alternative performance rating on each normalized attribute
MaxXi $_j$ = maximum value of elements in each attribute
MinXij = minimum element value in each attribute
Benefits = if the attribute properties include profit and the greatest value is the best

cost = if the attribute properties include cost and the smallest value is the best

4. Calculation of final grades and ranking

Calculation of the final value using a normalized performance rating (rij) of each alternative Ai on the attribute where Cj, starting from i = 1.2, up to the m and j = 1.2, up to the nth. The calculation of the preference value for each alternative (Vi) is shown in equation (3).

$$V_i = \sum_{j=1}^{n} w_j r_{ij} \quad (3)$$

Information :

Vi = final value or alternative preference ranking

wj = attribute weight value

rij = normalized performance rating value

The result of the most optimal value of Vi indicates that alternative Ai is selected.

2.3. Decision Making Model

The model proposed in this study uses the SAW method. At the stage of the decision-making model using the SAW method, data on alternative online sales platforms and data on the selection assessment criteria used in the process are needed. The decision-making model can be seen in Figure 1 below.

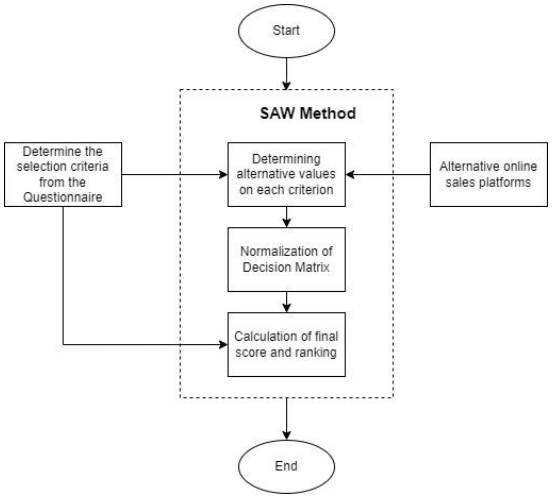

Figure 1. Decision Making Model Flowchart

In Figure 1 it can be explained that the decision making process begins with determining the criteria and alternatives used in the process of calculating alternative values for each criterion of the SAW method. The criteria and the weight of the criteria were obtained from an online questionnaire given to MSMEs in the culinary field by random sampling(Sugiyono, 2017), to find out the consideration of the assessment parameters when choosing an online sales platform. When giving consideration to the criteria, there are several alternative online sales platforms listed as alternative choices. After the criteria and alternatives are determined, the alternative values for each criterion are determined by modeling the criteria attributes. The process of the SAW method then determines the normalization of the decision matrix based on the nature of the cost or benefit criteria to be able to determine the tendency of the nature of the criteria, the final process of the method is to rank the values by calculating the normalized value of the matrix multiplied by the weight of the criteria that have been determined. The following is a table of questionnaire questions for SMEs which can be seen in table 1 below.

Table 1. Criteria Determination Questionnaire

Number	Question	Criteria Description	Criteria Type
1	How many transactions were successfully sold on sales media during a month?	Transaction average	Benefits
2	How many failures during the transaction process in the sales media?	Unsuccessful transaction	cost
3	How many days will it take to finish a transaction processing in sales?	Transaction time	cost
4	How easy is a sales transaction process on sales media?	Ease of use of the application	Benefits
5	How often do errors occur in the sales media that used?	Application errors	cost
6	The level of user satisfaction in general in use sales media as a whole	Satisfaction in use features	Benefits

In table 1 it can be explained that there are 6 online questionnaire questions given to MSMEs, each question is then analyzed and becomes an assessment criterion, namely the average transaction (C1),Unsuccessful transaction (C2), Transaction time (C3), Ease of use of the application (C4), Application error (C5) and Satisfaction in use features (C6). Each criterion is determined by the nature of the criteria based on the tendency for the value to be greater, the better, which is called the type of benefit, or the smaller the value, the better, which is called the type of cost.

3. RESULTS AND DISCUSSIONS

3.1. Analysis of Assessment Criteria and Attributes

The application of the online sales platform evaluation decision model for MSMEs using the SAW method is intended to obtain optimal ranking results. The assessment criteria data consists of six criteria, namely the average transaction (C1),Unsuccessful transaction (C2), Transaction time (C3), Ease of use of the application (C4), Application error (C5) and Satisfaction in use features (C6).The criterion weight value is determined by percentage. Table 2 provides specific information about the criteria.

Table 2. Criteria details

Criteria	Criteria Name	Manual Weight	Criteria Type
C1	Transaction average	0.25	Benefits
C2	Failed transaction	0.10	cost
C3	Transaction time	0.15	cost
C4	Ease of use of the application	0.20	Benefits
C5	Application errors	0.10	cost
C6	Satisfaction in use features	0.20	Benefits

For each criterion, the attribute value is then determined. On criteriaThe average transaction (C1) is determined by the average number of transactions each month, which is then scored using a Likert scale. Attribute value criteria C1 can be seen in table 3 below.

Table 3. Attribute Value of Criteria C1

Average number of transactions	Information	Scoring Value
1-20	Very less	1
21-40	Not enough	2
41-60	Enough	3
61-80	Well	4
81-100	very good	5

Criteria attribute valueFailed transaction(C2). Can be seen in Table 4 below.

Table 4. Attribute Value of Criteria C2

The number of failed transactions	Information	Scoring Value
13-15 times	Very less	5
10-12 times	Not enough	4
7-9 times	Enough	3
4-6 times	Well	2
0-3 times	very good	1

Criteria attribute valueTransaction time(C3). Can be seen in Table 5 below.

Table 5. Attribute Value of Criteria C3

Transaction time	Information	Scoring Value
9-10 days	Very less	5
7-8 days	Not enough	4
5-6 days	Enough	3
3-4 days	Well	2
0-2 days	very good	1

Criteria attribute valueEase of use of the application(C4). Can be seen in Table 6 below.

Table 6. Attribute Value of Criteria C4

Ease of use of the application	Information	Scoring Value
Not easy	very good	5
Less Easy	Well	4
Quite easy	Enough	3
Easy	Not enough	2
Very easy	Very less	1

Criteria attribute valueApplication errors(C5). Can be seen in Table 7 below.

Table 7. Attribute Value of Criteria C5

Application Errors	Information	Scoring Value
13-15	Very less	5
10-12	Not enough	4
7-9	Enough	3
4-6	Well	2
0-3	very good	1

Criteria attribute valueSatisfaction in use features(C6). Can be seen in Table 8 below.

Table 8. Attribute Value of Criteria C6

Application Feature Satisfaction	Information	Scoring Value
Very Satisfied	very good	5
Satisfied	Well	4
Quite satisfied	Enough	3
Less satisfied	Not enough	2
Not satisfied	Very less	1

3.2. Alternative Value Analysis

Alternative MSME online sales platforms are determined based on the 5 largest online platforms based on study literature(Muqtadir et al., 2022; Wijaya et al., 2022), then a

comparison was made with the platform used by MSME respondents. there are 4 alternative online sales platforms namely Whatsapp (A1), Go food from the application (A2), Grab Food (A3), and Instagram (A4). This alternative will be used for problem solving and decision making in the process of recommending the best online sales platform for MSMEs. Alternative rating values on the criteria can be seen in Table 9 below.

Table 9. Alternative values for each criterion

Alternatives	Alternative Name	Criteria					
		C1	C2	C3	C4	C5	C6
A1	Whatsapp	32 times	7 times	1 day	Very easy	5 times	satisfied
A2	Go Food	57 times	11 times	1 day	easy	9 times	Very satisfied
A3	GrabFood	44 times	15 times	1 day	easy	11 times	Very satisfied
A4	Instagram	36 times	8 times	2 days	Very easy	2 times	Very satisfied

3.3. Decision Matrix Normalization

The process of normalizing the decision matrix begins with scoring alternative values for each criterion based on the attribute values for each criterion. In order to obtain an alternative value for each criterion that has been scored alternative values. Alternative performance rating values for each criterion can be seen in table 10 below.

Table 10. Alternative Performance Rating Values

Alternatives	Alternative Name	Criteria					
		C1	C2	C3	C4	C5	C6
A1	Whatsapp	2	3	1	5	2	4
A2	Go Food	3	4	1	4	3	5
A3	GrabFood	3	5	1	4	4	5
A4	Instagram	2	3	1	5	1	5

Then carry out the matrix normalization process based on the nature of the criteria which can be seen in Table 2. The matrix normalization value (X) is calculated using equation (2) based on the characteristics of the benefit and cost criteria. The decision matrix can be seen in the following matrix.

$$X = \begin{bmatrix} 0.67 & 1 & 1 & 1 & 0.5 & 0.8 \\ 1 & 0.75 & 1 & 0.8 & 0.33 & 1 \\ 1 & 0.6 & 1 & 0.8 & 0.25 & 1 \\ 0.67 & 1 & 1 & 1 & 1 & 1 \end{bmatrix}$$

3.4. Calculation of Final Value

Calculation of the final value of alternative online sales platforms for MSMEs is obtained from the value of the normalized decision matrix which is then multiplied by the weight value of the criteria in Table 2. In determining the final alternative value, use equation (3). So that the results of the final calculation of the alternative (V) are obtained as follows.

V1 = (0.67 *0.25) + (1*0.1) + (1*0.15) + (1*0.2) + (0.5*0.1) + (0.8*0.2) = 0.827
V2 = (1 *0.25) + (0.75*0.1) + (1*0.15) + (0.8*0.2) + (0.33*0.1) + (1*0.2) = 0.868
V3 = 1 *0.25) + (0.6*0.1) + (1*0.15) + (0.8*0.2) + (0.25*0.1) + (1*0.2) = 0.845

V4 = (0.67 *0.25) + (1*0.1) + (1*0.15) + (1*0.2) + (1*0.1) + (1*0.2) = 0.912

Based on the results of calculating the total alternative value (V), it is possible to rank the alternative values from the largest value to the smallest value. Can be seen in Table 11 below.

Table 11. Final Value of Alternative Ranking

Alternatives	Alternative Name	Mark	ranking
A4	Instagram	0.912	1
A2	Go Food	0.868	2
A3	Grab food	0.845	3
A1	Whatsapp	0.827	4

In Table 11 it can be explained that the results of calculating the final value of the SAW method have an A4 alternative, namely Instagram as the best alternative online sales platform with a value 0.912, followed by alternative A2, namely Go Food as the 2nd ranking alternative with a value of 0.868, followed by alternative A3, namely Grab Food as the 3rd ranking alternative with a value of 0.845, and alternative A1 namely Whatsapp as the 4th rank with a value of 0.827. The ranking results prove that the decision model using the SAW method can be used in evaluating online sales platforms for MSMEs. Analysis of the final results can be explained by the tendency of the most priority criteria with high criteria weight values, namely the criteria for average transactions (C1), ease of use (C4) and satisfaction of application user features (C6) affecting the final results of ranking alternatives,

4. CONCLUSION

The conclusion of this study is that the application of the SAW method has been proven to be able to complete the determination of evaluation decisions based on online sales platforms for MSMEs. The assessment criteria data consists of six criteria, namely the average transaction (C1),Unsuccessful transaction (C2), Transaction time (C3), Ease of use of the application (C4), Application error (C5) and Satisfaction in use features (C6).The research results showInstagram as an alternative to the best online sales platform with value 0.912. The final results of ranking alternative online sales platforms can certainly be an alternative decision choice for MSMEs in determining sales platforms that are adjusted to predetermined assessment criteria to produce objective decisions. Suggestions for further research are to apply the weighting method and add alternatives from the online platforms being evaluated.

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