

## **DECISION SUPPORT SYSTEM FOR TOKO ANDA SUPPLIER SELECTION WITH THE SIMPLE ADDITIVE WEIGHTING (SAW) METHOD**

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### **Abstrak**

*Memilih supplier atau pemasok merupakan faktor penting untuk menjalankan usaha karena pemasok dapat mempengaruhi ketersediaan barang, kualitas, serta keuntungan dari usaha. Namun pemilihan supplier ini menjadi salah satu masalah yang rumit dalam usaha karena banyaknya alternatif dan kriteria yang menjadi faktor penentu dalam pemilihan supplier dan sulitnya memilih supplier yang tepat dengan kriteria tersebut objektif dalam waktu yang singkat. Untuk membantu dalam pemilihan supplier di Toko Anda maka dibangunlah SPK yang dapat membantu memberi rekomendasi supplier terbaik dari beberapa alternatif-alternatif berdasarkan kriteria pemilihan yang diberikan oleh pemilik toko sehingga pemilihan supplier di Toko Anda dapat dilakukan dengan cepat dengan menggunakan sistem dan menghasilkan pilihan supplier yang objektif. Dalam melakukan proses pengambilan keputusan pada SPK ini metode yang akan digunakan yaitu SAW. Pada proses perhitungannya metode SAW melakukan penjumlahan terbobot pada alternatif terhadap semua kriteria yang menjadi acuan dalam penentuan supplier. Kriteria yang menjadi penentu pada sistem penunjang keputusan ini adalah kualitas, harga, kelengkapan, pengemasan, garansi, waktu kirim, layanan. berdasarkan pada proses perhitungan dengan menggunakan metode saw didapatkan hasil perankingan supplier dari beberapa alternatif yang ada. Hasil perankingan supplier dari sistem penunjang keputusan ini dapat digunakan oleh pemilik toko Anda sebagai rujukan dalam menentukan suppliernya. Dari hasil proses perhitungan dengan SAW didapat perankingan Supplier F dengan nilai tertinggi 22 selanjutnya Supplier E dan Supplier B dengan nilai 21,4 lalu Supplier D dengan nilai 21 selanjutnya Supplier A dengan nilai 20,6 dan terakhir Supplier C dengan nilai 20,4. Dari penelitian pembuatan SPK ini Metode SAW dapat memberikan perankingan supplier pada toko Anda dengan objektif dan waktu yang singkat.*

*Kata kunci: Sistem Penunjang Keputusan; Simple Additive Weighting; Pemilihan Supplier*

### **Abstract**

Choosing a supplier or supplier is an important factor for running a business because suppliers can affect the availability of goods, quality, and profits from the business. However, the selection of suppliers is a complicated problem in business because of the many alternatives and criteria that are the determining factors in supplier selection and the difficulty of choosing the right supplier with objective criteria in a short time. To assist in the selection of suppliers in Toko Anda, an SPK is built that can help provide the best supplier recommendations from several alternatives based on the selection criteria provided by the shop owner so that the selection of suppliers in Toko Anda can be done quickly using the system and produces an objective supplier choice. In carrying out the decision-making process in this SPK, the method that will be used is SAW. In the calculation process, the SAW method performs a weighted summation of the alternatives against all the criteria that are the reference in determining suppliers. The criteria that determine this decision support system are quality, price, completeness, packaging, warranty, delivery time, service. based on the calculation process using the saw method, the supplier ranking results from several existing alternatives are obtained. The supplier ranking results from this decision support system can be used by Toko Anda owner as a reference in determining the supplier. From the results of the calculation process with SAW, the ranking of Supplier F with the highest value is 22, then Supplier E and Supplier B with a value of 21.4, then Supplier D with a value of 21, then Supplier A with a value of 20.6 and finally Supplier C with a value of 20.4. From this research on making SPK, the SAW method can provide a ranking of suppliers in Toko Anda with an objective and short time.

**Keywords:** Decision Support System; Simple Additive Weighting; Supplier Selection

## INTRODUCTION

Toko Anda is a shop that sells various stationery (office stationery), books, and educational toys (Hutagalung, 2019). In this globalized computerization era, competition between businesses is becoming more and more intense. The development of communication science and information systems at this time, as well as the wider reach and technology that supports it causes information to become a basic need in running a business. The information serves as a support in determining decisions taken in stores, including in determining suppliers. Suppliers are one of the main factors in transaction activities in stores (Masykur & Mahmudi, 2016; Nugraha & Mustafidah, 2020; Putra et al., 2020). Therefore, making decisions in choosing suppliers is an important activity carried out in stores because it can affect the availability, quality of goods, prices, and profits from the store (Parli & Diana, 2021; Susandi & Anita, 2019). The supplier selection process sometimes becomes a complicated problem for stores because each supplier has unique characteristics and each supplier also has its own advantages and disadvantages (Maulana et al., 2021; Pradipta & Diana, 2017). To solve the problem of supplier selection in toko Anda, an DSS (Decision Support System) is built which is useful to help Toko Anda choose suppliers by providing alternative decisions based on predetermined criteria from existing suppliers (Maulana et al., 2021; Parli & Diana, 2021).

Decision Support System (DSS) is a flexible, adaptable, interactive computer-based system that can provide decision references to management to solve problems in semi-structured and unstructured conditions to make a decision (Edward et al., 2018; Hasanah et al., 2021; Putra et al., 2020). Decision support systems can provide sources of information, provide a form of modeling, and the ability to manipulate data to assist decision making. This system was created not to be a substitute for decision makers in determining the decisions to be taken, but to support also provide recommendations for alternative decision choices that can be made by decision makers (Susandi & Anita, 2019). In the decision-making process carried out by DSS, a method is needed that is in accordance with the problems to be faced. In making this DSS, the method used in solving the supplier selection problem in toko Anda is Simple Additive Weighting (SAW) (Agnes Mareta, Arie Yandi Saputra, 2020).

Simple Additive Weighting (SAW) method known as the weighted addition method, this method is one of several methods that are widely used in processing decision support systems

(Marbun & Hansun, 2019). SAW method can provide a reference for the best alternative choices from the criteria that determine (Trimulia et al., 2018). In the SAW method the criteria are divided into two categories, first Cost and second Benefit, these two categories will later become the basis for the calculation process in determining decisions (Hermanto & Izzah, 2018; Parli & Diana, 2021). In the calculation process, the SAW method performs a weighted summation of alternatives against all existing criteria. To get a scale that can be compared between existing alternatives, in the calculation of the SAW method, matrix normalization is needed (Wolo et al., 2019).

Previous studies on decision support systems and the use of the SAW method are Feasibility Study of Supplier Selection of Equipment, and ATK Using SAW Method (Hutagalung, 2019), application designing of supplier selection decision support system on ud. Web-based sawoo motto (Masykur & Mahmudi, 2016), Selection of Drug Suppliers Using the Simple Additive Weighting (SAW) Method in BPM X (Yusuf et al., 2020), Decision Support System for Selecting the Best Supplier for Branded Eggs Using the SAW Method (Hariyanto & Khotimah, 2018), Selection of the right Drug Supplier with the Simple Additive Weighting Method (Trimulia et al., 2018).

Supplier selection studies that have been carried out previously in building DSS with the SAW method are made and used to make decisions by using different criteria preferences between objects according to the preferences of each object, therefore this study aims to create a DSS that can be used by Toko Anda to support supplier selection decisions based on the alternatives and criteria in Toko Anda so that the results of the decisions made are in accordance with the preferences of the decision maker in Toko Anda. The method that will be used in the calculation process and the ranking process in this DSS is SAW. The results of the SPK from the research carried out are expected to help Toko Anda in choosing the best supplier based on the decision support system made (Astuti, 2018; Nugraha & Mustafidah, 2020).

## RESEARCH METHODS

The things to do in collecting data and information that will be used to build a supplier selection DSS for Toko Anda. First, make observations at Toko Anda to learn how supplier selection is done. The second is to interview the owner and parties who play a role in selecting suppliers in Toko Anda to get the data and information needed. Third, carry out a literature

review through journals and books related to the supplier selection problems being faced. Fourth, learn the SAW method which is a method use in the decision-making process in Toko Anda (Boy et al., 2020; Susandi & Anita, 2019).

The supplier is one of the important role holders in ensuring the supply and availability of goods in the business. the quality and speed of delivery from suppliers determines the continuity of transactions from the business carried out (Haryani, 2016). In the process of distributing goods to final consumers, there are several parties that play a role, namely supplier, manufacturer, distributor, retailer (Dul Hapid et al., 2020).

The system is a set of concepts, procedures, a collection of people who carry out certain functions in fulfilling a target (Agnes Mareta, Arie Yandi Saputra, 2020). DSS (Decision Support System) is a system that can solve or communicate problems to help choose alternative decisions in unstructured and semi-structured conditions. DSS aims to provide guidance and predictive decisions to users so that the results of decisions made are better (Edward et al., 2018; Narulita et al., 2018). This system is capable of providing data manipulation capabilities, modeling, and providing interactive information (Tbk et al., 2021).

SAW (Simple Additive Weighting) otherwise known as the weighted addition method. In solving problems involving many attributes this method is the method that is widely used from many other methods (Hariyanto & Khotimah, 2018; Kahar & Palupi, 2020). The concept of searching with the SAW method is to do a weighted summation by the existing alternatives to the criteria that are owned. To get an alternative scale that can be compared, a decision matrix normalization process is needed. The results of this search process are then compared and sorted in a ranking to determine the best alternative (Hasanah et al., 2021; Susandi & Anita, 2019; Trimulia et al., 2018). In finding a decision using the SAW method, the steps taken are (Agustin & Irawan, 2019; Hariyanto & Khotimah, 2018; Nugraha & Mustafidah, 2020).

1. Determine the criteria and the weight of the criteria and categories.
2. Give the value of each alternative against all existing criteria.
3. Perform matrix normalization calculations.

$$R_{ij} = \frac{x_{ij}}{\max_i(x_{ij})} \text{ (Benefit) ..... (1)}$$

$$R_{ij} = \frac{\min_i(x_{ij})}{x_{ij}} \text{ (Cost) ..... (2)}$$

4. Perform a Value search Vector Vi.

$$V_i = \sum_{j=1}^n W_j R_{ij} \text{ ..... (3)}$$

5. Ranking the results of the Vector values.

**RESULTS AND DISCUSSION**

From the results obtained during observation and data collection at Toko Anda, then calculations are carried out to find decisions using the SAW method. The steps taken to determine the supplier in Toko Anda are:

1. Determine the criteria and assess the weight of each criterion according to the level of importance of the criteria. After that the criteria that have been determined are categorized whether they are beneficial or cost. The criteria used to determine the supplier in Toko Anda are listed in the table 1 below.

Table 1. Criteria, Weights, and Types

Criteria	Weight	Type
Quality	C1	5 Benefit
Price	C2	5 Benefit
Completeness	C3	3 Benefit
Packaging	C4	4 Benefit
Warranty	C5	3 Benefit
Delivery time	C6	4 Benefit
Service	C7	2 Benefit

2. Provide a suitability value of the existing alternatives to the criteria used in the selection of suppliers. The alternatives and their suitability values for the criteria can be seen in the following table 2 and table 3.

Table 2. Scoring scale

Scale	Number
Very good	1
Good	2
Average	3
Bad	4
Very Bad	5

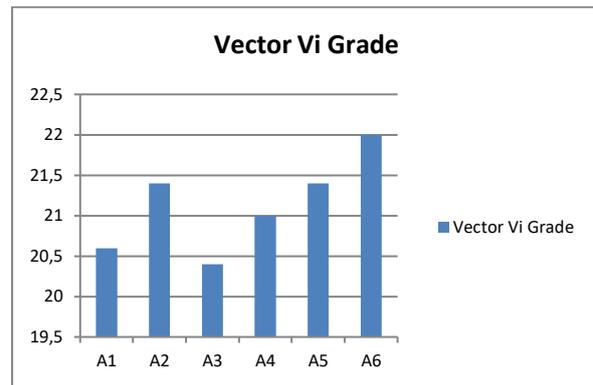
Tabel 3. Alternatives and scores

Alternative	Criteria						
	C1	C2	C3	C4	C5	C6	C7
Supplier A	4	5	4	3	4	3	5
Supplier B	3	5	4	4	3	5	5
Supplier C	4	4	3	5	3	4	4



Supplier D	4	5	3	4	3	4	5
Supplier E	5	4	4	3	4	5	3
Supplier F	5	4	5	5	4	3	3

3. Normalize the alternative weight values against the criteria.
  - a. Quality criteria  
 $A_1 = 0,8$  ;  $A_2 = 0,6$  ;  $A_3 = 0,8$  ;  $A_4 = 0,8$  ;  
 $A_5 = 1$  ;  $A_6 = 1$  ;
  - b. Price criteria  
 $A_1 = 1$  ;  $A_2 = 1$  ;  $A_3 = 0,8$  ;  $A_4 = 1$  ;  $A_5 = 0,8$  ;  
 $A_6 = 0,8$  ;
  - c. Completeness criteria  
 $A_1 = 0,8$  ;  $A_2 = 0,8$  ;  $A_3 = 0,6$  ;  $A_4 = 0,6$  ;  
 $A_5 = 0,8$  ;  $A_6 = 1$
  - d. Packaging criteria  
 $A_1 = 0,6$  ;  $A_2 = 0,8$  ;  $A_3 = 1$  ;  $A_4 = 0,8$  ;  $A_5 = 0,6$  ;  
 $A_6 = 1$  ;
  - e. Warranty criteria  
 $A_1 = 1$  ;  $A_2 = 0,75$  ;  $A_3 = 0,75$  ;  $A_4 = 0,75$  ;  $A_5 = 1$  ;  
 $A_6 = 1$  ;
  - f. Delivery time criteria  
 $A_1 = 0,6$  ;  $A_2 = 1$  ;  $A_3 = 0,8$  ;  $A_4 = 0,8$  ;  $A_5 = 1$  ;  
 $A_6 = 0,6$  ;
  - g. Service criteria  
 $A_1 = 1$  ;  $A_2 = 1$  ;  $A_3 = 0,8$  ;  $A_4 = 1$  ;  $A_5 = 0,6$  ;  
 $A_6 = 0,6$  ;
4. Search for the value of the vector V that is useful in determining suppliers.  
 $V_1 = 20,6$  ;  $V_2 = 21,4$  ;  $V_3 = 20,4$  ;  $V_4 = 21$  ;  
 $V_5 = 21,4$  ;  $V_6 = 22$
5. Ranking the search results for vector Vi from the largest to the smallest. The largest value of vector Vi from searching using the SAW method is V6 which has a value of 22 then the second V5 and V2 with each value of 21.4, then the third V4 which has a value of 21 then the fifth V1 which has a value of 20.6 and the last V3 which has a value of 20.4. Based on the vector ranking of Vi suppliers, the best alternative is the sixth supplier, namely Supplier F.



The results of data processing with the SAW method will then be implemented into an DSS program that can be used to provide a reference to Toko Anda owner in determining suppliers. This program will be created using the PHP programming language and to store the data, a MySQL database will be used with a simple appearance to make it easier for shop owners to access it.

## CONCLUSIONS AND SUGGESTIONS

### Conclusion

From the research on making DSS supplier selection with the SAW method that has been carried out, it can produce SPK which can provide a reference for making supplier selection decisions in Toko Anda with the results of supplier ranking with the first rank Supplier F, the second rank Supplier F and B, the third rank Supplier D, and then Supplier A and Supplier C. The SAW (Simple Additive Weighting) method can process and provide reference results from supplier ranking based on the calculation process. This system can provide supplier recommendations quickly and objectively in accordance with the wishes of the shop owner.

### Suggestion

For further system development, the methods used can be added with other methods that are suitable for the problems at hand so that the decision recommendations given can be more varied and can be compared with the results of one method's decision with another.

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