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Decision Support System to Select The Best Customers Using Analytical Hierarchy Process (AHP) Methods, Simple Additive Weighting (SAW) Method, Weight Aggregated Sum Product Assessment Method (WASPAS) at kebaya Shop

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Abstract *– Style Queen Kebaya Store (SQ Kebaya) is a store that is engaged in apparel, its product sales focus includes adult and children's kebaya. The negative impact of the Covid 19 Pandemic has proven that the Store (SQ Kebaya) has experienced a decline in sales turnover in 2020, therefore the SQ Kebaya Store's efforts to restore its sales activities are by giving gifts for customer appreciation during the COVID 19 season through selecting the best customers for the 2020 period. However, the problem faced by SQ Kebaya Stores in the process of evaluating the best customer selection is that there is no criterion weight so that the decision making is not right on target, making the best customer decisions less efficient because they have to look for customer sales records manually in the sales record book. This study produces a web-based decision support system for selecting the best customers at SQ Kebaya Stores using the AHP (criteria weight), SAW and WASPAS (best customer ranking) methods, this study produces priority weights and importance levels of each criterion, namely status (0.37), method of payment (0.23), total spending (0.14), quantity (0.13), intensity of visits (0.07), length of subscription (0.07) and the result of ranking the percentage of the largest alternative value is the alternative SAW method with an average of 0.6952 , while the WASPAS method is 0.6405. It can be concluded that the right method used to obtain the best alternative value is the SAW method.*

Keywords - SQ Kebaya, SPK, Best Customer, AHP, SAW, WASPAS

I. INTRODUCTION

Store *SQ* or SQ Kebaya Store is a store engaged in the sale of apparel, the focus of its product sales includes adult and children's kebaya, batik skirts, songket skirts, adult men's shirts and children of various sizes. Competition in the world of trade, especially in the era of COVID 19, is getting tougher, one of which is in the Tanah Abang Wholesale Center area, Central Jakarta, apparel traders are very aggressively carrying out various attractive product marketing promotions, which aim to increase purchasing power and customer enthusiasm for the products being marketed. , maintain the existence of stores, as well as keep buying and selling activities running during the COVID 19 season. The negative impact of this COVID 19 Pandemic has made SQ Kebaya Store's revenue decrease in turnover by 40% to 60% each month from January to August 2020. In responding to this The owner of the SQ Kebaya Store plans to give gifts to the best wholesale and retail customers who meet the shop owner's evaluation criteria during the 2020 period for their loyal appreciation of being customers at SQ Kebaya Stores during the COVID 19 season. This gift-giving activity has taken place before in 2017. 2019, but not be going well and not on target giving gifts to customers, because shop owners have problems choosing the best customers, some of the obstacles faced by SQ Kebaya shop owners in determining the best customers are still using *hardcopy* (notebooks) in collecting sales transaction data, there is no weight For each criterion used in the assessment of the best customer selection, it is difficult to make efficient decisions due to the absence of a decision support system for selecting the best customer. From some of the obstacles obtained, a Decision Support System (DSS) is needed that can help SQ Kebaya Stores in choosing the best customers. This study tries to develop a Decision Making System using the *Analytical Hierarchy Process* (AHP) method for weighting criteria, *Simple Additive Weighting* (SAW) and the *Weight Aggregated Sum Product Assessment* (WASPAS) method. to find out the ranking of the best customer selection decisions. Several previous studies that have the same object of study as[1] make a Decision Support System (DSS) application design using the *Simple Additive Weighting* (SAW) to determine the best customer, then research from [2] made a Decision Support System (DSS) application with the *Analytchical Hierarchy Process* (AHP) & *Weight Sum Model* (WSM) method for the selection of the *Customer* Award Recipient, and [3] made a Decision Support System (SPK) to determine the best customer in a building store using the WASPAS method.

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A. Decision Support System

According to Penerapan Metode Profile Matching Untuk Menentukan Pemberian Reward Terhadap Pelanggan Pada Bisnis Ritel [4] Decision Support System (DSS) is a system designed to assist *decision makers* in making decisions. With the DSS, a decision is expected to be more similar to a decision that should be based on complete and perfect information. Two elements contained in the DSS are boundaries and guidelines. The limit in question is the extent and method of SPK in limiting the decisions of its users. Meanwhile, guidelines mean the extent and way of SPK providing guidance for users in making decisions.

B. Customers

Explaining that customers or customers are individuals or groups who are accustomed to buying a product or service based on their decisions based on considerations of benefits and prices who then make contact with the company via telephone, mail, and other facilities to get a new offer from the company[5].

C. Analytical Hierarchy Process (AHP) Method

According to [6],[7]AHP is a decision-making method that involves a number of criteria and alternatives selected based on consideration of all related criteria in a hierarchical form. With a hierarchy, a complex problem can be broken down into groups which are then arranged hierarchically so that the problem will look more structured and systematic.

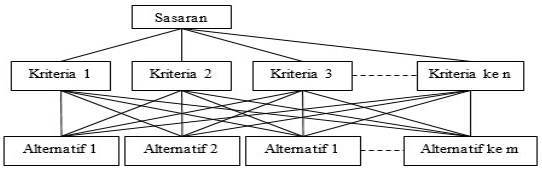

Figure I. Structure of the *Analytical Hierarchy Process* (AHP)

In detail, describes the procedures and steps of the *Analytical Hierarchy Process* (AHP), namely:

a. Creating a pairwise comparison matrix of each specified criterion.
b. Specifies the priority of the element. 1) Make pair comparisons by comparing elements in pairs according to the given criteria. 2) Each pairwise comparison matrix is filled in by using numbers to describe the relative priority level between elements.
c. Synthesis is a combination of considerations against pairwise comparisons to obtain ordered priorities.
d. Measuring Consistency which means that in making a decision, it is important to know how much consistency there is to avoid low consistency.
e. Calculating *Consistency*
f. Calculating the ratio *Consistency Index* (CI).

- Calculating *Consistency Index* (CI) with equation (2.1)

$$CI = \frac{\lambda_{max-n}}{n-1} \quad (1)$$

Where n is the number of elements

- Calculate *Consistency Ratio* (CR) with equation (2.2)

$$CR = \frac{CI}{IR} \quad (2)$$

Where *IR* is the *Random Consistency Index* with values as shown in table (2.1):

Table I. Value of Indes Random Consistency

Matrix Size	IR Value
1.2	0.00
3	0.58
4	0.90
5	1.12
6	1.24
7	1.32
8	1.41
9	1.45
10	1.49
11	1.51
12	1.48
13	1.56
14	1.57
15	1.59 Checking

The consistency of the hierarchy. If the value is more than 10%, then the data judgment assessment must be corrected. However, if the consistency ratio (CI/IR) is less or equal to 0.1 then the results of the calculations that have been carried out can be declared correct.

D. Method Simple Additive Weighting (SAW)

The SAW method is often also known as the weighted addition 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 the process of normalizing the decision matrix (X) to a scale that can be compared with all existing alternative ratings.

The steps of the SAW method are [8]:

1. Determine the criteria that will be used as a reference in making decisions.
2. Determine the suitability rating of each alternative on each criterion.
3. Make a decision matrix based on criteria (C), then normalize the matrix based on the equation that is adjusted to the type of attribute so that a normalized matrix R is
4. The final result is obtained from the ranking process, namely the addition of the multiplication of the normalized matrix R with the weight vector so that the largest value is chosen as an alternative best (A) as the solution.

The formula for normalization is:

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a. variable *benefit* with the equation (2.3)

$$r_{ij} = \frac{X_{ij}}{Max_{ij}} \quad (3)$$

b. variable *cost* with the equation (2.4)

$$r_{ij} = \frac{Min_{ij}}{X_{ij}} \quad (4)$$

Where:

r_{ij} = Performance rating normalized
Max_{ij} = Maximum value of each row and column
Min_{ij} = Minimum value of each row and column
x_{ij} = Rows and columns of matrix

Where r_{ij} is the normalized performance rating of alternative Ai on attribute Cj; i =1,2,... m and j = 1,2,....n

The preference value for each alternative (Vi_i) is given as:

$$V_i = \sum_{j=1}^{n} W_j R_{ij} \quad (2.5)$$

Where:

Vi_j = Final value of alternative
W_{ij} = Weight that has been determined
$r_{greater}$= Normalization matrix
value Vi_i indicates that alternative A_{method} is preferred

E. Weight Aggregated Sum Product Assessment (WASPAS)

The WASPAS method is to find the priority of the most preferred location in accordance with using weighting [9] The *Weighted Aggregated Sum Product Assessment* (WASPAS) method is a method that can reduce errors or optimize the estimation for the selection of the highest and lowest values. Thus, the main objective of the MCDMapproaches approach is to select the best option from a set of alternatives in the face of various conflicting criteria.. The calculation process step applies the WASPAS method .

1. Create a decision matrix
2. Normalize the x matrix, *benefit / cost*
3. Calculate the value of Qi

$$Qi = 0.5 \sum_{j=1}^{n} x_{ijw} + 0.5 nj \prod = 1 (xij)\, wj \quad (2.7)$$

Where

Qi : Value from Q to i
x_{ijw} : Multiply the value of x_{ijw} with a weight (w)
0.5 :

The best alternative is the alternative that has the highest Qi value

F. Unfied Modeling Language (UML)

According to [9] *Unified Modeling Language* (UML) was introduced to analyze object-oriented modules and requirements withassistance *use-case* and actorUML is a widely used modeling language for software analysis, design, and implementation. Developers . can easily do software development using UML

G. Black Box Testing (BBT)

According to [10] *Black box testing* is testing software in terms of functional specifications without testing the design and program code. *Black box testing* is the stage used to test the smoothness of the program that has been created. This test is important to do so that there are no errors in the flow of the program that has been made.

H. Technology Acceptance Method (TAM)

The Technology Acceptance Model (TAM) is an adaptation of the *Theory of Reasoned Action Model* (TRA). This model was developed by Fred D. Davis in 1986. TAM is a theory that describes the behavior of technology users in accepting and using new technology. TAM has two main variables that are used to predict acceptance of use, namely perceived usefulness and perceived ease of use which will affect attitudes towards use, behavioral intentions to use and ultimately indicate*actual system use* [11].

II. RESEARCH METHODOLOGY

A. Research Methods

This research is a quantitative research method where there are certain populations and samples to be processed. In more detail, the quantitative data in this study came from the results of weighting criteria in the process of selecting the best customers at SQ Kebaya Stores using the *Analytical Hierarchy Process* (AHP) method. In addition, the *Simple Additive Weighting* (SAW) method and the *Weight Aggregated Sum Product Assessment* (WASPAS) method are used to obtain alternative ranking results as one of the final decisions.

B. Population and Sample Selection Methods The

Population in this study are customers at the SQ Kebaya Store, the sample that will be used is the prospective customer data at the SQ Kebaya Store. The sample selection method used is *non-probability sampling* which depends more on the ability and limitations of the researcher in drawing samples. The *non-probability sampling technique* used is *purposive sampling. Purposive sampling* is a non-probability technique that is often used because of its simplicity. This sample selection method is considered more

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suitable because the author can adjust the sample to the existing population.

C. Data Collection Methods The data

Collection methods used in this study are:

1 Interview (*interview*)
In this study is the owner of the SQ Kebaya Store, namely Elvi Yanti, which aims to be able to collect information on how the process of choosing the best customers at SQ Kebaya Stores and what criteria and weights used in making decisions in selecting the best customers.

2 Observation (observation)
Observation at SQ Kebaya Store aims to find out how the process of choosing the best customers and find out how the owner of the SQ Kebaya Store chooses the best customers.

3 Literature Study
The method of collecting data is obtained by studying, researching, and reading books, information from the internet, journals, theses related to the selection of the best customers.

4 Internal
Data The internal data used in this study is the customer data of the SQ Kebaya Store.

D. Instrumentation The instrumentation

Used in this study was a questionnaire designed to collect data and test the system. The instrumentation are:

1 Questionnaire weight criteria.
The criterion weight questionnaire was provided by the researcher to determine the assessment criteria in choosing the best customers at the SQ store kebaya.

2 Technology *Technology Acceptance Model* (TAM) Questionnaire The *Acceptance Model* (TAM) [12] questionnaire was provided by researchers to determine the level of user acceptance of the decision support system application to be developed.

E. Analysis Techniques, Design and Testing

1 Analytical

Techniques The analysis technique used in this study uses an object-oriented analysis approach with UML. The analysis process is carried out on the results of the stages of data collection with interviews and literature studies to obtain specifications for the system requirements to be developed. In the analysis process, the analytical techniques used are:

- Analysis of data and information obtained from interviews, questionnaires and literature studies.
- Analysis of functional, non-functional, and user requirements. Functional requirements modeling to describe the system functions and the users involved and what functions can be obtained by each user are modeled with *use case diagrams.*
- System actor analysis. At this stage, an analysis of system actors is carried out which is developed and modeled with *use cases* that run in the system.
- In this study, the best customer selection technique uses the *Analytical Hierarchy Process* (AHP) method for weighting the criteria, *Simple Additive Weighting* (SAW) and the *Weight Aggregated Sum Product Assessment* (WASPAS) method to determine the final total value of the sum of all the largest alternative values which will later be The SAW or WASPAS method is chosen to be used to determine the best customer ranking results.

2 Design Techniques

In designing and developing *a prototype* decision support system to choose the best customers at the *SQ* Kebaya Store, the author uses the *prototyping* proposed by Roger S Pressman, where there are 5 main stages in the process, namely *communication, quick plan, modeling quick plan, construction of prototype* and *deployment delivery & feedback*. The first stage of *communication*, the author tries to communicate and identify the general concept and design of *the prototype* by asking directly the owner of the *SQ* Kebaya Store which is adjusted to the results of the AHP, SAW and WASPAS analysis. In the second stage, the author will start planning *the prototype of the* DSS, namely the *quick plan* , then carry out the design, namely the *quick plan modeling* in the third stage. At the design stage, the author uses *the Unified Modeling Language* (UML) tool, while in the implementation stage the author uses several *tools* , namely PHP *Hypertext Preprocessor* (PHP) and *database* . The fourth stage is the *construction of prototyping* DSS, at this stage the *prototype* begins to be developed in accordance with the planning and design in the previous stage. The fifth stage is *deployment delivery & feedback*. At the last stage, *the prototype* is put into use and tested, repairs will be made immediately if there are deficiencies.

3. Testing Techniques

System testing is carried out using the *blackbox testing* [13] to identify the reliability and functionality of the decision support system application later. After it is deemed appropriate, *a Test Acceptance Model* (TAM) [14],[15] will then be carried out to find out how far the level of user acceptance is for using the application (Decision Support System) to choose the best customer. A TAM questionnaire will be prepared to be filled out by users containing their assessment of the application.

III. RESULTS AND DISCUSSION

A. Alternative

The author uses a *non-probablity sampling method.* In this research, the population is shop customers proposed by the owner of the SQ Kebaya Store in 2020

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as many as 225 customers. For criteria the length of subscription is calculated based on the number of days, for example 648 days.

Table III. Example of Alternative Data Research

No	Customer	Intensity Visit	Long Subscription	Payment method	Total Shopping	Quantity	Status
1	Abduh	3	648	Cash	962.000	20	Paid Off
2	Abdul	1	435	Cash	50.000	1	Paid Off
3	Ableh Luar	3	593	Cash	509.000	10	Paid Off
4	Ade Padang	2	648	Cash	234.000	4	Paid Off
5	Adib	1	620	Cash	60.000	1	Paid Off
6	Afni	1	588	Cash	42.000	1	Paid Off
7	Agustin	1	589	Cash	208.000	4	Paid Off
8	Ambar	1	450	Cash	75.000	1	Paid Off
9	Amsar	1	574	Cash	48.000	1	Paid Off
225	Zainal	1	438	Cash	70.000	1	Paid Off

B. Method Analytical Hierarchy Process (AHP)

At this stage the author begins to determine and weight the criteria, the determination of the criteria has been determined by the owner of the SQ Kebaya Store, and to determine the weight of the criteria obtained from the results of the criteria weight questionnaire which was previously filled in by the Store Owner. SQ Kebaya. The calculation results are as in table IV.

Table IV. Pairwise Comparison Matrix

	Status	Payment method	Total Shopping	Quantity	Intensity Visit	Long Subscription
Status	1.00	2/1	3/1	3/1	5/1	4/1
Payment method	1/2	1.00	2/1	2/1	4/1	3/1
Total Shopping	1/3	1/2	1.00	1.00	2/1	3/1
Quantity	1/3	1/2	1.00	1.00	2/1	2/1
Intensity Visit	1/5	1/4	1/2	1/2	1.00	1.00
Long Subscription	1/4	1/3	1/3	1/2	1.00	1.00

Table V. Pairwise Comparison Matrix Values in Decimal

	Status	Payment method	Total Shopping	Quantity	Intensity Visit	Long Subscription
Status	1,00	2,00	3,00	3,00	5,00	4,00
Payment method	0,50	1,00	2,00	2,00	4,00	3,00
Total Shopping	0,33	0,50	1,00	1,00	2,00	3,00
Quantity	0,33	0,50	1,00	1,00	2,00	2,00
Intensity Visit	0,20	0,25	0,50	0,50	1,00	1,00
Long Subscription	0,25	0,33	0,33	0,50	1,00	1,00
TOTAL	**2,62**	**4,58**	**7,83**	**8,00**	**15,00**	**14,00**

In Table V, there is a row TOTAL which is the result of the sum of all rows in each criterion. The details of the calculation are as follows:

C1=1.00+0.50+0.33+0.33+0.20+0.25=**2.62**
C2=2.00+1.00+0.50+0 ,50+0.25+0.33=**4.58**
C3=3.00+2.00+1.00+1.00+0.50+0.33=**7.83**
C4=3.00+2 ,00+1.00+1.00+0.50+0.50=**8.00**
C5=5.00+4.00+2.00+2.00+1.00+1.00=**15, 00**
C6=4.00+3.00+3.00+2.00+1.00+1.00=**14.00**

Table VI. Matrix Normalization

	Status	Payment method	Total Shopping	Quantity	Intensity Visit	Long Subscription
Status	0,38	0,44	0,38	0,38	0,33	0,29
Payment method	0,19	0,22	0,26	0,25	0,27	0,21
Total Shopping	0,13	0,11	0,13	0,13	0,13	0,21
Quantity	0,13	0,11	0,13	0,13	0,13	0,14
Intensity Visit	0,08	0,05	0,06	0,06	0,07	0,07
Long Subscription	0,10	0,07	0,04	0,06	0,07	0,07
TOTAL	**1,00**	**1,00**	**1,00**	**1,00**	**1,00**	**1,00**

Details of the calculation of the matrix normalization value in Table VI are as follows:

Status (**C1**)

C1: 1.00/2.62=0.38
C2: 0.50/2.62=0.19
C3: 0.33 /2.62=0.13
C4: 0.33/2.62=0.13
C5: 0.20/2.62=0.08
C6: 0.25/2.62=0.10

Total Belanja (**C3**)

C1: 3.00/7.83=0.38
C2: 2.00/7.83=0.26
C3: 1.00/7.83=0.13
C4: 1.00/7, 83=0.13
C5: 0.50/7.83=0.06
C6: 0.33/7.83=0.04

Intensitas Kunjungan (**C5**)

C1: 5.00/15.00=0.33
C2: 4.00/15.00=0.27
C3:2.00/15.00=0.13
C4: 2.00/15.00=0.13
C5: 1.00/15.00=0 .07
C6: 1.00/15.00=0.07

Cara Pembayaran (**C2**)

C1: 2.00/4.58=0.44
C2: 1.00/4.58=0.22
C3: 0 .50/4.58=0.11
C4: 0.50/4.58=0.11
C5: 0.25/4.58=0.05
C6: 0.33/4.58=0.07

Kuantitas (**C4**)

C1: 3.00/8.00=0.38
C2: 2.00/8.00=0.25
C3: 1.00/8.00=0.13
C4: 1.00/8 ,00=0.13
C5: 0.50/8.00=0.06
C6: 0.50/8.00=0.06

Lama Berlangganan (**C6**)

C1: 4.00/14.00=0, 29
C2: 3.00/14.00=0.21
C3: 3.00/14.00=0.21
C4: 2.00/14.00=0.14
C5: 1.00/14.00= 0.07
C6: 1.00/14.00=0.07

Table VII. Eigen Vector

	Status	Payment method	Total Shopping	Quantity	Intensity Visit	Long Subscription
Status	0,38	0,44	0,38	0,38	0,33	0,29
Payment method	0,19	0,22	0,26	0,25	0,27	0,21
Total Shopping	0,13	0,11	0,13	0,13	0,13	0,21
Quantity	0,13	0,11	0,13	0,13	0,13	0,14
Intensity Visit	0,08	0,05	0,06	0,06	0,07	0,07
Long Subscription	0,10	0,07	0,04	0,06	0,07	0,07
TOTAL	**1,00**	**1,00**	**1,00**	**1,00**	**1,00**	**1,00**

Details of priority weight calculation (*eigen vector*) in Table VII are as follows:

C1: (0.38+0.44+0.38+0.38+0.33+0.29)/6 = 0.37
C2: (0.19+0.22+0.26+0.25+0.27+0.21)/6 = 0.23
C3: (0.13+0.11+0.13+0, 13+0.13+0.21)/6 = 0.14
C4: (0.13+0.11+0.13+0.13+0.13+0.14)/6 = 0.13
C5 : (0.08+0.05+0.06+0.06+0.07+0.07)/6 = 0.07
C6: (0.10+0.07+0.04+0.06 +0.07+0.07)/6 = 0.07

Table VIII. Pairwise Comparison Value Multiply By Weight (Maximum Eigen)

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	Status	Payment method	Total Shopping	Quantity	Intensity Visit	Long Subscription	Weight	Vector
Status	1,00	2,00	3,00	3,00	5,00	4,00	0,37	2,236
Payment method	0,50	1,00	2,00	2,00	4,00	3,00	0,23	1,419
Total Shopping	0,33	0,50	1,00	1,00	2,00	3,00	0,14	0,843
Quantity	0,33	0,50	1,00	1,00	2,00	2,00	0,13	0,774
Intensity Visit	0,20	0,25	0,50	0,50	1,00	1,00	0,07	0,399
Long Subscription	0,25	0,33	0,33	0,50	1,00	1,00	0,07	0,414

Details for calculating the *vector*are as follows:
C1: (1.00*0.37) + (2.00*0.23) + (3.00*0,14) + (3.00*0.13) + (5.00*0.07) + (4.00*0.07) = 2.236
C2: (0.50*0.37) + (1.00 *0.23) + (2.00*0.14) + (2.00*0.13) + (4.00*0.07) + (3.00*0.07) = 1.419
C3: (0.33*0.37) + (0.50*0.23) + (1.00*0.14) + (1.00*0.13) + (2.00*0.07) + (3.00*0.07) = 0.843
C4: (0.33*0.37) + (0.50*0.23) + (1.00*0.14) + (1.00*0.13) + (2.00*0.07) + (2.00*0.07) = 0.774
C5: (0.20*0.37) + (0.25*0.23) + (0.50*0.14) + (0.50*0.13) + (1.00*0.07) + (1.00*0.07) = 0.399
C6: (0.25*0.37) + (0 .33*0.23) + (0.33*0.14) + (0.50*0.13) + (1.00*0.07) + (1.00*0.07) = 0.413

Table IX. The results of the division of vector values to priority weights. The

Criteria	Vector	Weight	Result (λ)
Status (**C1**)	2,236	0,37	6,1
Payment method (**C2**)	1,419	0,23	6,1
Total Shopping (**C3**)	0,843	0,14	6,0
Quantity (**C4**)	0,774	0,13	6,1
Intensity Visit (**C5**)	0,399	0,07	6,1
Long Subscription (**C6**)	0,414	0,07	6,0

Details of the calculation are as follows:
C1: 2.236/0.37=6.1
C2: 1.419/0.23=6.1
C3: 0.843/0.14=6.0
C4: 0.774/ 0.13=6.1
C5: 0.399/0.07=6.1
C6: 0.414/0.07=6.0

$$max = \frac{(6.1 + 6.1 + 6.0 + 6.1 + 6,1 + 6.0)}{6} = 6.1$$

$$(Consistency\ Index)\ CI = \frac{(6.1 - 6)}{(6 - 1)} = 0.014$$

If the value of CR < 0.1 then the data and calculations are considered consistent, but if CR > 0.1, then need to be recalculated.

$$(Consistency\ Ratio)\ CR = \frac{0.014}{1.24} = 0.0112$$

From the results of the calculation of the CR value, obtained CR <0.1 which indicates the consistency of the calculation. Thus, the value of the priority weight or *eigenvector* obtained can be used in this study.

C. Simple Additive Weighting (SAW) Method and Weight Aggregated Sum Product Assessment (WASPAS) Method

Table X. Attributes of Each Criteria for Best Customer Selection at *SQ* Kebaya

No	Criteria	Criteria Name	Atribut	Weight
1	C1	Intensity Visit	Benefit	0,37
5	C2	Long Subscription	Benefit	0,23
3	C2	Payment method	Benefit	0,14
2	C4	Total Shopping	Benefit	0,13
4	C5	Quantity	Benefit	0,07
6	C6	Status	Benefit	0,07

Table XI. Crips Data for Each Best Customer Criteria for SQ Kebaya Store

Criteria Code	Criteria Name	Crips	Score
C1	Intensity Visit	> 24	5
C1	Intensity Visit	20 sd 24	4
C1	Intensity Visit	13 sd 19	3
C1	Intensity Visit	7 sd 12	2
C1	Intensity Visit	< 6	1
C2	Long Subscription	> 24 Month	5
C2	Long Subscription	19 sd 24 Month	4
C2	Long Subscription	13 sd 19 Month	3
C2	Long Subscription	6 sd 12 Month	2
C2	Long Subscription	< 6 Month	1
C3	Payment method	Cash	5
C3	Payment method	Credit	1
C4	Total Shopping	> Rp. 50.000.000	5
C4	Total Shopping	Rp. 10.000.000 sd Rp. 50.0000	4
C4	Total Shopping	Rp. 5.000.000 sd Rp. 10.000.000	3
C4	Total Shopping	Rp. 500.000 sd Rp. 5.000.000	2
C4	Total Shopping	< Rp. 500.000	1
C5	Quantity	> 200	5
C5	Quantity	150 sd 200	4
C5	Quantity	100 sd 150	3
C5	Quantity	50 sd 100	2
C5	Quantity	1 sd 50	1
C6	Status	Paid Off	5
C6	Status	Not Yet Paid Off	1

Table XII. Alternative Attribute Values Based on Crips Data Conversion

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No	Customer	Intensity Visit	Long Subscription	Payment method	Total Shopping	Quantity	Status
		Benefit	Benefit	Benefit	Benefit	Benefit	Benefit
1	Abduh	1	4	5	2	1	5
2	Abdul	1	3	5	1	1	5
3	Ableh Luar	1	4	5	2	1	5
4	Ade Padang	1	4	5	1	1	5
5	Adib	1	4	5	1	1	5
6	Afni	1	4	5	1	1	5
7	Agustin	1	4	5	1	1	5
8	Ambar	1	3	5	1	1	5
9	Amsar	1	4	5	1	1	5
225	Zainal	1	3	5	1	1	5

- **Normalization SAW & WASPAS Method**

a. Visit Intensity
Because of the benefits, then look for max (1,2,3) = 3

$$r_{1\,1} = \frac{1}{3} = 0.33$$

$$r_{2\,1} = \frac{1}{3} = 0.33$$

$$r_{3\,1} = \frac{1}{3} = 0.33$$

$$\vdots$$

$$r_{225\,1} = \frac{1}{3} = 0.33$$

b. Length of subscription
Due to benefits, then find max (2,3,4) = 4

$$r_{1\,2} = \frac{4}{4} = 1$$

$$r_{2\,2} = \frac{3}{4} = 0.75$$

$$r_{3\,2} = \frac{4}{4} = 1$$

$$\vdots$$

$$r_{225\,2} = \frac{3}{4} = 0.75$$

c. Payment Methods
Because of the benefits, then find max (1,5) = 5

$$r_{1\,3} = \frac{5}{5} = 1$$

$$r_{2\,3} = \frac{5}{5} = 1$$

$$r_{3\,3} = \frac{5}{5} = 0,1$$

$$\vdots$$

$$r_{225\,3} = \frac{5}{5} = 1$$

d. Total Expenditure
Due to benefits, then find max (1,2,3,4) = 4

$$r_{1\,4} = \frac{2}{4} = 0.5$$

$$r_{2\,4} = \frac{1}{4} = 0.25$$

$$r_{3\,4} = \frac{2}{4} = 0.5$$

$$\vdots$$

$$r_{225\,4} = \frac{1}{4} = 0.25$$

e. Quantity
Because of the benefit, then find max (1,2,3,4,5) = 5

$$r_{1\,5} = \frac{1}{5} = 0.2$$

$$r_{2\,5} = \frac{1}{5} = 0.2$$

$$r_{3\,5} = \frac{1}{5} = 0.2$$

$$\vdots$$

$$r_{225\,5} = \frac{1}{5} = 0.2$$

f. Status
Because of the benefits, then find max (1,5) = 5

$$r_{1\,6} = \frac{5}{5} = 1$$

$$r_{2\,6} = \frac{5}{5} = 1$$

$$r_{3\,6} = \frac{5}{5} = 1$$

$$\vdots$$

$$r_{225\,1} = \frac{5}{5} = 1$$

Table XIII. Normalization Result of Alternative

No	Customer	Intensity Visit	Long Subscription	Payment method	Total Shopping	Quantity	Status
		(0,07)	(0,07)	(0,23)	(0,14)	(0,13)	(0,37)
1	Abduh	0,33	1	1	0,5	0,2	1
2	Abdul	0,33	0,75	1	0,25	0,2	1
3	Ableh Luar	0,33	1	1	0,5	0,2	1
4	Ade Padang	0,33	1	1	0,25	0,2	1
5	Adib	0,33	1	1	0,25	0,2	1
6	Afni	0,33	1	1	0,25	0,2	1
7	Agustin	0,33	1	1	0,25	0,2	1
8	Ambar	0,33	0,75	1	0,25	0,2	1
9	Amsar	0,33	1	1	0,25	0,2	1
225	Zainal	0,33	0,75	1	0,25	0,2	1

1 Value Calculating Alternative Value

- Calculating Alternative Value of SAW Method
The calculation of alternative value of SAW method is as follows:

$V_1 = (0.07 * 0.33) + (0.07 * 1) + (0.23 * 1) + (0.14 * 0,5) + (0.13 * 0.2) + (0.37 * 1) = 0.78933$

$V_2 = (0.07 * 0.33) + (0.07 * 0.75) + (0.23 * 1) + (0.14 * 0.25) + (0.13 * 0.2) + (0.37 * 1) = 0.73683$

$V_3 = (0.07 * 0.33) + (0.07 * 1) + (0.23 * 1) + (0.14 * 0.5) + (0.13 * 0.2) + (0.37 * 0.1) = 0.78933$

$\vdots$

$V_{225} = (0.07 * 0.33) + (0.07 * 0.75) + (0.23 * 1) + (0.14 * 0.25) + (0.13 * 0.2) + (0.37 * 1) = 0.73683$

- Calculating the Alternative Value of the WASPAS Method
The calculation of the alternative value of the WASPAS method is as follows:

$Q_1 = 0.5 \sum (0.33 * 0.07) + (1 * 0.07) + (1 * 0.23) + (0.5 * 0.14) + (0.2 * 0.13) + (1 * 0.37) = 0.5 \sum (0.39467)$
$= 0.5 \sum (0.33^{0.07}) * (1^{0.07}) * (1^{0.23}) * (0.5^{0.14}) * (0.2^{0.13}) * (1^{0.37}) = 0.5 \prod (0.34085)$
$= 0.5 \sum (0,39467 + 0.5)(\prod 0.34085)$
$= 0.5 * (0.39467) + 0.5 * (0.34085)$
$=$ **0.73552**

$Q_2 = 0.5 \sum (0.33 * 0.07) + (0.75 * 0.07) + (1 * 0.23) + (0.25 * 0.14) + (0.2 * 0.13) + (1 * 0.37) =$
$0.5 \sum (0.36842)$
$= 0.5 \sum (0.33^{0.07}) * (0.75^{0.07}) * (1^{0.23}) * (0.25^{0.14}) * (0.2^{0.13}) * (1^{0.37}) = 0.5 \prod (0.30316)$
$= 0.5 \sum (0.36842 + 0.5)(\prod 0.30316)$
$= 0.5 * (0.36842) + 0.5 * (0.30316)$
$= 0.67158$

$Q_3 = 0.5 \sum (0.33 * 0.07) + (1 * 0.07) + (1 * 0.23) + (0.5 * 0.14) + (0.2 * 0.13) + (1 * 0.37) = 0,5 \sum (0.39467)$
$= 0.5 \sum (0.33^{0.07}) * (1^{0.07}) * (1^{0.23}) * (0.5^{0.14}) * (0.2^{0.13}) * (1^{0.37}) = 0.5 \prod (0.34085)$
$= 0.5 \sum (0,39467 + 0.5)(\prod 0.34085)$
$= 0.5 * (0.39467) + 0.5 * (0.34085)$
$= 0.73552$
$\vdots$

$Q_4 = 0.5 \sum (0.33 * 0.07) + (0.75 * 0.07) + (1 * 0.23) + (0.25 * 0.14) + (0.2 * 0.13) + (1 * 0.37) =$
$0.5 \sum (0.36842)$
$= 0.5 \sum (0.33^{0.07}) * (0.75^{0.07}) * (1^{0.23}) * (0.25^{0.14}) * (0.2^{0.13}) * (1^{0.37}) = 0.5 \prod (0.30316)$
$= 0.5 \sum (0.36842) + 0.5 \prod (0.30316)$
$= 0.5 * (0.36842) + 0.5 * (0.30316)$
$= 0.67158$

2 Calculating Alternative Ranking

Table XIV. Ranking Results of the Best Customers at *SQ* Kebaya

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Ranking	SAW		WASPAS	
	Customer	Score	Customer	Score
1	Bang Ibrahim Palembang	0,9667	Bang Ibrahim Palembang	0,9635
2	Bang Ando Kalimantan	0,9333	Bang Ando Kalimantan	0,9146
3	Nia Blok B	0,9025	Nia Blok B	0,8948
4	Sobirin Ciseeng	0,8733	Sobirin Ciseeng	0,8516
5	Uda Ranji	0,8658	Uda Ranji	0,8479
6	Bang Azar Bekasi	0,8658	Bang Azar Bekasi	0,8479
7	Fatih Anak Babeh	0,8392	Fatih Anak Babeh	0,8204
8	Nando Kalimantan	0,8108	Nando Kalimantan	0,7916
9	Koh Edi	0,8058	Bang Doni	0,7780
225	Nia Dukuh	0,2758	Nia Dukuh	0,2621
	Average	0,6952		0,6405

From table XIV the results of the ranking above show the largest percentage of alternative values, namely the results of the alternative SAW method with an average of 0.6952, while the WASPAS method is 0.6405. It can be concluded that the right method and can be used to obtain the largest alternative in the case of making the decision to choose the best customer at the SQ Kebaya Store is the SAW method where the final value of a large alternative indicates that the best alternative is preferred [9]. It is hoped that this SAW method is appropriate to use to select the best customers at the *SQ* Kebaya Store.

D. System Design

At this stage, the author uses *the Unified Modeling Language* (UML) tool to describe the system design in general. The results of the design can later be used as documentation for future system development.

Protoype Design

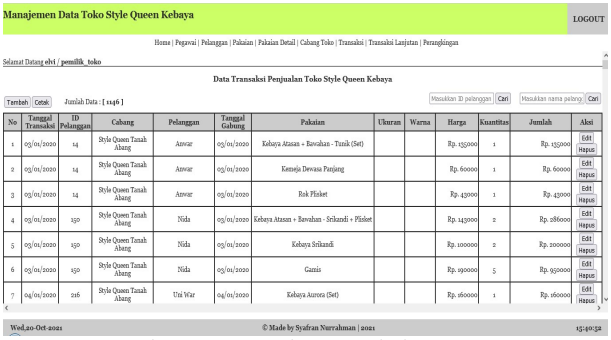


Figure II. Transaction Page Display

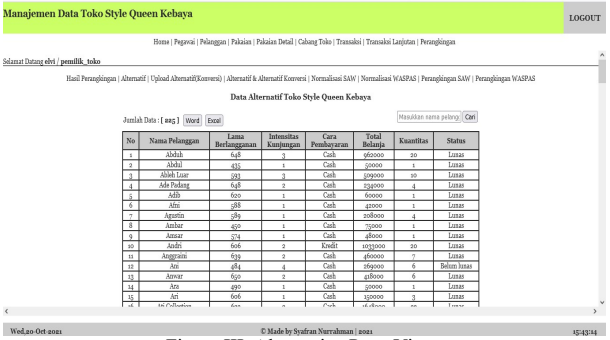


Figure III. Alternative Page Views

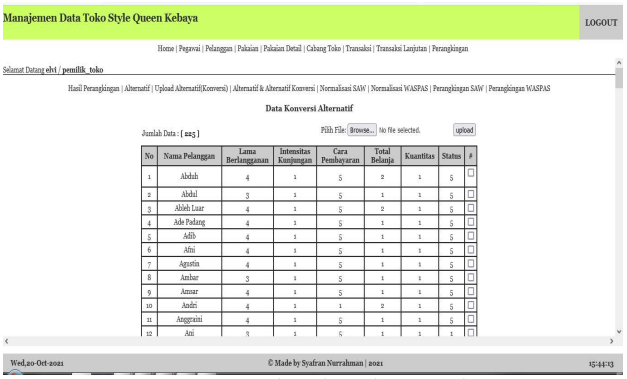
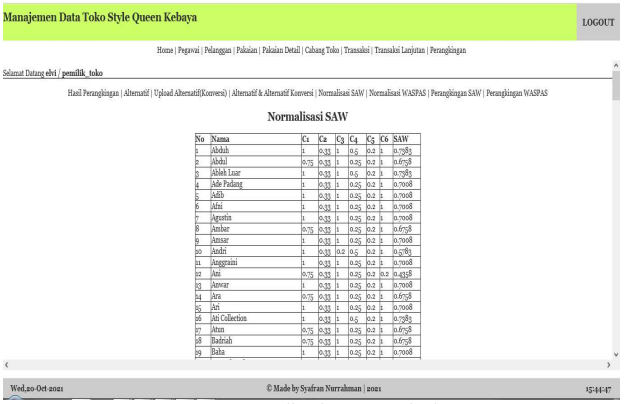


Image IV. Image Conversion Alternative Page Views



V. SAW Normalization Page Display

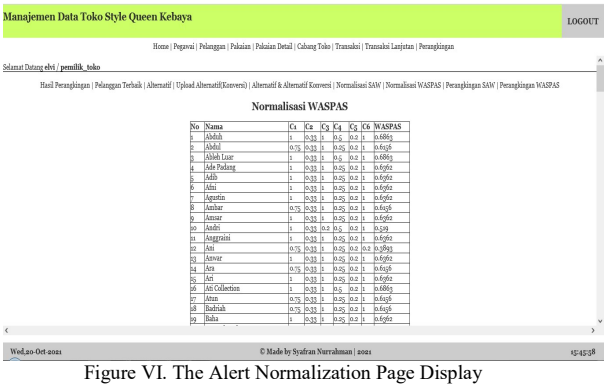


Figure VI. The Alert Normalization Page Display

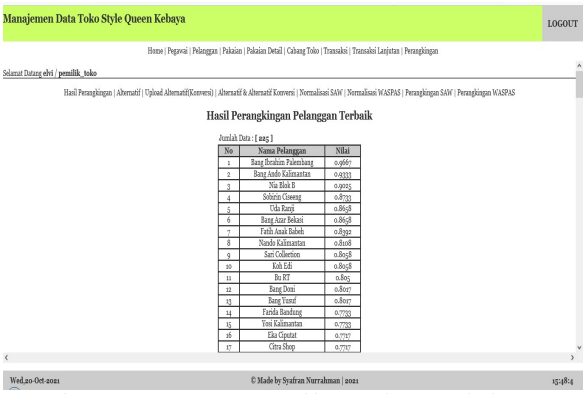


Figure VII. Best Customer Ranking Results Page Display

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E. Testing Prototype

1 Testing *Black Box Testing* (BBT)

At this stage testing of the SQ Store web application, the test is carried out by running the SQ Kebaya Store web application by *inputting, editing,* deleting, searching, printing, *uploading* data and see *output* is as expected.

2. Testing Technology Acceptance Method (TAM)

Testing Questionnaire

Table XV. Results of Respondents' Recap of Perceive Usefulness Construct (*Perceive Usefulness*)

Name	Part	Question					
		1	2	3	4	5	6
Elvi Yanti	Shop Owner	5	5	5	5	5	5
Alfina Diniati	Shop Employee	4	4	4	5	5	5
M. Fatah	Shop Employee	5	5	4	4	5	5
Titi Suryati	Shop Employee	5	5	5	5	5	5
Nanda Pratiwi	Shop Employee	4	5	4	4	4	5

Table XVI. Results of Respondents' Recap of Perceive Ease of Use (*Perceive Ease of Use*)

Name	Part	Question				
		1	2	3	4	5
Elvi Yanti	Pemilik Toko	5	5	5	4	5
Alfina Diniati	Pegawai Toko	4	5	4	3	5
M. Fatah	Pegawai Toko	5	5	5	3	5
Titi Suryati	Pegawai Toko	5	5	5	5	5
Nanda Pratiwi	Pegawai Toko	5	5	4	5	5

Table XVII. Results of Respondents' Recap of User Acceptance (*User Acceptance*)

Name	Part	Question			
		1	2	3	4
Elvi Yanti	Pemilik Toko	4	5	5	5
Alfina Diniati	Pegawai Toko	4	4	5	5
M. Fatah	Pegawai Toko	4	4	5	5
Titi Suryati	Pegawai Toko	4	4	5	5
Nanda Pratiwi	Pegawai Toko	4	5	5	5

Table XVIII. Percentage of Likert Scale Score

Score Interveal	Description
0% - 19,99%	Strongly Disagree
20% - 39,99%	Don't agree
40% - 59,99%	Neutral
60% - 79,99%	Agree
80% - 100%	Strongly agree

Table XIX. Results of Calculation of Percentage of Useful Perceived

Code	Weight	Question						Total
		1	2	3	4	5	6	
SA	5	1	3	1	2	3	4	14
A	4	4	1	2	2	2	1	12
N	3	0	1	1	1	0	0	3
DA	2	0	0	0	0	0	0	0
SD	1	0	0	0	0	0	0	0
Number of respondents		5	5	5	5	5	5	
Skor Aktual		21	22	16	21	23	24	127
Ideal Score		25	25	25	25	25	25	150

$$\text{Score \% Actual Score} = \frac{127}{150} * 100 \ = \ 84.7\%$$

Table XX. Calculation Results Percentage Score Perception of Ease

Code	Weight	Question					Total
		1	2	3	4	5	
SA	5	3	0	1	0	3	7
A	4	2	4	2	3	2	13
N	3	0	1	2	2	0	5
DA	2	0	0	0	0	0	0
SD	1	0	0	0	0	0	0
Number of respondents		5	5	5	5	5	
Skor Aktual		23	19	19	18	23	102
Ideal Score		25	25	25	25	25	125

$$\text{\% Actual Score} = \frac{102}{125} * 100 \ = \ 81.6\%$$

Table XXI. Calculation Results Percentage Score User Acceptance

Code	Weight	Question				Total
		1	2	3	4	
SA	5	0	0	2	5	7
A	4	2	3	3	0	8
N	3	3	2	0	0	5
DA	2	0	0	0	0	0
SD	1	0	0	0	0	0
Number of respondents		5	5	5	5	
Actual Score		17	18	22	25	82
Ideal Score		25	25	25	25	100

$$\text{\% Actual Score} = \frac{82}{100} * 100 \ = \ 82\%$$

Table XXII. Conclusion Testing

No	Testing Aspect	Actual Score	Ideal Score	% Ideal Score	Description
1.	Useful Perception	127	150	84,7 %	Strongly Agree
2.	Perception of Ease	102	125	81,6 %	Strongly Agree
3.	User Acceptance Perception	82	100	82 %	Strongly Agree

IV. CONCLUSION

A. Conclusion

Based on the problems, literature study, research reviews, research objects and research methodology in the decision support system to choose the best customers at SQ Stores Kebaya with AHP, SAW, and WASPAS methods. So it can be concluded as follows:

1. This research produces a web-based decision support system with the AHP method as a weighting method and gets the results of the priority weights and importance levels of each criterion, namely status (0.37), payment method (0.23), total spending (0.14).Store owners be *SQ* accurate (right on target) in choosing the best customers.
2. The results of ranking the best customers obtained the largest percentage of alternative values, namely the results of the alternative value of the SAW method with an average of 0.6952, while the WASPAS method was 0.6405. It can be concluded that the right method and can be used to obtain the optimal best alternative in the case of making the decision to choose the best customer at the SQ Store Kebaya is the SAW method. So it is hoped that this

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SAW method is used appropriately to choose the best customers at SQ Stores kebaya.

3. The results of the *User Acceptance Test* (UAT) test using the *Technology Acceptance Method* (TAM) by emphasizing on 3 aspects of the test. The result of the percentage score based on the Usability aspect is 84.7%, the percentage score for the Convenience aspect is 81.6% and the percentage score for the User Acceptance aspect is 82%. In general, the percentage of the UAT score in this study was 82.7% and based on the score interval it can be concluded that the user Strongly Agrees with the Decision Support System (DSS) for Selecting the Best Customers by Using the *Analytical Hierarchy Process* (AHP), Method *Simple Additive Weighting Method* (PBUH) and Stores *Weight Aggregated Sum Product Assessment* (WASPAS) Method at SQ kebaya.

B. **Suggestions**

Based on the conclusions of existing research, the suggestions that the authors give for the development of a Decision Support System (DSS) to Choose the Best Customers Using the *Simple Additive Weighting* (SAW) and Method *Weight Aggregated Sum Product Assessment* (WASPAS) pada Toko SQ Kebaya yaitu:

1. This research can be continued with different decision support system methods in selecting the best customer, and the information system model can be developed even better.
2. The SQ Kebaya Store can provide input and suggestions for improvements to the research that has been done.

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