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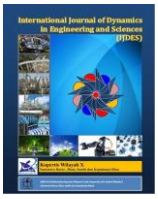

DECISION SUPPORT SYSTEMS IN SELECTION OF THE BEST SUPPLIERS AT RETAIL STORE USING SAW METHOD

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Abstract

The development of science and technology in today's modern age is growing so rapidly, the need for a fast, accurate piece of information is needed even more so in the field of commerce. As new productions present a wide range of products, the retail store has more exotic options to provide the product. Each individual characteristic has unique characteristics with its own strengths and weaknesses. It therefore needs to be done a way of determining or choosing effective, efficient continuity. The decision-making system (SPK) is an interactive computer-based system, which helps decision-makers utilize data and models to solve problems that are not structured and semistructured. The simple, equtive method (saw) is one that can be used in solving the problem of multiple attributes of decision making (madm). The simple method of weightriding (saw) is also often known by the term for the weightless count. The basic concept of the saw method is looking for the weightier sum of performance ratings on any alternative to all attributes. (see's method requires the normalizing of a decision matrix (x) to a scale that can be compared with all alternative levels present. According to the saw method of data processing, data deductions based on the category of goods from cigarettes found that supplier A1 in the category of cigarettes was the best with a value of 1.0434, and supplier A4 in the milk category was the best with a value of 0.8575. This would certainly make it easier for a retail store to determine and select the best items for her character needs.

Keywords: Decision Support System, Suppliers, Retail Store, Simple Additive Weighting (SAW).

1. Introduction

The modern age of science and technology is expanding so rapidly, the need for a fast, accurate piece of information is needed even more so in the field of commerce. To manage information requires good and sophisticated technologies such as data processing in a system that would make it easier for work to reduce human error [1].

As the presence of new suppliers offering a variety of products makes retail stores have more choices of suppliers to provide products. Each supplier has unique characteristics with their respective advantages and disadvantages.

Supplier is a company or institution that is willing to prepare the raw materials needed by the institution to produce both goods and services. Inappropriate selection of suppliers can have an impact on losses that will be experienced by the company such as inappropriate delivery estimates, the quality of goods not according to the order or the specified quality standards[10].

To overcome this problem, it is necessary to implement a Decision Support System (DSS) that is used to determine or select suppliers who are able to help retail leaders to meet product needs effectively and efficiently. Decision support systems (DSS) are interactive computer-based systems that help decision

makers utilize data and models to solve unstructured and semi-structured problems[2].

With the existence of a Decision Support System (DSS) using the SAW (Simple Addative Weighting) method, it is hoped that it can help retail stores in determining the best supplier in order to maintain loyalty and increase profits attributes

The Simple Additive Weighting (SAW) method is often also known as the weighted sum method. The basic concept of the SAW method is to find the weighted sum of the performance ratings for each alternative on all attributes. The SAW method requires a process of normalizing the decision matrix (X) to a scale that can be compared with all existing alternative ratings[4].

2. Theorical Basic

A. Defining System

The system is defined as an interrelated and interconnected set of procedures to perform a task together. Systems are a cluster of integrated elements with the same intent to achieve goals[2].

B. Decision Support System

Thus, decision support system has been defined as a subsidiary to the decision makers, to expand their capabilities, and not to take management into account[1]. The decision-making system (SPK) is an interactive computer-based system, which helps decision-makers utilize data and models to solve problems that are not structured and semistructured[3].

C. Simple Additive Weighting (SAW)

The simple, equtive method (saw) is one that can be used in solving the problem of multiple attributes of decision making (madm). The madm itself is a method employed to find the optimum alternative of some particular criteria. The method of saw instructs the decision-maker sets the weight for each attribute[7].

The simple method of weightriding (saw) is also often known by the term for the weightless count. The basic concept of the saw method is looking for the weightier sum of performance ratings on any alternative to all attributes. (see's method requires the normalizing of a decision matrix (x) to a scale that can be compared with all alternative levels present[4].

The multiplication attribute with the weight of the criteria. From a performance rating that has been normalized (rij) from an Ai alternative to cj:i attributes; I = 1.2, strive m and j = 1.2, contenn with this preference for every alternative (Vi[10]. The more normal performance performance rate of vi values indicates that alternative ai was more selected.

3. Research of Methodology

Research methods are essentially a scientific way of gaining information with a specific purpose and purpose. Research methods are a way that researchers use to collect data from their research. The scientific way meant that this study was based on the scientific characteristics of rational, empirical, and systematic. A method can refer to a path or a method that must be adopted to reach a certain goal.,

A. Research Framework

The framework of research is the stages by which the author completed the research. These steps are done by structured writers from beginning to end and thus can be obtained results from these studies. As for this research framework it can be described as Figure 1.

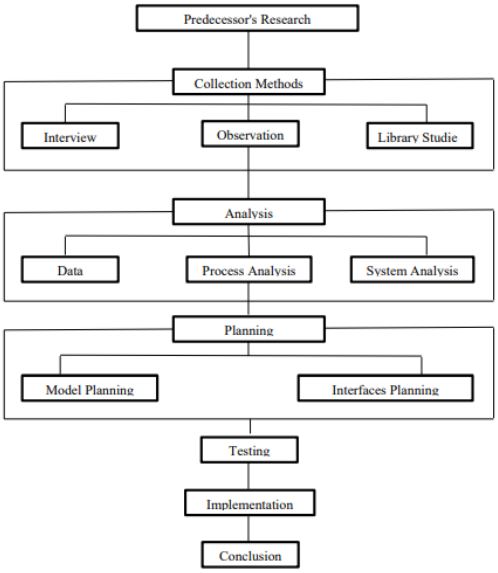

Figure 1. framework research

B. SAW Method

The guidelines in the development of this decision-making system (SPK) are based on research in general taking place in the selection process of retail stores. Where in this study any proportion will be judged by criteria. Research using the simple addve weigthing (saw) method requires criteria - criteria and weights to do the math so that the best alternative can be found.

In determining the best ingredients on a retail store anis/zaskia requires some supporting criteria to get maximum results in best

alternative variables, such as delivery speed, discount rate, service, product quality, warranty, authenticity of goods, payment tempo, profit percentage and profit restructuring.

The completion of the support system of decisions by applying the simple application of the application (saw) method is as follows[8].

1. Data analysis, the first step starts by determining the kind of criteria of the ci, which are there to distinguish which ones are the benefits and which ones are the cost.
2. Gives a compatible rating value on every alternative on each criteria.
3. Makes the matrpaycheck by criteria, then normalizes a matrix based on equations adjusted to the kinds of attributes, to be obtained with a normalized matrix[19].
4. Normalization of data, the following steps are made to change each attribute's worth by using an 0-1 scale and keep looking at the formula for any kind of benefit or cost criteria. Formula for normal attribute value using equation 1:

$$Rij = \begin{cases} \dfrac{xij}{Max\ xij} \rightarrow \ (Benefit) \\ \dfrac{Min\ xij}{xij} \rightarrow (cost) \end{cases}$$

Where :
Rij: normalized performance rating Value
Xij: criteria values which are possessed of every alternative
Max xij: the highest value of each criterion
Min xij: lowest value of each criterion
Benefit: the kind of criteria where the highest value is the best
Cost: the lowest kind of criteria where the lowest value is the best.

5. This step is the last step that in this step will be calculated the value of each alternative by quantifying the multiple results of each attribute with the weight of the criteria. From a performance rating that has been normalized (rij) from an ai alternative to cj;i attributes; I = 1.2, strive m and j = 1.2, contenn with this preference for every alternative (Vi)[18].

$$Vi = \sum_{j=1}^{n} \ Wjrij$$

Where :
Vi: rankings for every alternative
Wj: the weight value of each criterion
Rij: the value rating of better normalizing of vi values indicates that alternative ai was more selected.

C. Concuer Concept

1. Define criteria and weight
   In determining the criteria of each individual, it is determined by the needs needed in an organization, in this study the required value can be seen from criteria at Table 1.

Table 1. Supplier Criteria

Criteria Code	Criteria Name	Weight Criteria
C1	Delivery Speed	0.2
C2	Product Quality	0.25
C3	Authenticity goods	0.25
C4	service	0.2
C5	Discount rate	0.1

2. Determines the weight value of each criterion.
   The criteria used in a integer number can be seen at Table 2

Table 2. Criteria Sub

Criteria Sub	Percentage	Value Weight
very low	0.05	1
low	0.25	2
middle	0.5	3
Hight	0.75	4
Very Hight	1	5

3. Supplier goods category
   the assessment of each supplier is of course different, each supplier has a category of goods they have, in this study 2 samples were taken for the category of goods, namely cigarettes and milk, can be seen at table 3.

Table 3. Supplier Category

Supplier ID	Categori Of Goods	Types Of Goods
A1	Cigarettes	1
A2	Cigarettes	2
A3	Cigarettes	3
A4	Milk	4
A5	Milk	5

4. Value Matching Rating
   The match rating value is derived from the weighted value of the sub-critter of each corresponding criteria, can be seen at Table 4

Table 4. Matching Rating

Code	Suppliers Criteria				
	C1	C2	C3	C4	C5
A1	3	2	4	4	2
A2	3	3	4	4	3
A3	4	2	4	3	1
A4	4	3	3	5	5
A5	2	3	2	4	1

5. Normalization Data
   Normalizes data from an X matrix into an R matrix, can be seen at Table 5

Table 5. Normalization Data

Code	Suppliers Criteria				
	C1	C2	C3	C4	C5
A1	0,75	0,666667	1	0,8	0,5
A2	0,75	1	1	0,8	0,333334
A3	1	0,666667	1	0.75	1
A4	1	1	0,75	1	0.2
A5	0.5	1	0,5	0,8	1

6. Final Scoring And Ranking

   The final step is, calculating the end value of preference (vi) obtained from the value of summation is derived from the sum of the adjustable matrix line multiplies (r) with the weight of preferential line (w) as for the weight of the weight used is as follows:

a. Rank based on the criteria of cigarettes

Table 6. Rank criteria of cigarettes

Supplier ID	Categori-es of goods	Value	Ranking
A1	Cigarettes	0,777	3
A2	Cigarettes	1.0434	1
A3	Cigarettes	0,8667	2

Based on a category win, in the cigarette category it is believed that the A1 is the best quality with a 1.0434 weight.

b. Rank based on the criteria of milks

Table 7. Rank criteria of milks

Supplier ID	Categori-es of goods	Value	Ranking
A4	Milks	0,8575	1
A5	Milks	0.735	2

Based on a category win, in the milkscategory it is believed that the A4 is the best quality with a 0,8575 weight.

4. Results and Discussion

A. System analysis

This duplicate of the best unified modeling language (uml) system is designed by means of tools called unified modeling language (uml). To make it easier to transform concepts of systems designed into diagrams. The design system made with the uml consists of the design for use case diagram, sequences diagram, activity diagram and class diagram. As for the objective to be achieved at this stage, the system design should be able to prepare a detailed, useful, easy and efficient and effective design.

B. Data Analysis

a. Normalize value Max and min
   In the simple additive weihgthing method, there are 2 accounting values, minimum and maximum or called benefits and costs, in this data analysis there can be the following minadditive value.
   1. Normalize value Max (C1)

$$r11 = \text{Max} \quad 3 \quad = 3 \quad = 0{,}75$$

{3;3;4;4;2} 4

r21= Max 3 = 3 = 0,75
{3;3;4;4;2} 4

31= Max 4 = 4 = 1
{3;3;4;4;2} 4

r41= Max 4 = 4 = 1
{3;3;4;4;2} 4

r51= Max 2 = 2 = 0,5
{3;3;4;4;2} 4

2. Normalize value Min (C5)

r15=Min {2;3;1;5;3} = 1 =0,5
2 2

r25=Min {2;3;1;5;3} = 1 =0,4
3 3

r35=Min {2;3;1;5;3} = 1 =1
1 1

r45=Min {2;3;1;5;3} = 1 =0,2
5 5

r55=Min {2;3;1;5;3} = 1 =0,3
3 3

b. Ranking

The final step is, calculating the end value of preference (vi) obtained from the value of summation is derived from the sum of the adjustable matrix line multiplies (r) with the weight of preferential line (w) as for the weight of the weight used is as follows:

W={0,2;0,25;0,25;0,2;0.1}

Rank based on the normalization of data that has been done.

V1=(0.2x0.75)+(0,25x0,7)+(0,25x1)+
(0,2x0,8)+(0,1x0,5)
=0.777

V5= (0,2x0,5)+(0,25x0,4)+(0,25x1)+
(0,2x2)+(0,1x0,3)
=0,735

After a win, there will be the best results, which the best targets are grouped by the cost of each item, for total extension data can be seen in figure 3.

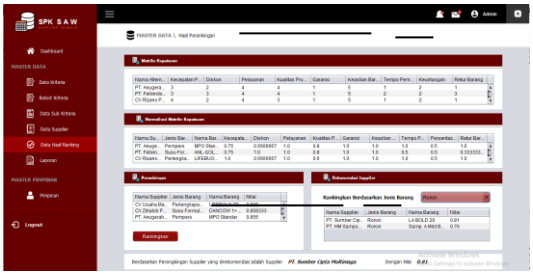

Figure 3. Ranking

5. Conclusion

Based on the system's design observations and analysis of the library in the religious district library, some conclusions can be drawn: 1. Using the simple application of the best adaptive decision system by using the saw method can help retail store anis/zaskia in choosing the best option.

This application of the system for decision support by the simple application of the saw method can help the shop in deciding which ones best for the improvement of the goods given without having to pick subjectively.

With the application of the saw system (simple simplicity, lacing) support system can give the decision on an accurate selection of best pronouns in the retail/zaskia store.

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