Implementation of Simple Additive Weighting to Determine Priority for Handling Customer Complaints

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Abstract

The number of population is increasing, and the competition is getting tougher. It requires companies to remain able to survive and be able to compete with other companies, especially with companies that have the same line of business. The increasing use of the internet today has caused many changes in various fields. Many efforts are made by the company to survive, including by providing the best service to its customers. The use of existing technology for developing information systems for handling customer complaints is expected to help companies improve the quality of their products or services. In company management, it is important to provide good quality service in order to increase customer satisfaction. By determining the priority for handling customer complaints, it is expected to improve the Key Performance Indicator (KPI) of engineers. The decision-making process using the simple additive weighting method is carried out by weighting each criterion. This research is expected to determine the priority of handling customer complaints so that it can help engineers in determining the priorities for handling existing complaints.

Keywords: Customer complain, KPI, Simple Additive Weighting

1. Introduction

The number of population is increasing, and the competition is getting tougher demands that companies can survive and be able to compete with other companies, especially with companies that have the same line of business.[1]. The increasing use of the internet today has caused many changes in various fields. Many efforts are made by the company to survive, including by providing the best service to its customers [2]. The rapid development of existing technology, be it software, hardware, and computational methods, one of which is Decisions Support System can help someone in the decision-making process [3][4][5]. The use of existing technology for developing information systems for handling customer complaints is expected to help companies improve the quality of their products or services.

Within the company, it is important to provide good quality service in order to increase customer satisfaction. Complaints about the services provided are an indicator of company performance appraisal, where any complaints that are not resolved properly can result in a negative impression of the customer towards the company [6]. Every customer complaint that is resolved properly, will increase customer satisfaction with the performance provided by the company, so that with high customer satisfaction it can increase the profits that will be obtained by the company [7].
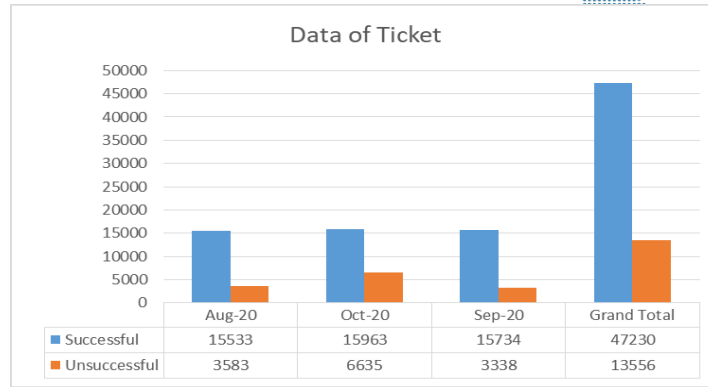
Figure 1. Complaint Ticket Data

In Figure 1, there are 13356 Tickets that have not been solved, and only 47230 Tickets have been solved. So that based on the above problems, the idea emerged to make a decision support system application to determine priority handling of customer complaints which is expected to make it easier for engineers to determine customer complaint handling decisions quickly and accurately. This system will adopt predetermined criteria.

2. Research Methodology

The Simple Additive Weighting method is a method that is often known as the weighted addition method. The basic concept of the Simple Additive Weighting method is to find the weighted sum of the performance ratings for each alternative on all attributes. The advantage of the SAW method with other methods is its ability to assess more precisely because it is based on the criteria value and the level of importance required [8][9].

The formula for carrying out the normalization is as follows:

$$r_{ij} = \begin{cases} \dfrac{x_{ij}}{\text{Max } x_{ij}} & \text{If j is a benefit attribute} \\ \dfrac{\text{Min } x_{ij}}{x_{ij}} & \text{If j is a Cost Attribute} \end{cases}$$

(1)

Information of r_{ij} is a normalized performance rating of the alternative Ai on the Cj criteria / attributes, i=1,2,3...,m dan j=1,2,3...,n.
Description
Max X_{ij} : The greatest value of each criterion.
Min X_{ij} : The smallest value of each criterion.
X_{ij} : The attribute value of each attribute.
Benefit : If the greatest value is the best value.
Cost : If the smallest value is the best value.

$$V_i = \sum_{j=1}^{n} w_j \, r_{ij}$$

(2)

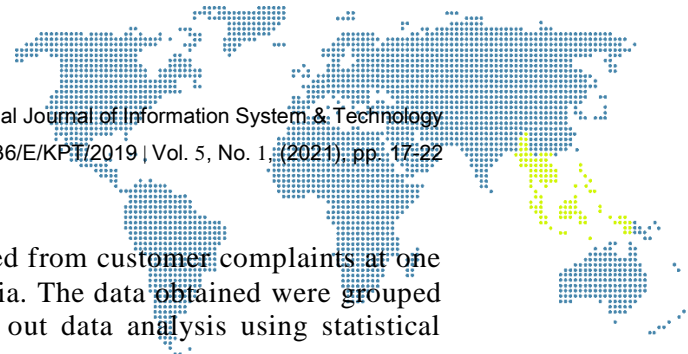The preference value for each alternative (Vi) is given the following formula:
Where
V_i : Rank for each alternative.
W_j : the weighted value of each criterion.
r_{ij} : normalized performance rating value.
A larger value of V indicates that the alternative Ai is preferred [10].

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3. Results and Discussion

The data source used in this study was obtained from customer complaints at one of the telecommunications companies in Indonesia. The data obtained were grouped according to predetermined criteria and carried out data analysis using statistical techniques.

3.1. Weighting Criteria Analysis

In the process of implementing Simple Additive Weighting to determine the priority of customer complaints, weighting is needed on each predetermined criterion. There are 2 (two) criteria that will be used in determining the handling of customer complaints. The criteria previously established to determine the handling of customer complaints are:

Table 1. Types of Alarms Based on Complaints

Types of Alarms Based on Complaints	C_1
Red Los	4
Rx Unstandard	3
All service down	2
Slow speed	1

Data from table 1 is the criteria for the type of alarm based on complaints and the value of crips (C_1) which will be matched with the alternative weight value.

Table 2. Package Type

Package Type	C_2
Value 30 Mbps	1
Fast 50 Mbps	2
Nova 100 Mbps	3
Supernova 300 Mbps	4
Gamer 50 Mbps	5
Gamer 150 Mbps	6
Business 50	7
Business 100	8
Business 300	9
Business Pro 150	10

Data from table 2 is the criteria for the type of package and the value of crips (C_2) which will be matched with the alternative weight values. From the table of criteria 1 and 2 above, it can be explained that several variables are used as input matrices, which are as follows:

Variable C_1 = Types of Alarms Based on Criteria
Variable C_2 = Package Type

3.2. Analysis of Discussion and Results

At this testing stage, the existing data will be tested using the Simple Additive Weighting method which is used to determine the priority for handling customer complaints.

Tabel 3. Alternative Criteria

Alternative Name	Criteria	
	C_1	C_2
Customer 1	2	2
Customer 2	3	3
Customer 3	2	4
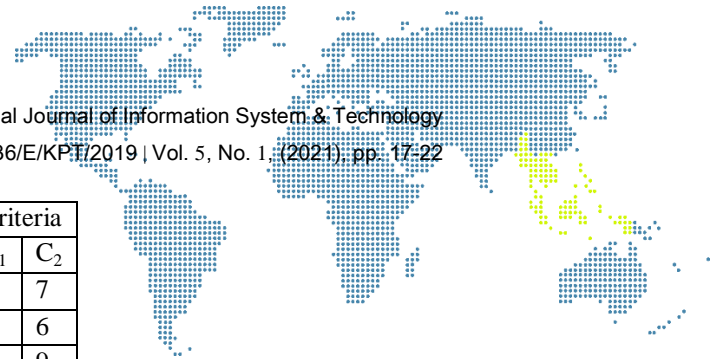
Alternative Name	Criteria	
	C_1	C_2
Customer 4	2	7
Customer 5	4	6
Customer 6	3	9
Customer 7	2	1
Customer 8	3	5
Customer 9	4	9
Customer 10	1	7

Table 3 above is a sample data of 10 customers who reported problems regarding the service they received for calculations using Simple Additive Weighting. Based on Table 3 above, a decision matrix X can be formed with the following data:

$$X = \begin{pmatrix} 2 & 2 \\ 3 & 3 \\ 2 & 4 \\ 2 & 7 \\ 4 & 6 \\ 3 & 9 \\ 2 & 1 \\ 3 & 5 \\ 4 & 9 \\ 1 & 7 \end{pmatrix}$$

The next step is to normalize the X matrix to calculate each criterion, based on the criteria assumed to be the criteria for benefit and cost. The following is the calculation result of the normalization matrix X:

$R_{1.1}$ Min X_{ij} / X_{ij} = 1/2 = 0.5

$R_{1.2}$ Min X_{ij} / X_{ij} = 1/3 = 0.333

$R_{1.3}$ Min X_{ij} / X_{ij} = 1/2 = 0.5

$R_{1.4}$ Min X_{ij} / X_{ij} = 1/2 = 0.5

$R_{1.5}$ Min X_{ij} / X_{ij} = 1/4 = 0.25

$R_{1.6}$ Min X_{ij} / X_{ij} = 1/3= 0.333

$R_{1.7}$ Min X_{ij} / X_{ij} = 1/2= 0.5

$R_{1.8}$ Min X_{ij} / X_{ij} = 1/3= 0.333

$R_{1.9}$ Min X_{ij} / X_{ij} = 1/4= 0.25

$R_{1.10}$Min X_{ij} / X_{ij} = 1/1= 1

$R_{2.1}$ X_{ij} / Max X_{ij} = 2/9 = 0.222

$R_{2.2}$ X_{ij} / Max X_{ij} = 3/9 = 0.333

$R_{2.3}$ X_{ij} / Max X_{ij} = 4/9 = 0.444

$R_{2.4}$ X_{ij} / Max X_{ij} = 7/9 = 0.778

$R_{2.5}$ X_{ij} / Max X_{ij} = 6/9 = 0.667

$R_{2.6}$ X_{ij} / Max X_{ij} = 9/9 = 1

$R_{2.7}$ X_{ij} / Max X_{ij} = 1/9 = 0.111

$R_{2.8}$ X_{ij} / Max X_{ij} = 5/9 = 0.556

$R_{2.9}$ X_{ij} / Max X_{ij} = 9/9 = 1

$R_{2.10}$$X_{ij}$ / Max X_{ij} = 7/9 = 0.778

Based on the results of the calculation of the normalized matrix X, the normalized matrix R can be determined below:

$$X = \begin{pmatrix} 0,5 & 0,222 \\ 0,333 & 0,333 \\ 0,5 & 0,444 \\ 0,5 & 0.778 \\ 0,25 & 0,667 \\ 0,333 & 1 \\ 0,5 & 0,111 \\ 0,333 & 0,556 \\ 0,25 & 1 \\ 1 & 0,778 \end{pmatrix}$$
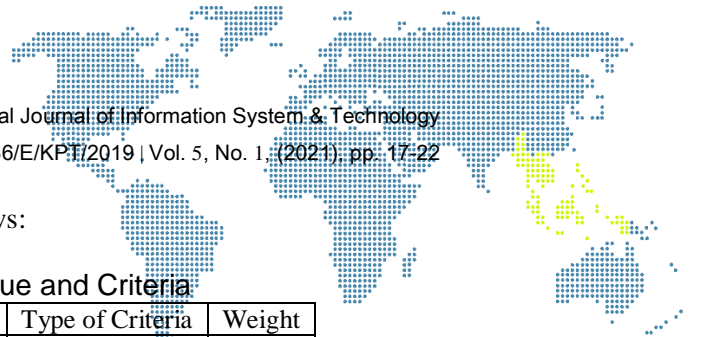
The weight value of each of these criteria is as follows:

Table 4. Table of Weight Value and Criteria

No	Criteria	Type of Criteria	Weight
1	Types of Alarms Based on Complaints	Cost	60%
2	Package Type	Benefit	40%

It is known that W = [0,60   0,40]

$V_1 = (0,6*0,5)+(0,4*0,222) = 0.3888$

$V_2 = (0,6*0,333)+(0,4*0,333) = 0.3333$

$V_3 = (0,6*0,5)+(0,4*0,4444) = 0.4776$

$V_4 = (0,6*0,5)+(0,4*0,778) = 0.6112$

$V_5 = (0,6*0,25)+(0,4*0,667) = 0.4168$

$V_6 = (0,6*0,333)+(0,4*1) = 0.5998$

$V_7 = (0,6*0,5)+(0,4*0,111) = 0.3444$

$V_8 = (0,6*0,333)+(0,4*0,556) = 0.4222$

$V_9 = (0,6*0,25)+(0,4*1) = 0.55$

$V_{10} = (0,6*1)+(0,4*0,778) = 0.9112$

All values for the V1 - V10 ratings from the multiplication result with normalization are combined in table 4, so that the weighted results are obtained in the table. 5.

Table 5. Total Value of Sample Data

Alternative name	Criteria		Result
	C_1	C_2	
Customer 1	2	2	0,3888
Customer 2	3	3	0,3333
Customer 3	2	4	0,4776
Customer 4	2	7	0,6112
Customer 5	4	6	0,4168
Customer 6	3	9	0,5998
Customer 7	2	1	0,3444
Customer 8	3	5	0,4222
Customer 9	4	9	0,55
Customer 10	1	7	0,9112

The results of the grouping above have not gotten the actual results for the 10 alternative customers, so it is necessary to do the ranking by sorting the highest yield values to the lowest ones. The results of the ranking of the 10 customers can be seen in table 6.

Table 6. Result of the Decision

Alternative name	Criteria		Result	Rank
	C_1	C_2		
Customer 1	2	2	0,3888	8
Customer 2	3	3	0,3333	10
Customer 3	2	4	0,4776	5
Customer 4	2	7	0,6112	2
Customer 5	4	6	0,4168	7
Customer 6	3	9	0,5998	3
Customer 7	2	1	0,3444	9
Customer 8	3	5	0,4222	6
Customer 9	4	9	0,55	4
Customer 10	1	7	0,9112	1
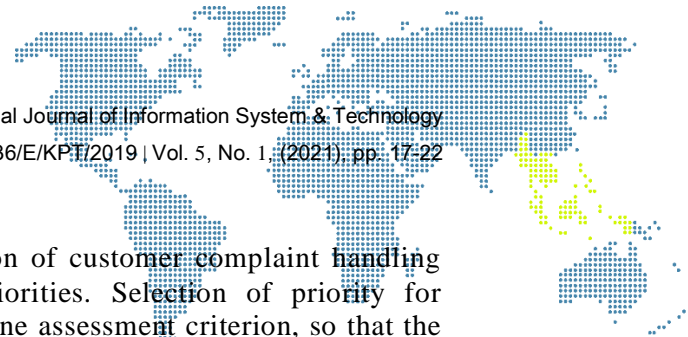
4. Conclusion

From the results of this research, the selection of customer complaint handling can be generated based on predetermined priorities. Selection of priority for handling customer complaints is not only from one assessment criterion, so that the results obtained can be accepted to determine priority for handling customer complaints. In this study, there are 2 criteria used to determine customer priority handling, namely Types of Alarms Based on Complaints and Package Type. In testing the system being developed, 10 customer data is tested. Based on the tests conducted, Customer 10 complaints are the ones that have the highest priority, and Customer 2 complaints are the complaints that have the lowest priority.

Acknowledgments

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