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OPTIMIZATION OF DECISION SUPPORT SYSTEM (DSS) CUSTOMER SERVICE OF TELECOMMUNICATION COMPANIES WITH MOORA METHOD

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Abstract: Decision Support System (DSS) in telekomunication company service is the key to improving customer satisfaction and operational efficiency. This study aims to assess and select the optional customer service strategy using the Mutly Objective Optimization on The Basic of Ratio Analysis (MOORA) method. This approach is used to analyze various indicators such as respon time, complaint resolution, service cost and costomer satisfaction to find the most efficient solution. The research finding indicate that the MOORA method can provide from the calculation results, it was found that the age range <25 years was ranked first as users who felt satisfied with Product Quality, Price, Service Quality, and the most telecommunications users and the second rank was the age range 25-35 years, the third rank was the age range 36-45 years, the fourth rank was the age range >45 years. The implementation of DSS strengthened by MOORA is expected to improve the quality of service and competitiveness of companies in the competitive telecomunication industry.

Keywords: customer service; DSS; MOORA; telecomunication; optimization

Abstrak: Sistem Pendukung Keputusan (DSS) dalam layanan perusahaan telekomunikasi merupakan kunci untuk meningkatkan kepuasan pelanggan dan efisiensi operasional. Penelitian ini bertujuan untuk menilai dan memilih strategi layanan pelanggan opsional dengan menggunakan metode Mutly Objective Optimization on The Basic of Ratio Analysis (MOORA). Pendekatan ini digunakan untuk menganalisis berbagai indikator seperti waktu respons, penyelesaian keluhan, biaya layanan dan kepuasan pelanggan untuk menemukan solusi yang paling efisien. Temuan penelitian menunjukkan bahwa metode MOORA dapat memberikan Dari hasil perhitungan, ditemukan bahwa rentang usia <25 tahun menduduki peringkat pertama sebagai pengguna yang merasa puas terhadap Kualitas Produk, Harga, Kualitas Layanan, dan pengguna telekomunikasi terbanyak dan peringkat kedua adalah rentang usia 25-35 tahun, peringkat ketiga adalah rentang usia 36-45 tahun, peringkat keempat adalah rentang usia >45 tahun. Penerapan DSS yang diperkuat oleh MOORA diharapkan dapat meningkatkan kualitas layanan dan daya saing perusahaan dalam industri telekomunikasi yang kompetitif.

Kata kunci: DSS; MOORA; layanan pelanggan; telekomunikasi; optimasi

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INTRODUCTION

Maintaining customer loyalty in the telecommunications industry means handling customer complaints quickly and accurately. By providing customer data, complaint history, and recommendations for the best solution, decision support systems (DSS) improve process efficiency. With DSS, customer service can easily find patterns of problems that often occur and immediately provide the right solution without having to do a long manual search. In addition, DSS offers historical data-based solutions to help automate the complaint resolution process [1]. In telecommunications companies, DSS can directly suggest problem solutions to customers[2].

Not only will it speed up problem resolution, but it will also reduce the workload of customer service, allowing them to serve more customers in less time. In addition, an integrated system can integrate various communication methods, such as chatbots, email, social media, and telephone, to monitor and manage all complaints[3]. With this method, communication companies can ensure that every customer complaint gets the right attention, reduce the possibility of complaints going unanswered, and monitor how customer service agents handle complaints so that companies can find areas where services need to be improved[4].

Telecommunication companies can increase customer satisfaction, reduce churn rates, and enhance their reputation as responsive and reliable service providers [5].

The purpose of this study is to improve the quality of customer service of telecommunications companies so that customers can receive accurate and precise information. With more responsive and efficient services, it is expected that the level of customer satisfaction will increase. Because customer satisfaction is one of the indicators of company performance, companies can evaluate aspects of service that need to be improved if customers feel dissatisfied or disadvantaged. If this happens, it can endanger the reputation and survival of the company[6]. Therefore, this study concentrates on how companies can use DSS technology to identify problems faster, provide better solutions to complaints, and proactively take action to improve customer experience [7].

In this study, the following problems are formulated the first what is the role of DSS in improving the efficiency and effectiveness of customer service in telecommunications companies. Second how DSS can help in processing customer data to provide faster and more accurate solutions to customer complaints and third challenges faced when implementing DSS in telecommunications companies[8].

A decision support system (DSS) is a component of a knowledge management system that functions significantly to assist an organization or company in the decision-making process. DSS can be described as a computer system that can transform data into information needed for a relatively structured decision-making process [9]. DSS assists the decision-making process by helping solve problems and communicate about structured and unstructured problems[10].

Decision Systems have objectives related to basic principles that include the structure of problems that are difficult to distinguish between structured and unstructured problems, so that computer decision support is needed to be applied to the unstructured parts of the

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problem so that effective decisions can be made [11].

DSS explains the type that provides the least support is the manager taking the information element, where the manager in the implementation of the Decision Support System (DSS) in telecommunications companies, the information elements used are very diverse and have an important role in supporting more accurate and efficient decision making[12]. One of the main elements is customer data, which includes customer profiles, service usage history, complaints that have been submitted, and satisfaction levels based on surveys and reviews. In addition, DSS also relies on network operational data[13] such as network status, service usage traffic, and network capacity monitoring, which helps companies optimize service performance and resolve disruptions more quickly [14].

In addition to technical aspects, customer financial data will be a crucial element in DSS including customer payment history, revenue analysis and customer churn prediction to identify potential customers who will stop using the service[15]. Telecommunication companies need to consider competitor and market data such as competitor price and service analysis, communication market trends and marketing effectiveness to maintain competitiveness [16].

Moora is one of the methods in the Decision Support System or DSS which is used to solve multi-criteria problems in decision making[17]. This method has a good level of selectivity in determining an alternative. The approach taken by MOORA is defined as a simultaneous process to optimize two or more conflicting constraints on several constraints [18]. MOORA works by normalizing each criterion in a decision and then optimizing the values obtained to obtain the best alternative [19].

METODE

The existing framework describes the research flow starting from determining the topic through a literature review and data processing using the MOORA method collecting primary data using questionnaire to analyzing the result which culminate in decision support system (DSS).

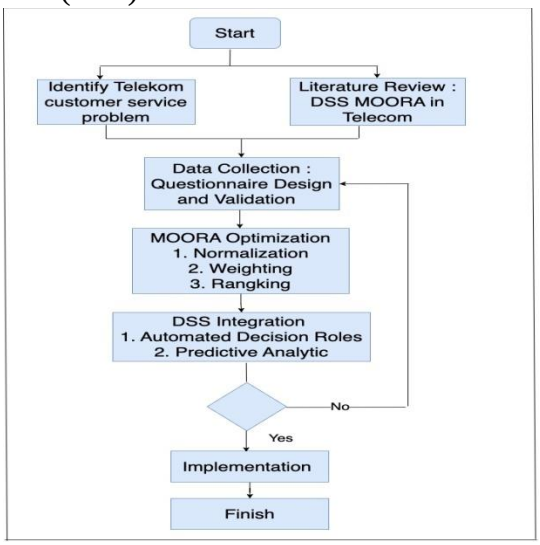

Image 1. Framework

Data collection was done using a questionnaire. In addition to interviews, data collection was also done using a questionnaire. A questionnaire is a series of formal questions used to obtain information from respondents. In this form of question, respondents are asked to answer questions in the form of a scale to measure the respondent's attitude towards the questions in the questionnaire [11]. Likert Scale 1-5 is used in this study which is divided into: 1: Strongly Agree, 2: Agree, 3: Neutral, 4: Disagree, 5: Strongly Disagree.

Identify attributes and evaluate them. All identified attributes are formed into a de-

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cision matrix. Then the ratio system is developed into a comparison alternative, where the attributes are compared as denominators[20]. The attributes themselves are representatives for all these alternatives, Determine the value of the decision matrix

$$X_{ij} = \begin{bmatrix} X_{11}\ X_{1i}\ X_{1n} \\ X_{j1}\ X_{ji}\ X_{jn} \\ X_{m1}\ X_{m1}\ X_{mn} \end{bmatrix} \dots\dots\dots (1)$$

Determining the normalization of the matrix. Concluded by Breaures, for the denominator, the best choice is the square root of the sum of the squares and each alternative per attribute.

$$X_{ij}^{*} = \frac{x_{ij}}{\sqrt{\left[\Sigma_{j=1}^{m}\ x_{ij}^{2}\right]}} \dots\dots\dots (2)$$

Determining the attribute optimization For Multi-Objective optimization, the normalized performance is added in the case of maximization (for profitable attributes) and subtracted in the case of minimization (for non-profitable attributes

$$Y_1 = \sum_{j-1}^{x} W_j\ X_{ij}^{*} - \sum_{j=g+1}^{n} W_j X_{ij}^{*} \dots\dots (3)$$

The value of Yi depends on the maximum and minimum totals in the decision matrix, positive or negative bias. The ranking of the Yi values can be used as the decision result.

The questionnaire was filled out by respondents, this study used questionnaire distribution conducted on some telecommunication users with as many as 64 respondents so that it is easier for researchers to get appropriate respondents. In addition to primary data, this study also uses secondary data obtained from journals, books, articles from print media, and the internet.

RESULT AND DISCUSSION

The objects in this research are: The criteria in this research are Product Quality, Cost, Service Quality, Majority of Users. The alternative in this study uses the user age range, namely:

Table 1. Alternatif

No	Alternatif	Kode
1	< 25 year	A01
2	25-35 year	A02
3	36-45 year	A03
4	> 45 year	A04

Table 2. Input criteria value

No	Criteria name	Weight Value	Criteria
1	Product quality	A01	Benefit
2	Affordable prices	A02	Cost
3	Majority of Users	A03	Benefit
4	Service Quality	A04	Benefit

Information:
Cost = Min
Benefit = Max

Table 3. Responden to criteria

Alternatif	C1	C2	C3	C4
A01	2,7	2,86	2,5	2,89
A02	1,95	2,33	1,86	2,3
A03	1,92	2,56	1,93	2,31
A04	2,075	1,96	2	2,29
Optimum	Max	Min	Max	Max

Table 4. Decision matrix

Alternatif	C1	C2	C3	C4
A01	2,7	2,86	2,5	2,89
A02	1,95	2,33	1,86	2,3
A03	1,92	2,56	1,93	2,31

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A04	2,075	1,96	2	2,29

	2,7	2,86	2,5	2,89
	1,95	2,33	1,86	2,3
Xij =	1,92	2,56	1,93	2,31
	2,075	1,96	2	2,29

Table 5. Normalisasi Matriks

Product Quality (C1)		Affordable Price (C2)	
X_{A01}	0,618049254	X_{A01}	0,58375006
X_{A02}	0,446368906	X_{A02}	0,475572601
X_{A03}	0,439501692	X_{A03}	0,522517536
X_{A04}	0,474982297	X_{A04}	0,400052488

Table 6. Normalisasi Matriks

Majority User (C3)		Service Quality (C4)	
X_{A01}	0,598735846	X_{A01}	0,587205552
X_{A02}	0,44545947	X_{A02}	0,467326218
X_{A03}	0,462224073	X_{A03}	0,469358071
X_{A04}	0,478988677	X_{A04}	0,465294365

Product quality normalization 1:

$$x^*_{1.1} = \frac{x_{1.1}}{\sqrt{x^2_{1.1} + x^2_{2.1} + x^2_{3.1} + x^2_{4.1}}}$$
$$x^*_{1.1} = \frac{2.7}{\sqrt{x^2_{2.7} + x^2_{1.95} + x^2_{1.92} + x^2_{2.075}}}$$
$$x^*_{1.1} = \frac{2.7}{\sqrt{19.084525}}$$
$$x^*_{1.1} = 0,618049254$$

Product quality normalization 2:

$$x^*_{2.1} = \frac{x_{2.1}}{\sqrt{x^2_{1.1} + x^2_{2.1} + x^2_{3.1} + x^2_{4.1}}}$$
$$x^*_{2.1} = \frac{1,95}{\sqrt{x^2_{2.7} + x^2_{1.95} + x^2_{1.92} + x^2_{2.075}}}$$
$$x^*_{2.1} = \frac{1,95}{\sqrt{19.084525}}$$
$$x^*_{2.1} = 0,44636890569$$

Product quality normalization 4:

Price Normalization 1:

$$x^*_{1.2} = \frac{x_{1.2}}{\sqrt{x^2_{1.2} + x^2_{2.2} + x^2_{3.2} + x^2_{4.2}}}$$
$$x^*_{1.2} = \frac{2,86}{\sqrt{x^2_{2.86} + x^2_{2.33} + x^2_{2.56} + x^2_{1.96}}}$$
$$x^*_{1.2} = \frac{2,86}{\sqrt{24.0037}}$$
$$x^*_{1.2} = 0,58375005969$$

Price Normalization 2:

$$x^*_{2.2} = \frac{x_{2.2}}{\sqrt{x^2_{1.2} + x^2_{2.2} + x^2_{3.2} + x^2_{4.2}}}$$
$$x^*_{2.2} = \frac{2,33}{\sqrt{x^2_{2.86} + x^2_{2.33} + x^2_{2.56} + x^2_{1.96}}}$$
$$x^*_{2.2} = \frac{2,33}{\sqrt{24.0037}}$$
$$x^*_{2.2} = 0,47557260108$$

Use Normalization 1:

$$x^*_{1.3} = \frac{x_{1.3}}{\sqrt{x^2_{1.3} + x^2_{2.3} + x^2_{3.3} + x^2_{4.3}}}$$
$$x^*_{1.3} = \frac{2.5}{\sqrt{x^2_{2.5} + x^2_{1.85} + x^2_{1.93} + x^2_{2}}}$$
$$x^*_{1.3} = \frac{2.5}{\sqrt{17.3974}}$$
$$x^*_{1.3} = 0,59937390933$$

Use Normalization 2:

$$x^*_{2.3} = \frac{x_{2.3}}{\sqrt{x^2_{1.3} + x^2_{2.3} + x^2_{3.3} + x^2_{4.3}}}$$
$$x^*_{2.3} = \frac{1.85}{\sqrt{x^2_{2.5} + x^2_{1.85} + x^2_{1.93} + x^2_{2}}}$$
$$x^*_{2.3} = \frac{1.85}{\sqrt{17.3974}}$$
$$x^*_{2.3} = 0,44353669291$$

Service Normalization 1:

$$x^*_{1.4} = \frac{x_{1.4}}{\sqrt{x^2_{1.4} + x^2_{2.4} + x^2_{3.4} + x^2_{4.4}}}$$
$$x^*_{1.4} = \frac{2.89}{\sqrt{x^2_{2.89} + x^2_{2.3} + x^2_{2.31} + x^2_{2.29}}}$$
$$x^*_{1.4} = \frac{2.89}{\sqrt{24.2223}}$$
$$x^*_{1.4} = 0,58720555234$$

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Service Normalization 2:

$$x^*_{2.4} = \frac{x_{2.4}}{\sqrt{x^2_{1.4} + x^2_{2.4} + x^2_{3.4} + x^2_{4.4}}}$$

$$x^*_{2.4} = \frac{2.3}{\sqrt{x^2_{2.89} + x^2_{2.3} + x^2_{2.31} + x^2_{2.29}}}$$

$$x^*_{2.4} = \frac{2.3}{\sqrt{24.2223}}$$

$$x^*_{2.4} = 0,46732631812$$

Table 7. Matrix Ternomalisasi

Matrix Ternomalisasi			
0,618049	0,58375	0,598736	0,587206
0,446369	0,475573	0,445459	0,467326
0,439502	0,522518	0,462224	0,469358
0,474982	0,400052	0,478989	0,465294
C1	C2	C3	C4

Table. 8 Result

Hasil				
A01	0,123609851	0,087562509	0,089810377	0,293602776
A02	0,089273781	0,07133589	0,06681892	0,233663109
A03	0,087900338	0,07837763	0,06933611	0,234679036
A04	0,094996459	0,06007873	0,07148302	0,232647183
Optimum	Max	Min	Max	Max

Table 9 Rank

Alf	Max	Min	Yi	Ranking
A01	0,507023004	0,087562509	0,419460495	1
A02	0,389755811	0,071335890	0,318419921	3
A03	0,391912985	0,078377630	0,313535355	4
A04	0,399491943	0,060007873	0,339484070	2

CONCLUSION

This study analyzed telecommunication user satisfaction using four criteria product quality, price, service quality and number user evaluated across different age grups. From the total of 64 responden, 10 sample per age grup were selected to ensure balanced representation in data analysis. The result revealed that user aged >25 years ranked first in satisfaction across all aspect including product quality, affordability, and service exelence while also representing the largest user base among the telecommunication consumers studied. The 25-35 age grup secured second place, followed by 36-45 years in third and respondents age >45 years in fourth position. These finding highlight distinct generalition preferences in telecom service expectation with younger user demonstrating the highest satisfaction levels. The stratified sampling approach by age range provides valuable insight for targeted service improvement and market segmentation strangies in the telecommunication industry

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