Journal of Computer Science and Information Technology
https://jcsitech-upiyptk.org/ojs
2023 Volume 9 Issue 3 Pg 138-142 e-ISSN: 2502-1486

Implementation of a Decision Support System for Selection of Used Motorbikes using the Simple Additive Weighting Method

Afridho Rahman [1]
[1] Putra Indonesia University YPTK Padang
afridhorahman0504@gmail.com

Abstract

Motorized vehicles are one of the means of transportation that is widely used in society. In a traffic jam, the motor can provide good mobility. Motorcycles are one of the primary needs for the middle-class economic community. The economic limitations of some people to buy a new motorbike are experiencing problems. So the alternative way is to choose to buy a used motorbike. Not a few consumers who want to buy a used motorcycle at a slightly cheaper price but with a quality brand. On the grounds of a lack of funds or simply wanting to replace a used motorbike, buying a used motorbike can be an option to meet these needs. The SAW method is a method that is often used to make a decision using a weighted algorithm and requires matrix normalization which has alternative rating scales available. To overcome existing problems, it is necessary to implement a decision support system in selecting the best used motorbike in order to provide a structured assessment that can help visitors in choosing the best used motorbike using the Simple Additive Weighting (SAW) method. With the existence of a decision support system for selecting used motorbikes that applies the SAW method, it is hoped that this system can help visitors choose the best used motorbike, can fulfill information needs relating to selecting the best used motorbike, and can answer and assist admins and visitors in solve the problem of selecting the best used motorcycle.

Keywords: Used Motorcycle, Decision Support System, Simple Additive Weighting Method, Scale, Alternative.

1. Introduction

The development of human activity requires the need for means of transportation. Means of transportation is a vehicle or transport that can take us to move from one place to another. In general, the types of transportation are divided into three, namely land transportation, water transportation, and air transportation. Of the various types of transportation, the type of land transportation is the most widely used means of transportation. [1]

The desire for transportation is something that is absolute in modern life. Transportation facilities, especially the ability of non-public transportation are needed by the community to transport various necessities of life every day. One of the most widely used means of land transportation by people in Indonesia is motorbikes, because apart from being more economical when compared to four-wheeled motorized vehicles, motorbikes have the advantage of being able to reach their destination more quickly. [2]

Motorized vehicles are one of the means of transportation that is widely used in society. In a traffic jam, the motor can provide good mobility. Motorcycles are one of the primary needs for the middle-class economic community. The economic limitations of some people to buy a new motorbike are experiencing problems. So the alternative way is to choose to buy a used motorbike. A used motorbike is a motorbike that someone buys in a new condition and has been used, then sells it to someone else .[3]

Not a few consumers want to buy a used motorbike at a slightly cheaper price but with a quality brand. On the grounds of a lack of funds or simply wanting to replace a used motorbike, buying a used motorbike can be an option to meet these needs. Most consumers are looking for used motorcycles priced between IDR 8 million and IDR 12 million per unit and currently the ones most in demand are automatic motorbikes, namely the Yamaha Mio, Honda Vario and Honda Beat. The price of a used motorbike varies depending on the brand and year of manufacture. Most people who want to find a used motorbike will first look for information about the price of a used motorbike through the internet or newspapers. This is not effective because it will waste a lot of time and money, especially if you have to find information on used motorbikes one by one but the results are not in accordance with your wishes and needs .[4]

Some people often experience problems buying a new motorbike due to economic limitations, so they choose to buy a used motorbike. Used motorbikes are motorbikes that have been owned by other people. The price of used motorbikes is generally cheaper than new motorbikes and is sold through used motorbike showrooms or offered directly by the owner. The types of used motorbikes sold at dealers include ducks, sports and automatic scooters of various brands and years. [5]

Accepted: 06-09-2023 | Revised: 07-06-2023 | Published: 07-31-2023 | doi: 10.35134/jcsitech.v9i3.77

Dealer/showroom is a business place to sell and buy vehicles. Here the author discusses CV. Baroda Motor located in Lubuk Begalung, Padang. CV. Baroda Motor sells many variants of used motorbikes, so this showroom is able to attract consumers. However, consumers are confused about choosing the motorbike that suits them because there are many motorbike variants in the CV. Baroda Motor. [6]

Information technology is increasingly developing and the increasing number of technology users influences people's lifestyles , especially computer use. Almost every activity in society today can be facilitated with a system that can be accessed via computer, for example for education, health and business. Business, especially in the sales business, is currently greatly helped by information technology. Sellers can promote the products they sell on the internet. Even though this can provide benefits and convenience for sellers and buyers, it sometimes makes it difficult for buyers to make their choices due to the large number of products they can access. [7]

As time goes by, the number of people interested in using motorbikes is increasing, the use of motorbikes among the community is very important to help people carry out their activities. Therefore, motorbike manufacturers compete in creating motorbikes with their own advantages and disadvantages so that the number of motorbikes is very large and also of various kinds. With these various choices, prospective buyers are faced with various criteria that influence when choosing a motorbike, for example engine condition, mileage, price, etc. There are many decision making methods that can help in decision making . [8] Due to these difficulties, many information systems have been built to make it easier for users to make decisions or are often called Decision Support Systems (DSS). [9]

A decision support system can be defined as a computer program that provides information in the application domain provided by a decision analysis model and access to a database, which is intended to support decision makers in making decisions effectively both in complex and complex conditions. unstructured. The decision making system is an inseparable part of the total organizational system. That organizational systems at least include physical systems (operational systems), management systems (decision systems), and information systems. [10]

2. Research methodology

The research framework created in this research methodology has the aim of getting the results as expected and making it easy to solve problems and easy to understand. The steps that will be taken in this research are arranged systematically. So a research framework is needed, where the research framework carried out is as shown in Figure. 1 below:

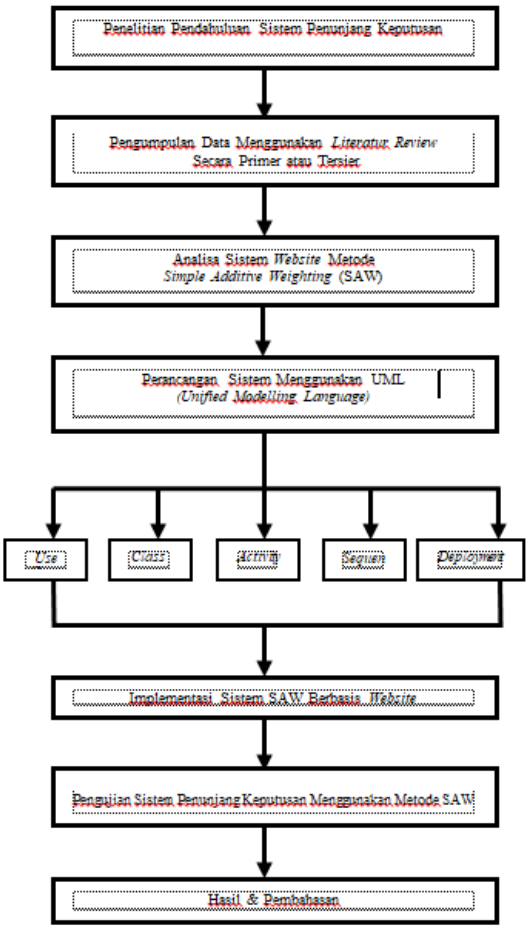

Figure 1. Research Framework

Research stages are steps that must be taken to make conducting research easier. The stages of this research are as follows:

2.1 Preliminary Research

Preliminary research is the first step in conducting research. The research was carried out at CV. Baroda Motor, selection of used motorbikes in Lubuk Begalung, Padang. Aims to help in choosing the best used motorbike on CV. Baroda Motor Lubuk Begalung, Padang.

2.2 *Data* Collection

In this research, data was collected from various sources by searching for references such as books, scientific works and journals, both in libraries and on the internet, which are related to research. Data was also obtained from field studies by direct observation and interviews.

2.3 Analysis

Based on the preliminary research described above, in this research data analysis can be carried out which aims to solve and find solutions in research precisely

and accurately. A decision support system using the Simple Additive Weighting (SAW) method can be used as a solution in solving existing problems, namely to assist decision making in selecting the best used motorbikes for customers at CV. Baroda Motor Padang. The system that will be created can help find and determine the selection of the best and quality used motorbikes for customers.

2.4 Planning

In system design, object-oriented modeling is carried out by designing the Unified Modeling Language (UML). At this stage, facts are collected that support the system design. Unified Modeling Language (UML) will be used as a tool in explaining the flow of program analysis.

2.5 Implementation

System implementation is a stage that is carried out when the designed system is ready to operate. Implementation is carried out with the aim of confirming the results of system design so that users can provide input (feedback) on system development.

2.6 Testing

At this testing stage monitoring is carried out or the use or function of the system that has been made which will be periodically audited the system . After the implementation phase is complete, the authors also conduct tests that aim to make corrections to the system that has been built based on the efficiency level of the system as a solution in solving the problems that have been formulated. Application testing is the final stage in carrying out testing in order to find out errors in the application.

2.7 Results and Discussion

This stage is the final stage of the research, namely making conclusions and suggestions from the research results that have been achieved.

3. Results and Discussion

The method used in the selection of used motorbikes is the Simple Additive Weighting (SAW) method, which is a calculation method that is carried out by determining alternatives, in which each alternative will be assessed based on criteria.

The Simple Additive Weighting (SAW) method is also known as the weighted addition method. The SAW method requires a process of normalizing the decision matrix to a scale that can be compared with all available alternatives.

To determine the selection of a used motorbike at CV Baroda Motor, it begins with the stage of checking the completeness of the requirements. After this stage, used motorbikes that meet the specified requirements will carry out the used motorbike selection process, where used motorbikes at CV Baroda Motor are an alternative. The alternatives can be seen in the table. 1.

Table. 1. Alternative

No	Alternative	Initials
1	Variant 110	A001
2.	CBS beats	A002
3	Scoopy	A003
4	Nmax	A004
5	Mio Soul	A005

The list of criteria is the conditions used to determine whether a used motorbike deserves to be the best or not. The criteria for Alternatives can be seen in Table. 2.

Table. 2. List of Criteria

Criteria Code	Criteria	Weight	Type
C 1	Price	0.25	*Cost* (-)
C 2	Year	0.15	*Benefits* (+)
C 3	Machine oil	0.20	*Cost* (-)
C 4	Engine (cc)	0.20	*Benefits* (+)
C5	Consumption	0.20	*Benefits* (+)

Information :

1. If the type of benefit criteria is then the bigger the better and the normalized MK is positive
2. If the type of cost criterion is smaller, the better and the normalized mk is negative.

For each criterion there is 1 criterion value. This criterion value describes how suitable an alternative is to a criterion. The weights of the criteria can be seen in the table. 3.

Table. 3. Criteria and weight

Criteria	Applicant Criteria	Mark
Price	Rp. 500000 - Rp. 12500000	1
	Rp.13000000 - Rp.15000000	2
	Rp.1550000-Rp.20000000	3
Year	2010-2013	1
	2013-2016	2
	2016-2022	3
Machine oil	1 Liter	1
	2 Litres	2
	2.5 Liters	3
Engine (cc)	108	1
	110	2
	150	3
Consumption (ml)	1 liter 40km	1
	1 liter 50km	2
	1 liter 60km	3

At the stage of creating a normalized matrix, a normalized decision matrix calculation is carried out, namely by dividing alternative weights, the worst (minimum) weight of the x-th criterion and the best (maximum) weight of the x-th criterion.

Data on the assessment of used motorbike selection was obtained through direct interviews with CV Baroda Motor which can be seen in Table 4.

Table 4. Alternative Values

Alternative	Criteria				
	C1	C2	C3	C4	C5
Variant 110	1	2	2	1	2
CBS beats	2	2	3	2	3
Scoopy	2	1	2	2	1
Nmax	1	2	2	1	2
Mio Soul	3	1	1	3	1

After all the value data has been obtained and the smallest and largest values have been determined, the next stage is to create a normalized matrix with the formula:

$$r_{ij} = \frac{x_{ij}}{\max x_{ij}} \qquad jika\ j\ atribut\ benefit$$

$$r_{ij} = \frac{\min x_{ij}}{x_{ij}} \qquad jika\ j\ atribut\ cost$$

Where r(ij) is the normalized weight value of alternative x, xi j- is the worst (minimum) weight and xi j is the best (maximum) weight of each x-th criterion. The following is the systematic calculation of the existing matrix normalization according to the previous explanation:

A001 = 1/ 1 = 1 A004 = 1/1 = 1

A002 = 1/ 2 = 0.5 A005 = 1/3 = 0.33

A003 = 1/ 2 = 0.5

A001 = 2/ 2 = 1 A004 = 2/2 = 1

A002 = 2/ 2 = 1 A005 = 1/2 = 0.5

A003 = 1/ 2 = 0.5

A001 = 1/ 2 = 0.5 A004 = 1/2 = 0.5

A002 = 1/ 3 = 0.33 A005 = 1/1 = 1

A003 = 1/ 2 = 0.5

A001 = 1/ 3 = 0.33 A004 = 1/3 = 0.33

A002 = 2/ 3 = 0.67 A005 = 3/3 = 1

A003 = 2/ 3 = 0.67

A001 = 2/ 3 = 0.67 A004 = 2/3 = 0.67

A002 = 3/ 3 = 1 A005 = 1/3 = 0.33

A003 = 1/ 3 = 0.33

So the results of matrix normalization for parts can be seen in Table. 5. below :

Table. 5. Matrix Normalization

Alternative	Criteria				
	C1	C2	C3	C4	C5
Vario 110	1.00	1.00	0.50	0.33	0.67
CBS Beats	0.50	1.00	0.33	0.67	1.00
Scoopy	0.50	0.50	0.50	0.67	0.33
Nmax	1.00	1.00	0.50	0.33	0.67
Mio Soul	0.33	0.50	1.00	1.00	0.33

The next stage will be multiplication of the normalized matrix with weights using the formula:

$$V(x) = \sum_{1=1}^{n} wj\ x\ Xij$$

Where V(x) is the evaluation value of the ith object and wj is the weight that determines the value of how important the ith element is to other elements. While n is the number of elements. The normalization matrix multiplication process for selecting used motorcycles is as follows:

A001 = 1 x 0.25 = 0.25 A004 = 1 x 0.25 = 0.25

A002 = 0.5 x 0.25 = 0.125 A005 = 0.333 x 0.25 = 0.083

A003 = 0.5 x 0.25 = 0.125

A001 = 1 x 0.15 = 0.15 A004 = 1 x 0.15 = 0.15

A002 = 1 x 0.15 = 0.15 A005 = 0.5 x 0.15 = 0.075

A003 = 0.5 x 0.15 = 0.75

A001 = 0.5 x 0.2 = 0.1 A004 = 0.5 x 0.2 = 0.1

A002 = 0.333 x 0.2 = 0.066 A005 = 1 x 0.2 = 0.2

A003 = 0.5 x 0.2 = 0.1

A001 = 0.333 x 0.2 = 0.066 A004 = 0.33 x 0.2 = 0.066

A002 = 0.666 x 0.2 = 0.133 A005 = 1 x 0.2 = 0.2

A003 = 0.66x 0.2 = 0.13

A001 = 0.667 x 0.2 = 0.133 A004 = 0.66 x 0.2 = 0.133

A002 = 1 x 0.2 = 0.2 A005 = 0.333 x 0.2 = 0.066

A003 = 0.333 x 0.2 = 0.066

The results of the calculation of the normalization matrix multiplication or the results of the preference values for selecting used motorbikes at CV Baroda Motor can be seen in Table 6.

Table. 6. Normalization of Result Calculations

Alternative	Criteria					Results	Rank
	C1	C2	C3	C4	C5		
Vario 110	**0.25**	0.15	0.10	0.07	0.13	0.70	1
CBS beats	0.25	0.15	0.10	0.07	0.13	0.70	2
Scoopy	0.13	0.15	0.07	0.13	0.20	0.68	3
Nmax	0.08	0.08	0.20	0.20	0.07	0.63	4
Mio Soul	0.13	0.08	0.08	0.13	0.07	0.50	5

From the calculation results of the Simple Additive Weighting (SAW) method above, it can be concluded that several alternatives that have the highest value are the Vario 110 motorbike and will be proposed as the best used motorbike.

4. In conclusion

After the existence of a decision support system for selecting used motorbikes that applies the SAW method, this system can help visitors choose the best used motorbike, can fulfill information needs regarding selecting the best used motorbike, and can answer and assist admins and visitors in solve the problem of choosing the best used motorbike.

References

[1] Siahaan, AM, Pane, DH, & Ginting, RI (2019). Decision Support System for Recommendations for Purchasing Used Motorbikes Using the ARAS Method. Cyber Tech Journal, 2(4). https://doi.org/10.53513/jct.v2i4.4038

[2] Hidayatulloh, S. (2020). Decision Support System for Selection of Used Motorcycles Using the TOPSIS Method. *Responsive Journal: Science Research and Informatics , 2* (1), 9-18. https://doi.org/10.51977/jti.v2i1.189

[3] Yuniantika, AS, & Hadikurniawati, W. (2021). Implementation of Selection of Used Motors Using the AHP-TOPSIS Method. INFORMATICS SCIENTIFIC JOURNAL, 9(01), 24-28. https://doi.org/10.33884/jif.v9i01.3708

[4] Meganuari, F., & Wismarini, T.D. (2022). Decision Support System for Selection of Used Motorcycles with WASPAS. Pixel: Scientific Journal of Computer Graphics, 15(1), 1-9. https://doi.org/10.51903/pixel.v15i1.630

[5] Arifin, NA (2020). Decision Support System for Selection of Used Motorbikes using AHP and SAW Methods (Case Study: Sahabat Motor). STRING (Technology Research and Innovation Writing Unit), 5(2), 160-170. http://dx.doi.org/10.30998/string.v5i2.7739

[6] Sipayung, EM Decision Support System for Selection of Used Motorbikes Using the Simple Additive Weighting (SAW) Method. JUSTIN (Journal of Information Systems and Technology), 11(2), 295-300. http://dx.doi.org/10.26418/justin.v11i2.56495

[7] Fazri, I. (2021). Application of the Multi Factor Evaluation Process (MFEP) Method in Collector Performance Assessment in Collecting Motorcycle Credit Funds. Journal of Computer Systems and Informatics (JSON), 2(2), 110-114. http://dx.doi.org/10.30865/json.v2i2.2449

[8] Surapati, U., & Septian, A. (2022). Classification of Decision Support Systems for Determining Growth and Development of Toddlers at Posyandu Kamal Tegal Grove Using the Simple Additive Weighting (Saw) Method. Journal of Education and Counseling (JPDK), 4(5), 1003-1013. https://doi.org/10.31004/jpdk.v4i5.6726

[9] Hermawan, L., & Felicia, A. (2017). Decision Support System for Selecting Clothing According to One's Character. JuSiTik: Journal of Communication Information Systems and Technology, 1(1), 33-42.

[10] Gusrianty, G., Oktarina, D., & Kurniawan, WJ (2019). Decision Support System Using the Promethee Method to Determine Customer Satisfaction in Used Motorcycle Sales. SYSTEMS: Journal of Information Systems, 8(1), 62-69. https://doi.org/10.32520/stmsi.v8i1.419