Multi-Attribute Utility Theory (MAUT) Method for Selecting the Best Affiliate Marketing

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Abstract-
Background: Digital marketing has become crucial for companies to remain relevant and grow. One common marketing strategy used is through collaboration with affiliate marketing. However, many companies still need help selecting the best affiliate marketing, often relying on subjective approaches.
Objective: This research aims to develop a Decision Support System (DSS) using the MAUT method to choose the best affiliate marketing in the digital marketing industry.
Methods: This research method involves applying the MAUT method to identify normalization value variations among affiliate marketing options, resulting in a ranking of affiliate marketers.
Result: The results of this research show that Sugiharto, Rifan Jauhari, and Nina Dwi Lestari rank the highest, with respective preference values of 0.8750 and 0.8625.
Conclusion: The developed DSS successfully manages affiliate marketing data, providing valuable information for decision-making processes. This study contributes significantly to data management and marketing and has potential applications in various business contexts.

Keywords: Affiliate Marketing; Decision Support System; Multi-Attribute Utility Theory.

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1. INTRODUCTION

The rapid advancement of information technology, such as the Internet of Things, smart cities, big data, and artificial intelligence (AI), has significantly transformed the business landscape. In an era marked by volatility, uncertainty, complexity, and ambiguity (VUCA) [1]. Digital marketing has become a crucial key for companies to remain relevant and thrive [2]. Digital marketing can be described as a term that has been used for a long time, is not associated with any specific expert or year in its definition, and is constantly evolving [3]. Collaboration with affiliate marketing is among the commonly used digital marketing strategies [4]. Affiliate marketing is a business model where individuals become affiliates to sell a company's products or services to earn a commission. The commission amount varies depending on the percentage and selling price of the products. Many companies still rely on subjective approaches, often leading to inefficient and time-consuming decisions. The problem concerns the challenges of selecting the most suitable affiliate marketing options, underscoring the need for a decision support system. By leveraging a decision support system, companies can overcome the subjectivity and inefficiencies that often plague the commission assessment process. It will also help mitigate risks such as fraud, ensuring that companies maximize results while safeguarding against potential threats.

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Decision Support Systems (DSS) are recognized as tools that can assist companies in making better decisions [5]. DSS has been successfully applied in various industries to provide quick and accurate solutions. One promising approach is the Multi-Attribute Utility Theory (MAUT) method [6]. The MAUT method, a powerful tool in decision-making, allows the integration of several variables into decisions based on the preferences and behavior of decision-makers. This method allows efficient and accurate calculations without requiring conversion to fuzzy numbers, providing distinct advantages in the decision-making process. The ability to handle many variables and easy calculations makes it a valuable asset in decision-making [7].

Previous studies conducted by A Ferico Octaviansyah Pasaribu with the title of decision support system for determining the best customers using profile matching [8]. Another study was conducted by Agusta Praba Ristadi Pinem with the title of decision support system for determining the industry's location based on the Moora method [9]. Additionally, research by Federico Pitsalitz Sabandar with the title Decision Support System for Determining the Best Products using the Weighted Product Method [10]. There is research by Arjun Nainggolan with the title Decision Support System for Sales Marketing Performance Index Assessment applying the Moora method [11]. Some **gaps** have not been resolved by previous research, namely the absence of specific research focusing on selecting the best affiliate marketing in the digital marketing industry. While previous studies have explored decision support systems for different aspects of business operations, the unique challenges and requirements of affiliate marketing in the digital realm have not been adequately addressed. **Novelty** this study aims to fill the research gap by developing a decision support system specifically tailored for selecting the best affiliate marketing strategies in the digital marketing industry. By incorporating factors such as evolving technologies, digital trends, and performance metrics unique to affiliate marketing, this research provides a new perspective and practical tools for enhancing decision-making in this dynamic sector.

This research aims to utilize the MAUT method to analyze various best affiliate marketing options and provide a clear framework for decision-makers to select the most optimal affiliate marketing strategy. **The contribution** of this reasear are to facilitate informed and efficient decision-making in selecting the best affiliate marketing by developing a website to visualize the final decision based on utility value. Ultimately, the aim is to increase knowledge in this area and support policymakers in making strategic choices that maximize utility and effectiveness.

2. RESEARCH METHOD

2.1. Types of Research and Algorithms Used

In this research, real data from PT. Mubarokcorp Digital Indonesia is a startup operating in the digital sector with a focus on digital product sales services, web development, and digital marketing. The research method employed is a deductive method with a quantitative approach, explaining the relationship among the parameters of product sales, affiliate marketing experience, digital marketing knowledge, communication, creativity, work ethics, analysis, resilience, adaptability, and reliability. These aspects are analyzed using the MAUT method and implemented into an output website that can provide clear visualization for assessing the best affiliate marketing selection. The deductive method is chosen because this study refers to existing theories to develop a decision support system application model. The quantitative approach is utilized as the research focuses on calculating the values of variables and attributes.

The MAUT method is a quantitative method used as the basis for decision-making through a systematic procedure that identifies and analyzes multiple variables. Measurement and weighting are done by considering each type of context as an attribute item. MAUT method provides a framework for making optimal evaluation decisions. The result of this method is a ranking of alternative evaluations depicting decision-makers choices [12].

The MAUT method can provide solutions from several alternatives by comparing each alternative by determining the weight value and priority value for each parameter [13]. The overall research outcome is developing a web-based application to identify the best affiliate marketing selection based on parameters and

calculations using the MAUT method. The calculation stages with the MAUT method by [14] consist of five stages. In the first stage, the alternatives and variables are determined. The second stage involves determining the weight of variables. The third stage is creating a normalization matrix. The fourth stage is multiplying the normalized matrix by the weight of variables. The fifth stage is ranking or categorization.

The form of the representation theorem for some attribute value functions is determined by a set of conditions for decision-makers, with the following equation shown in Equation (1).

$$V(x) = \sum_{i=n}^{n} wi.vi(x) \tag{1}$$

Explanation:

$V(x)$	=	Total evaluation score for alternative -x
wi	=	Relative weight of variable i
$vi(x)$	=	Evaluation result of attribute (variable) i for alternative x
i	=	Index to indicate variable
n	=	Number of variables

The function $vi(x)$ is a representation and a crucial value function for attribute i. Weight wi is not just a number but a determinant of the importance of element one over other elements. And n is not just a count but a key factor in the number of elements [15]. Next, the total weight process is not just a step but a significant operation, using Equation (2) as follows.

$$\sum_{i=1}^{n} wi = 1 \tag{2}$$

Explanation:

wi	=	Weight of relative variable i
i	=	Index to indicate variable
n	=	Number of variables

The next step involves normalizing the matrix and multiplying the normalized matrix with relative weights to determine the results of each Value, as shown in Equation (3).

$$U(x) = \frac{x - xi^{-}}{xi^{+} - xi^{-}} \tag{3}$$

Explanation:

$U(x)$	=	Utility value of each alternative variable x
x	=	Value of each alternative variable x
$xi-$	=	Worst Value of variable i among all alternatives
$xi+$	=	Best Value of variable i among all alternatives

2.2. Research Stages

This research develops a website-based application using the PHP (Hypertext Preprocessor) programming language. The decision support system application for selecting the best affiliate marketing consists of several stages, namely: (1) problem identification stage, (2) information needs definition, (3) system requirements analysis, (4) system implementation, and (5) system testing and evaluation.

1. Problem Identification Stage

   The problem identification stage involves studying literature and field studies to observe the workflow of affiliate marketing. A literature review is conducted to understand better affiliate marketing, the MAUT

method, and decision support systems. The literature study is carried out by reading books, scientific journals, online articles, and relevant sources of information. The findings of the literature study will serve as a reference for selecting relevant variables.

2. Definition of Information Needs

At this stage, information needs are collected to develop a decision support system application. The data used in this study is primary data obtained from observations, data analysis, archives, books, and other documentation. The population in this study uses a purposive sampling technique, where several affiliate marketers with significant performance and contributions were selected. Subsequently, 65 affiliate marketing data were selected using a random sampling method, where 65 affiliate marketers were randomly chosen from the registered list in the population. The variables used in this study include product sales, affiliate marketing experience, digital marketing knowledge, communication, creativity, work ethics, analysis, pressure resilience, adaptation, and reliability. The predetermined variables are used to determine the importance level of each variable based on the weight values to identify the best affiliate marketers. The variables and weight values are shown in Table 1.

Table 1. Variables and Variable Weights

No	Variable	Weight
1	Product sale	0,30%
2	Affiliate marketing experience	0,10%
3	Digital marketing knowledge	0,10%
4	Communication	0,10%
5	Creativity	0,10%
6	Work ethic	0,10%
7	Analysis	0,05%
8	Resistant to pressure	0,05%
9	Adaptation	0,05%
10	Reliability	0,05%

The next step is to determine the priority of attributes for each variable. Each attribute is assigned a weight, as shown in Table 2.

Table 2. Attributes and Attribute Weights

No	Variable	Attribute	Weight
1	Product sale	> 40 Sales	5
		31 - 40 Sales	4
		21 - 30 Sales	3
		11 - 20 Sales	2
		0 - 10 Sales	1
2	Affiliate marketing experience	> 9 Years	5
		7 years	4
		5 years	3
		3 years	2
		1 year	1
3	Digital marketing knowledge	Very high	5
		High	4
		High Enough	3
		Not high enough	2
		Very Less High	1
4	Communication	Very good	5
		Good	4
		Quite good	3
		Not good	2
		Very Not Good	1

No	Variable	Attribute	Weight
5	Creativity	Very creative	5
		Creative	4
		Quite Creative	3
		Less Creative	2
		Very Less Creative	1
6	Work ethic	Totality	5
		Consistent	4
		Normal	3
		Limited	2
		Violation	1
7	Analysis	Very good	5
		Good	4
		Pretty good	3
		Not good	2
		Very Not Good	1
8	Resistant to pressure	Very Resistant	5
		Stand	4
		Just Hold On	3
		Less resistant	2
		Very less durable	1
9	Adaptation	Very easy	5
		Easy	4
		Quite easy	3
		Not Easy	2
		Very Less Easy	1
10	Reliability	Very satisfied	5
		Satisfied	4
		Quite satisfied	3
		Less satisfied	2
		Very Dissatisfied	1

3. System Analysis

   This stage involves analyzing the data requirements for system processing and determining the data flow for designing a database by creating a conceptual data model (CDM) and a physical data model (PDM). The next step is constructing a unified modeling language (UML) to define the use case diagram (UCD) in the developed decision support system. The description of the use case diagram illustrates how the process management occurs during usage. The unified modeling language reflects the processes during system usage [16–18].

4. System Implementation

   This stage involves implementing the decision support system application process, which includes data entry and program coding processes using the PHP programming language.

5. System Testing and Evaluation

   At this stage, testing is conducted on the code generated during the coding phase to ensure that all planned features from the planning phase are functioning as expected. Testing of the decision support system application is done using the black-box method. The black-box testing method enables software developers to create a set of input conditions that will test a program's functional requirements. Testing is performed by selecting several modules with various data types to ensure that the program only accepts input with correct data types. In case of any errors in the system, they will be rectified.

3. RESULTS AND ANALYSIS

The process of developing a decision support system application for selecting the best affiliate marketing is designed using the PHP programming language. The results of designing a decision support system are as follows.

3.1. User Interface

1. Login Menu

   This form provides access rights to the admin to utilize the system and the user to view the results. The login form consists of a username, password, and login button. The login button processes whether the username and password are correct in the system. The login menu is shown in Figure 1.

Figure 1. Login Menu

2. Dashboard Menu

   The initial display page of the decision support system application features a main menu, as depicted in Figure 2.

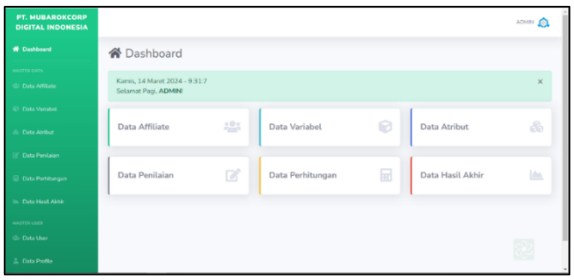

Figure 2. Dashboard Menu

3. Affiliate Data Menu

   Administrators can access a list of affiliate marketing data along with details such as the affiliate's name, email, phone number, membership, and status. The display page for the affiliate data menu is shown in Figure 3.

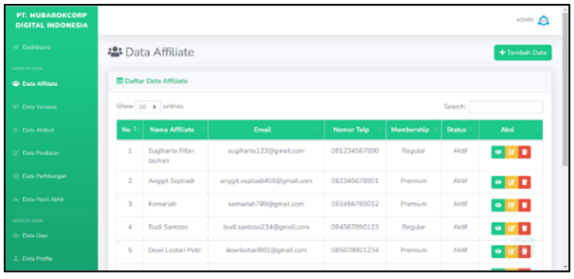

Figure 3. Affiliate Data Menu

4. Variable Data Menu

The menu manages the variables utilized in the affiliate marketing assessment process. Important variables, which will serve as the basis for the assessment, can be added, edited, or deleted as required. The page displays the variable data menu, as shown in Figure 4.

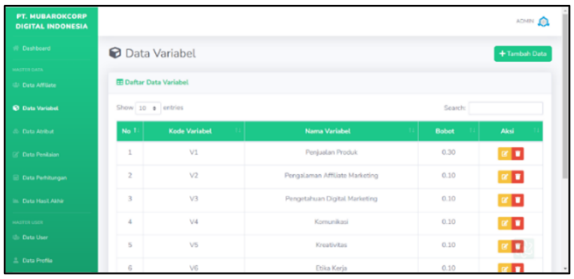

Figure 4. Variable Data Menu

5. Attribute Data Menu

The menu is used to manage attribute data related to each variable in the system. Administrators can add, edit, and delete attributes as needed. The attribute data menu page is displayed as shown in Figure 5.

Figure 5. Attribute Data Menu

6. Assessment Data Menu

In the assessment data menu page, the administrator is presented with a list of relevant variables that need to be evaluated. Each variable is related to a specific aspect. The administrator can input or update attribute values for each listed variable based on the observed or evaluated performance. The page layout is illustrated in Figure 6.

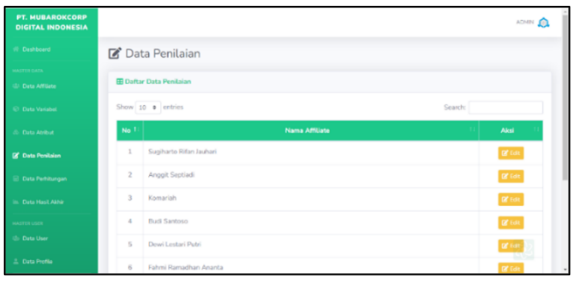

Figure 6. Assessment Data Menu

7. Calculation Data Menu

Administrators can view the calculation results derived from predetermined variables and have access to crucial elements such as decision matrices, normalized matrices, variable weights, and the outcomes of

multiplying the normalized matrix by variable weights. The calculation data display page is illustrated in Figure 7.

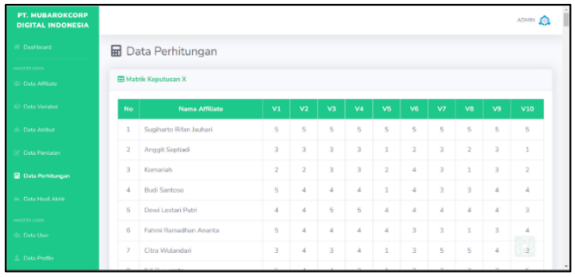

Figure 7. Calculation Data Menu

8. Final Data Menu

The administrator can view a list of affiliate marketing along with their preferences and rankings and print the ranking results data in a PDF file format. The display page of the final results data menu is shown in Figure 8.

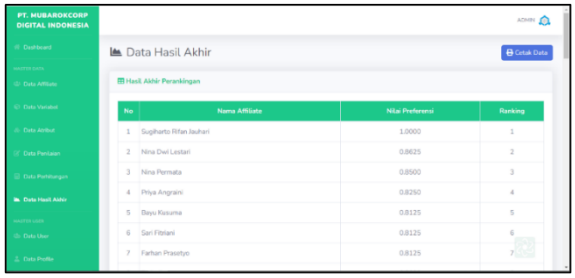

Figure 8. Final Data Menu

3.2. Analysis Results

This study utilizes affiliate marketing data as an alternative to determining the best affiliate marketing. The variables employed in this study encompass product sales, affiliate marketing experience, digital marketing knowledge, communication, creativity, work ethics, analytical skills, stress tolerance, adaptability, and reliability. The predetermined variables are utilized to determine each variable's importance level based on the weight values used to identify the best affiliate marketing. The list of variables and the weights of each variable can be seen in Table 1. The next step is to determine the attribute priorities for each variable. Each attribute is assigned a weight value, as shown in Table 2. Subsequently, normalization of the matrix is conducted using Equation (3). Table 3 displays the Decision Matrix (X), which is the core value representing the absolute preferences of the decision-makers.

Table 3. Decision Matrix X

No	Affiliate Marketing Name	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10
1	Sugiharto Rifan Jauhari	5	4	3	4	4	5	5	5	5	5
2	Anggit Septiadi	3	3	3	3	1	2	3	2	3	1
3	Komariah	2	2	3	3	2	4	3	1	3	2
4	Budi Santoso	5	4	4	4	1	4	3	3	4	4
5	Dewi Lestari Putri	4	4	5	5	4	4	4	4	4	3
6	Fahmi Ramadhan Ananta	5	4	4	4	4	3	3	1	3	4
7	Citra Wulandari	3	4	3	4	1	3	5	5	4	3
8	Edi Purwanto	5	4	4	3	1	3	3	2	2	5
9	Firdaus Alfarisi Azmi	4	3	5	4	5	5	3	2	2	3

No	Affiliate Marketing Name	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10
10	Grace Mulyani Indri	3	2	2	2	4	5	4	4	1	3
11	Hadi Purnomo	2	2	1	1	3	3	4	2	2	3
12	Indah Permata Sari	1	2	2	3	2	3	2	2	3	2
13	Joko Prabowo	2	3	3	3	2	4	4	5	1	5
14	Kartika Putri	1	1	1	3	2	4	5	3	5	5
15	Luthfi Hakim Ahmad	2	1	1	5	3	3	2	2	5	2
16	Melati Dian Angraini	2	2	3	3	2	5	2	1	4	2
17	Nurul Huda	4	2	5	5	4	4	3	2	5	5
18	Oki Setiana Septi	2	3	3	4	3	3	3	4	2	4
19	Linda Puspita Sari	3	3	3	3	4	2	2	4	5	4
20	Qori Nurul Istiqomah	2	4	5	3	2	3	3	2	4	4
21	Reni Pratiwi Dewi	2	2	3	3	3	5	4	2	5	3
22	Surya Adi Nugraha	3	3	4	4	4	5	2	2	3	4
23	Tiara Angraini	4	2	2	3	3	4	4	3	4	3
24	Ufi Fatmawati	1	2	1	2	2	2	3	2	3	2
25	Vino Aditya Baskara	2	2	3	2	2	3	2	2	3	1
26	Widya Ningsih	2	2	3	3	4	4	3	4	4	1
27	Yudianto Wibowo Putro	2	2	2	3	5	4	5	4	4	4
28	Zahra Fitria	3	4	4	3	3	3	3	3	3	3
29	Adi Nugroho	2	2	2	2	4	3	2	2	3	2
30	Bella Saputri	4	3	3	4	3	4	2	4	3	4
31	Candra Wijaya	3	3	4	4	5	5	5	3	4	3
32	Dini Rahmawati	3	3	4	4	4	5	5	4	5	5
33	Erwin Saputra	5	4	4	3	4	5	3	3	4	1
34	Indah Farida Sari	3	3	4	5	3	5	3	3	4	4
35	Gilang Prasetyo	4	3	4	5	3	4	3	4	5	3
36	Hanifah Nurul	4	3	4	4	2	5	3	5	4	4
37	Ilham Perdana	3	3	5	4	2	3	4	5	4	5
38	Julianti Putri	2	4	3	5	5	4	4	5	3	3
39	Karya Santoso	3	3	3	3	3	5	4	4	4	4
40	Linda Wulandari	3	4	4	1	5	3	4	5	4	3
41	Nisa Ayu	4	5	3	4	2	3	4	2	4	5
42	Oki Pratama	4	5	4	4	2	5	4	4	4	4
43	Priya Angraini	5	5	5	4	4	4	4	3	2	3
44	Qori Ramadhani	3	5	4	4	3	4	3	4	4	4
45	Reva Ayu	4	4	3	5	4	5	3	3	5	2
46	Zaki Muhammad Bagus	3	5	4	5	3	3	4	5	3	4
47	Anisa Putri	5	4	3	5	3	4	4	2	5	2
48	Farhan Prasetyo	4	3	4	5	5	5	5	4	4	4
49	Nina Dwi Lestari	5	4	5	3	4	5	4	4	4	5
50	Rafiq Pratama	4	5	5	4	4	4	4	5	2	5
51	Muhammad Ridwan	2	1	1	1	1	1	1	1	1	1
52	Yulia Rahayu	5	3	3	1	2	2	2	3	4	5
53	Rudi Hartono	1	2	3	5	1	3	3	4	4	5
54	Winda Pratiwi Ihsani	2	4	3	5	2	4	4	4	5	2
55	Bayu Kusuma	4	4	5	4	5	4	4	4	4	5
56	Sari Fitriani	4	4	4	5	4	5	4	4	5	4
57	Fajar Wijaya Kusuma	3	3	3	5	4	5	5	5	5	3
58	Ratna Sari	4	4	4	3	3	4	4	4	4	5
59	Aldi Perdana	4	4	3	5	3	5	3	4	5	3
60	Sinta Putri	2	2	2	5	2	4	2	4	3	5
61	Hendra Pratama	1	2	2	4	2	3	4	5	5	3
62	Dewi Septiana	1	2	4	5	4	5	4	4	3	3
63	Andi Kurniawan	3	3	3	4	3	4	3	3	2	5
64	Nina Permata	3	4	4	5	5	5	4	5	5	4

No	Affiliate Marketing Name	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10
65	Rizki Saputra	3	5	4	4	5	5	5	4	3	5
	Point A+	5	5	5	5	5	5	5	5	5	5
	Point A-	1	1	1	1	1	1	1	1	1	1

Table 4 presents alternative data post-normalization. From the normalization of the product sales variable on 65 alternatives, it is known that the lowest normalization value is 0 to 6 affiliate marketing. In contrast, the highest normalization value for the product sales variable is 1 to 9 affiliate marketing. In normalizing the affiliate marketing experience variable on 65 alternatives, it is known that the lowest normalization value is 0 to 3 affiliate marketing. In contrast, the highest normalization value for the affiliate marketing experience variable is 1 to 7 affiliate marketing.

In normalizing the affiliate marketing knowledge variable on 65 alternatives, it is known that the lowest normalization value is 0 to 5 affiliate marketing. In contrast, the highest normalization value for the affiliate marketing knowledge variable is 1 to 9 affiliate marketing. In normalizing the communication variable for 65 alternatives, it is known that the lowest normalization value is 0 to 4 affiliate marketing. In contrast, the highest normalization value for the communication variable is 1 to 17 affiliate marketing. In normalizing the creativity variable on 65 alternatives, it is known that the lowest normalization value is 0 to 6 affiliate marketing. In contrast, the highest normalization value for the creativity variable is 1 to 9 affiliate marketing. In normalizing the work ethics variable on 65 alternatives, it is known that the lowest normalization value is 0 to 1 affiliate marketing. In contrast, the highest normalization value for the work ethics variable is 1 to 22 affiliate marketing.

In normalizing the analysis variables for 65 alternatives, it is known that the lowest normalization value is 0 to 1 affiliate marketing. In contrast, the highest normalization value for the analysis variable is 1 to 9 affiliate marketing. In normalizing the variable resistance to pressure on 65 alternatives, it is known that the lowest normalization value is 0 to 4 affiliate marketing. In contrast, the highest normalization value for the variable resistance to pressure is 1 to 12 affiliate marketing. In normalizing the adaptation variable to 65 alternatives, it is known that the lowest normalization value is 0 to 3 affiliate marketing. In contrast, the highest normalization value for the adaptation variable is 1 to 16 affiliate marketing. In normalizing the reliability variable on 65 alternatives, it is known that the lowest normalization value is 0 to 5 affiliate marketing. In contrast, the highest normalization value for the reliability variable is 1 to 17 affiliate marketing. For detailed information, please refer to Table 4.

Table 4. Multiplication Matrix

No	Affiliate Marketing Name	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10
1	Sugiharto Rifan Jauhari	1	0.75	0.5	0.75	0.75	1	1	1	1	1
2	Anggit Septiadi	0.5	0.5	0.5	0.5	0	0.25	0.5	0.25	0.5	0
3	Komariah	0.25	0.25	0.5	0.5	0.25	0.75	0.5	0	0.5	0.25
4	Budi Santoso	1	0.75	0.75	0.75	0	0.75	0.5	0.5	0.75	0.75
5	Dewi Lestari Putri	0.75	0.75	1	1	0.75	0.75	0.75	0.75	0.75	0.5
6	Fahmi Ramadhan Ananta	1	0.75	0.75	0.75	0.75	0.5	0.5	0	0.5	0.75
7	Citra Wulandari	0.5	0.75	0.5	0.75	0	0.5	1	1	0.75	0.5
8	Edi Purwanto	1	0.75	0.75	0.5	0	0.5	0.5	0.25	0.25	1
9	Firdaus Alfarisi Azmi	0.75	0.5	1	0.75	1	1	0.5	0.25	0.25	0.5
10	Grace Mulyani Indri	0.5	0.25	0.25	0.25	0.75	1	0.75	0.75	0	0.5
11	Hadi Purnomo	0.25	0.25	0	0	0.5	0.5	0.75	0.25	0.25	0.5
12	Indah Permata Sari	0	0.25	0.25	0.5	0.25	0.5	0.25	0.25	0.5	0.25
13	Joko Prabowo	0.25	0.5	0.5	0.5	0.25	0.75	0.75	1	0	1
14	Kartika Putri	0	0	0	0.5	0.25	0.75	1	0.5	1	1
15	Luthfi Hakim Ahmad	0.25	0	0	1	0.5	0.5	0.25	0.25	1	0.25
16	Melati Dian Angraini	0.25	0.25	0.5	0.5	0.25	1	0.25	0	0.75	0.25
17	Nurul Huda	0.75	0.25	1	1	0.75	0.75	0.5	0.25	1	1
18	Oki Setiana Septi	0.25	0.5	0.5	0.75	0.5	0.5	0.5	0.75	0.25	0.75

No	Affiliate Marketing Name	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10
19	Linda Puspita Sari	0.5	0.5	0.5	0.5	0.75	0.25	0.25	0.75	1	0.75
20	Qori Nurul Istiqomah	0.25	0.75	1	0.5	0.25	0.5	0.5	0.25	0.75	0.75
21	Reni Pratiwi Dewi	0.25	0.25	0.5	0.5	0.5	1	0.75	0.25	1	0.5
22	Surya Adi Nugraha	0.5	0.5	0.75	0.75	0.75	1	0.25	0.25	0.5	0.75
23	Tiara Angraini	0.75	0.25	0.25	0.5	0.5	0.75	0.75	0.5	0.75	0.5
24	Ufi Fatmawati	0	0.25	0	0.25	0.25	0.25	0.5	0.25	0.5	0.25
25	Vino Aditya Baskara	0.25	0.25	0.5	0.25	0.25	0.5	0.25	0.25	0.5	0
26	Widya Ningsih	0.25	0.25	0.5	0.5	0.75	0.75	0.5	0.75	0.75	0
27	Yudianto Wibowo Putro	0.25	0.25	0.25	0.5	1	0.75	1	0.75	0.75	0.75
28	Zahra Fitria	0.5	0.75	0.75	0.5	0.5	0.5	0.5	0.5	0.5	0.5
29	Adi Nugroho	0.25	0.25	0.25	0.25	0.75	0.5	0.25	0.25	0.5	0.25
30	Bella Saputri	0.75	0.5	0.5	0.75	0.5	0.75	0.25	0.75	0.5	0.75
31	Candra Wijaya	0.5	0.5	0.75	0.75	1	1	1	0.5	0.75	0.5
32	Dini Rahmawati	0.5	0.5	0.75	0.75	0.75	1	1	0.75	1	1
33	Erwin Saputra	1	0.75	0.75	0.5	0.75	1	0.5	0.5	0.75	0
34	Indah Farida Sari	0.5	0.5	0.75	1	0.5	1	0.5	0.5	0.75	0.75
35	Gilang Prasetyo	0.75	0.5	0.75	1	0.5	0.75	0.5	0.75	1	0.5
36	Hanifah Nurul	0.75	0.5	0.75	0.75	0.25	1	0.5	1	0.75	0.75
37	Ilham Perdana	0.5	0.5	1	0.75	0.25	0.5	0.75	1	0.75	1
38	Julianti Putri	0.25	0.75	0.5	1	1	0.75	0.75	1	0.5	0.5
39	Karya Santoso	0.5	0.5	0.5	0.5	0.5	1	0.75	0.75	0.75	0.75
40	Linda Wulandari	0.5	0.75	0.75	0	1	0.5	0.75	1	0.75	0.5
41	Nisa Ayu	0.75	1	0.5	0.75	0.25	0.5	0.75	0.25	0.75	1
42	Oki Pratama	0.75	1	0.75	0.75	0.25	1	0.75	0.75	0.75	0.75
43	Priya Angraini	1	1	1	0.75	0.75	0.75	0.75	0.5	0.25	0.5
44	Qori Ramadhani	0.5	1	0.75	0.75	0.5	0.75	0.5	0.75	0.75	0.75
45	Reva Ayu	0.75	0.75	0.5	1	0.75	1	0.5	0.5	1	0.25
46	Zaki Muhammad Bagus	0.5	1	0.75	1	0.5	0.5	0.75	1	0.5	0.5
47	Anisa Putri	1	0.75	0.5	1	0.5	0.75	0.75	0.25	1	0.25
48	Farhan Prasetyo	0.75	0.5	0.75	1	1	1	1	0.75	0.75	0.75
49	Nina Dwi Lestari	1	0.75	1	0.5	0.75	1	0.75	0.75	0.75	1
50	Rafiq Pratama	0.75	1	1	0.75	0.75	0.75	0.75	1	0.25	1
51	Muhammad Ridwan	0.25	0	0	0	0	0	0	0	0	0
52	Yulia Rahayu	1	0.5	0.5	0	0.25	0.25	0.25	0.5	0.75	1
53	Rudi Hartono	0	0.25	0.5	1	0	0.5	0.5	0.75	0.75	1
54	Winda Pratiwi Ihsani	0.25	0.75	0.5	1	0.25	0.75	0.75	0.75	1	0.25
55	Bayu Kusuma	0.75	0.75	1	0.75	1	0.75	0.75	0.75	0.75	1
56	Sari Fitriani	0.75	0.75	0.75	1	0.75	1	0.75	0.75	1	0.75
57	Fajar Wijaya Kusuma	0.5	0.5	0.5	1	0.75	1	1	1	1	0.5
58	Ratna Sari	0.75	0.75	0.75	0.5	0.5	0.75	0.75	0.75	0.75	1
59	Aldi Perdana	0.75	0.75	0.5	1	0.5	1	0.5	0.75	1	0.5
60	Sinta Putri	0.25	0.25	0.25	1	0.25	0.75	0.25	0.75	0.5	1
61	Hendra Pratama	0	0.25	0.25	0.75	0.25	0.5	0.75	1	1	0.5
62	Dewi Septiana	0	0.25	0.75	1	0.75	1	0.75	0.75	0.5	0.5
63	Andi Kurniawan	0.5	0.5	0.5	0.75	0.5	0.75	0.5	0.5	0.25	1
64	Nina Permata	0.5	0.75	0.75	1	1	1	0.75	1	1	0.75
65	Rizki Saputra	0.5	1	0.75	0.75	1	1	1	0.75	0.5	1

The next step involves calculating the normalized matrix multiplication, as shown in Table 4, using the variable weights indicated in Table 1. Determining each alternative's preferences and rankings is crucial in the next stage. The final decision should be based on the highest utility value, signifying that the best affiliate marketing option has the highest utility value. The results for each alternative can be observed in Table 5.

Table 5. Final Results Data

No	Affilate Marketing Name	Preference Value	Ranking
1	Sugiharto Rifan Jauhari	0.8750	1
2	Nina Dwi Lestari	0.8625	2
3	Priya Angraini	0.8250	3
4	Bayu Kusuma	0.8125	4
5	Sari Fitriani	0.8125	5
6	Farhan Prasetyo	0.8125	6
7	Rafiq Pratama	0.8000	7
8	Dewi Lestari Putri	0.7875	8
9	Nina Permata	0.7750	9
10	Anisa Putri	0.7625	10
11	Rizki Saputra	0.7625	11
12	Erwin Saputra	0.7625	12
13	Oki Pratama	0.7500	13
14	Reva Ayu	0.7375	14
15	Aldi Perdana	0.7375	15
16	Nurul Huda	0.7375	16
17	Fahmi Ramadhan Ananta	0.7375	17
18	Firdaus Alfarisi Azmi	0.7250	18
19	Budi Santoso	0.7250	19
20	Ratna Sari	0.7125	20
21	Gilang Prasetyo	0.7125	21
22	Dini Rahmawati	0.7125	22
23	Fajar Wijaya Kusuma	0.7000	23
24	Hanifah Nurul	0.7000	24
25	Candra Wijaya	0.6875	25
26	Qori Ramadhani	0.6625	26
27	Nisa Ayu	0.6625	27
28	Zaki Muhammad Bagus	0.6625	28
29	Indah Farida Sari	0.6500	29
30	Edi Purwanto	0.6500	30
31	Bella Saputri	0.6375	31
32	Ilham Perdana	0.6250	32
33	Julianti Putri	0.6125	33
34	Surya Adi Nugraha	0.6125	34
35	Karya Santoso	0.6000	35
36	Linda Wulandari	0.6000	36
37	Tiara Angraini	0.5750	37
38	Yulia Rahayu	0.5750	38
39	Citra Wulandari	0.5625	39
40	Andi Kurniawan	0.5625	40
41	Zahra Fitria	0.5500	41
42	Linda Puspita Sari	0.5375	42
43	Winda Pratiwi Ihsani	0.5375	43
44	Yudianto Wibowo Putro	0.5125	44
45	Dewi Septiana	0.5000	45
46	Grace Mulyani Indri	0.5000	46
47	Qori Nurul Istiqomah	0.4875	47
48	Reni Pratiwi Dewi	0.4750	48
49	Oki Setiana Septi	0.4625	49
50	Joko Prabowo	0.4625	50
51	Widya Ningsih	0.4500	51
52	Sinta Putri	0.4500	52
53	Anggit Septiadi	0.3875	53

No	Affilate Marketing Name	Preference Value	Ranking
54	Melati Dian Angraini	0.3875	54
55	Rudi Hartono	0.3750	55
56	Luthfi Hakim Ahmad	0.3625	56
57	Hendra Pratama	0.3625	57
58	Komariah	0.3625	58
59	Adi Nugroho	0.3375	59
60	Kartika Putri	0.3250	60
61	Vino Aditya Baskara	0.3000	61
62	Hadi Purnomo	0.2875	62
63	Indah Permata Sari	0.2375	63
64	Ufi Fatmawati	0.1750	64
65	Muhammad Ridwan	0.0750	65

The findings of this research are centered around the importance of ensuring the accuracy of calculations in decision support system applications that utilize the MAUT method. This study highlights three key approaches that can be utilized for this purpose: sensitivity testing, stability testing, and external validation. It is essential to ensure the accuracy of calculations in decision support system applications utilizing the MAUT method. Initially, sensitivity testing can be implemented by modifying the weights of variables or attributes to evaluate the effects of these adjustments on the results. Secondly, stability testing should be executed by repeating the calculation process to verify result consistency. Lastly, external validation can be conducted by applying the method to diverse datasets to validate its dependability and applicability across different contexts. This research results align with previous studies that emphasize the significance of accuracy in decision-support systems. Based on the results of these tests, this study is **in line** with research[10][11].

3.3. Black Box Testing

The following is the outcome of the functionality test carried out to assess the proper functioning of the decision support system that has been developed, as presented in Table 6.

Table 6. Black Box Testing

No	Process	Input	Output	Results
1	The system can validate usernames and passwords.	Admin enters username and password.	The admin has successfully entered the main menu, and a failed login notification will appear if there is an error in the username or password entered.	TRUE
2	The system is capable of displaying data.	Admin can manage affiliate marketing data.	Admins can manage affiliate marketing data, including adding, editing, and deleting.	TRUE
3	The system is capable of displaying variable data pages.	Admin can manage variable data.	Admins can manage variable data, including adding, editing, and deleting.	TRUE
4	The system can display the best affiliate marketing.	Admin selects the final results data menu and checks the ranking results.	Displays the best affiliate marketing rankings based on MAUT method calculations.	TRUE

Based on the results of the black box testing conducted on the system, it can be concluded that it has successfully passed a series of essential functional tests. Firstly, the system can validate usernames and passwords effectively, allowing the administrator to access the main menu successfully. Furthermore, the system also effectively displays notifications in case of login errors, indicating that the error detection mechanism is functioning properly. Additionally, the system has been adequately tested for displaying affiliate marketing data and variable data pages, enabling the administrator to manage such data smoothly, including adding, editing, and deleting data. Lastly, the system's ability to display the best affiliate marketing has also been demonstrated, with administrators able to assess rankings based on the MAUT method. Therefore, black box testing shows that the system operates as expected and is reliable for affiliate marketing-related activities

4. CONCLUSION

Risk management in choosing the best affiliate marketing involves carefully evaluating and selecting affiliate partners based on the highest-ranking value. Based on the results of the normalization matrix, there are variations in the normalized values for each observed variable, which indicates differences in performance and characteristics in the context of product sales, experience, and other relevant qualities. The study followed structured steps, which included matrix normalization and calculating preference values for each option. Following the process, ranking results for each affiliate marketing option were generated. These results indicate that Sugiharto Rifan Jauhari has the highest preference value, scoring 0.8750, followed by Nina Dwi Lestari, who scored 0.8625.

These findings offer valuable insights into the strengths and weaknesses of each affiliate marketing and suggest potential areas for improvement in marketing campaigns. The developed system effectively manages affiliate marketing data, aiding in selecting the best affiliate marketing based on predetermined variables. For future research, considering external factors and integrating Multi-Attribute Utility Theory with machine learning can enhance the accuracy of affiliate marketing predictions and decision-making. This research contributes significantly to data management and marketing, with the potential for further evolution and broader application in relevant business contexts. The study's innovative approach addresses research objectives by efficiently determining superior affiliate marketing options.

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