Customer Relationship Management to Retain Customers with the Topsis Method

Muhammad Nuzul Ikhsan 1
1 Putra Indonesia University YPTK Padang
Muhammadnuzulikhsan24@gmail.com

Abstract

In the era of globalization, the increasingly rapid development of technological sophistication is an aspect that can be utilized to achieve convenience, including the flow of information. Each company has its own way of retaining customers. At the Metacom store, efforts to retain customers have not been carried out in an updated and online manner. Customer Relationship Management (CRM) is one way of retaining customers to fulfill this goal by combining CRM and TOPSIS methods. For this reason, customer data analysis was carried out at the Metacom store using the Topsis method, from 10 transaction data, 2 were recommended to be given a discount on the goods. The results of applying TOPSIS use ranking results from goods transaction results. This Topsis analysis can be used to change a CRM application, where this application is equipped with a sales information system as well as goods data collection (Cashier) and a sales application using the Topsis method with a combination of these two methods in the Metacom Store. From the processed data, the ranking results show that the one with the highest preference value is the Flashdisk alternative with a value of 0.78.

Keywords : Customer Relationship Management, TOPSIS Method, Sales, Ranking, Transactions.

JCSITech is licensed under a Creative Commons 4.0 International License.

1. Introduction

In the era of globalization, the increasingly rapid development of technological sophistication is an aspect that can be utilized to achieve convenience, including the flow of information. With increasingly advanced technology from time to time, the use of this easy and practical technology cannot be denied that business processes really need information technology which makes an information system a primary need to support the development of an existing system. The large amount of data held can have an impact on the information delivery process. In order to obtain quality information, a collection of data must be processed so as to produce information that is useful for all parties who receive the information [1].

A customer is any individual who receives a type of good or service from some other person or group of people. Customers are defined as people who buy, especially those who buy regularly and continuously. A customer is someone who continuously and repeatedly comes to the same place to satisfy his desires by buying a product or getting a service and paying for the product or service [2].

Customer Relationship Management is an important strategy for every business sector organization. By using Customer Relationship Management, companies can find out more about the extent of CRM utilization and how to provide optimal service to customers [3]. Customer Relationship Management (CRM) is a concept that focuses on maintaining relationships between companies and customers to build long and profitable relationships with customers [4]. CRM is a new approach to managing corporate relationships with customers at a business level so that it can maximize communication and marketing through managing various different contacts. This approach makes it possible to retain customers and provide continuous added value to customers. CRM combines the policies, processes and strategies implemented by the company into one whole. The use of CRM is to interact with customers and also to track customer information. CRM is a new approach to managing relationships between corporations and business customers. With this relationship, it is hoped that there will be communication and marketing through managing various different contacts. This approach is taken to increase customer loyalty to the company and also add continuous value. Currently, CRM implementations almost always use information technology to attract profitable new customers so that they become attached to the company[ 5].

TOPSIS is a multi-criteria decision support method that was first introduced by Yoon and Hwang (Rahim, et al., 2018). TOPSIS ( Technique For Others Reference by Similarity to Ideal Solution) uses the principle that the alternative chosen must have the shortest distance from the positive ideal solution and have the furthest distance from the negative ideal solution from the geometric point. Using euclidean
distance to determine the relative closeness between alternatives to the optimal solution [6].

In previous research conducted by Iin Mutmainah and Yunita in 2021 with the title Application of the TOPSIS Method in Selecting Expedition Services, in this research there were many factors that influenced the selection of expedition services, such as delivery time, prices offered and services provided. At first the company chose shipping service partners based solely on custom, however, problems often occurred such as unsatisfactory service, untidy packing of goods, quite high prices, etc. The result is customer dissatisfaction with the services provided. In this study applying the TOPSIS method as one of the problem solvers in the selection of expedition services, using the TOPSIS method can determine the best expedition service partner by searching for the value of the distance from the ideal positive solution and the ideal negative solution. With the application of this method, determining the selection of the best expeditionary services becomes objective [7].

In previous research conducted by Muhammad Alhafa Ardhy and Said Salim in 2022 with the title Selection of Coconut Fruit Suppliers using the AHP and TOPSIS Method at PT XYZ, in this research the quality and availability of raw materials played an important role in the production process. To overcome buyer problems and produce quality goods, supplier selection needs to be carried out further to ensure the quality and safety of production supplies. From the results of this research, it can be concluded that the AHP method is known to get the best supplier results with the highest value, namely the Head of Singaraja farmers, then using the TOPSIS method also gets the same results, namely the Singaraja coconut farmers in first place. In this way, both methods obtain similar decisions to determine the best coconut supplier [8].

Many other studies such as

2. Research methodology

Research methodology is a branch of science that explains or discusses procedures for carrying out research based on scientific facts or symptoms, which includes activities of formulating, analyzing and preparing reports. The research framework created in the research methodology has a goal, namely to get results that are in line with what is expected and to make it easy to solve problems and so that they do not deviate or leave the subject of discussion so that they are easier to understand. Therefore, a research framework is needed as shown in Figure 1 below:

Research stages are steps that must be taken to make conducting research easier. The stages of this research are as follows:

Formulation of the problem
Formulation of this problem is the first step in conducting research to find out the problems that occur in the object. So this research can provide solutions for METACOM Stores to increase marketing, product sales and increase customer loyalty and how to retain customers.

Data collection
In collecting data, the author collected from various sources by searching for references such as books, e-books, journals and scientific works, both in libraries and on the internet, as well as those related to research. Data was also obtained from field studies by direct observation and interviews.

Data analysis
Based on the preliminary research above, data analysis was carried out with the aim of problem solving to find the right solution and avoid the emergence of new problems.

System Design
At this stage, the system design is carried out with the aim that the designed system does not deviate from the research objectives.

System Implementation
System implementation is a stage that is carried out when the designed system is ready to operate. Implementation is carried out with the aim of confirming the results of system design, so that users can provide input (feedback) on system development.

System Testing
The testing stage is the stage for testing the usability and function of the resulting system, as well as
ensuring that the designed system is in accordance with the design previously made.

3. Results and Discussion

This research was conducted at the Metacom Store, in front of the Midwife Ani Clinic, Jl. Dr. Moh. Hatta, Cupak Tangah, Kec. Pauh, Padang City, West Sumatra 25162. In this case the author made direct observations at the place under study in order to obtain research data such as alternative sampling and the criteria to be tested in Table 1 below:

<table>
<thead>
<tr>
<th>No</th>
<th>Transaction Name</th>
<th>Transaction Type</th>
<th>Price</th>
<th>Request</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pen</td>
<td>Goods</td>
<td>7000</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Paper</td>
<td>Goods</td>
<td>32000</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Flashdisk</td>
<td>Goods</td>
<td>90000</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Glue</td>
<td>Goods</td>
<td>10000</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Mouse</td>
<td>Goods</td>
<td>35000</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Keyboard</td>
<td>Goods</td>
<td>55000</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Scans</td>
<td>Service</td>
<td>2000</td>
<td>15</td>
</tr>
<tr>
<td>8</td>
<td>Photocopy</td>
<td>Service</td>
<td>1000</td>
<td>20</td>
</tr>
<tr>
<td>9</td>
<td>Volume</td>
<td>Service</td>
<td>4000</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>Laptop Service</td>
<td>Service</td>
<td>70000</td>
<td>3</td>
</tr>
</tbody>
</table>

Assessment of the Weight of Interest for Each Criterion, among others:
1. Transaction Type Criteria

<table>
<thead>
<tr>
<th>No</th>
<th>Transaction Type</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Server</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Goods</td>
<td>4</td>
</tr>
</tbody>
</table>

2. Price Criteria

<table>
<thead>
<tr>
<th>Price</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;=1000</td>
<td>Very low</td>
</tr>
<tr>
<td>&gt;=10000</td>
<td>Low</td>
</tr>
<tr>
<td>&gt;=20000</td>
<td>Enough</td>
</tr>
<tr>
<td>&gt;=50000</td>
<td>Tall</td>
</tr>
<tr>
<td>&gt;=80000</td>
<td>Very high</td>
</tr>
</tbody>
</table>

3. Request Criteria

<table>
<thead>
<tr>
<th>No</th>
<th>Request</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 to 5</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>6 to 10</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>10 to 15</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>16 onwards</td>
<td>4</td>
</tr>
</tbody>
</table>

To determine the weight of customer transactions, it is formed in Table 6 below:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Weight</th>
<th>Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>K1</td>
<td>Very High (V)</td>
<td>1</td>
</tr>
<tr>
<td>K2</td>
<td>Height (H)</td>
<td>0.3</td>
</tr>
<tr>
<td>K3</td>
<td>Medium (S)</td>
<td>0.2</td>
</tr>
</tbody>
</table>

1. Decision Matrix Normalization

\[ r_{ij} = \frac{X_{ij}}{\sqrt{\sum_{i=1}^{m} X_{ij}^2}} \]

Based on Equation 1, alternative normalization values will be calculated based on the criteria

\[ |x1| \geq 4^2 + 4^2 + 4^2 + 4^2 + 4^2 + 4^2 + 1^2 + 1^2 + 1^2 + 1^2 = 100 \]

\[ R_{11} = \frac{4}{10} = 0.4 \quad R_{16} = \frac{4}{10} = 0.4 \]

\[ R_{12} = \frac{4}{10} = 0.4 \quad R_{17} = \frac{2}{10} = 0.2 \]

\[ R_{13} = \frac{4}{10} = 0.4 \quad R_{18} = \frac{2}{10} = 0.2 \]

\[ R_{14} = \frac{4}{10} = 0.4 \quad R_{19} = \frac{10}{10} = 1 \]

\[ R_{15} = \frac{4}{10} = 0.4 \quad R_{110} = \frac{10}{10} = 1 \]

\[ |x2| \geq 1^2 + 3^2 + 5^2 + 1^2 + 3^2 + 4^2 + 1^2 + 1^2 + 1^2 + 4^2 = 89.4 \]

\[ \sqrt{89.4} = 9.45 \]

\[ R_{21} = \frac{1}{9.45} = 0.10 \quad R_{26} = \frac{4}{9.45} = 0.42 \]

\[ R_{22} = \frac{3}{9.45} = 0.31 \quad R_{27} = \frac{1}{9.45} = 0.10 \]

\[ R_{23} = \frac{8.94}{9.45} = 0.94 \quad R_{28} = \frac{1}{9.45} = 0.10 \]

\[ R_{24} = \frac{1}{9.45} = 0.10 \quad R_{29} = \frac{4}{9.45} = 0.42 \]

\[ R_{25} = \frac{0.34}{9.45} = 0.03 \quad R_{210} = \frac{0.45}{9.45} = 0.45 \]
2. Calculating a weighted normalized matrix (Y)

\[ Y_{ij} = W_i \times R_j \]

The following weight calculations are performed:

\[ y_{11} = (0.4) \times (1) = 0.4 \]
\[ y_{12} = (0.4) \times (0.5) = 0.2 \]
\[ y_{13} = (0.4) \times (0.5) = 0.2 \]
\[ y_{14} = (0.4) \times (0.5) = 0.2 \]
\[ y_{15} = (0.4) \times (0.5) = 0.2 \]
\[ y_{16} = (0.4) \times (0.5) = 0.2 \]
\[ y_{17} = (0.4) \times (0.5) = 0.2 \]
\[ y_{18} = (0.4) \times (0.5) = 0.2 \]
\[ y_{19} = (0.4) \times (0.5) = 0.2 \]
\[ y_{110} = (0.4) \times (0.5) = 0.2 \]

So the result is as follows:

Table 8 Normalized Matrix

<table>
<thead>
<tr>
<th>No</th>
<th>Alternative (R)</th>
<th>K1</th>
<th>K2</th>
<th>K3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pen</td>
<td>0.4</td>
<td>0.06</td>
<td>0.03</td>
</tr>
<tr>
<td>2</td>
<td>Paper</td>
<td>0.4</td>
<td>0.17</td>
<td>0.03</td>
</tr>
<tr>
<td>3</td>
<td>Flashdisk</td>
<td>0.4</td>
<td>0.28</td>
<td>0.03</td>
</tr>
<tr>
<td>4</td>
<td>Glue</td>
<td>0.4</td>
<td>0.06</td>
<td>0.03</td>
</tr>
<tr>
<td>5</td>
<td>Mouse</td>
<td>0.4</td>
<td>0.17</td>
<td>0.03</td>
</tr>
<tr>
<td>6</td>
<td>Keyboard</td>
<td>0.4</td>
<td>0.23</td>
<td>0.03</td>
</tr>
<tr>
<td>7</td>
<td>Scans</td>
<td>0.1</td>
<td>0.06</td>
<td>0.1</td>
</tr>
<tr>
<td>8</td>
<td>Photocopy</td>
<td>0.1</td>
<td>0.11</td>
<td>0.14</td>
</tr>
<tr>
<td>9</td>
<td>Volume</td>
<td>0.1</td>
<td>0.06</td>
<td>0.03</td>
</tr>
<tr>
<td>10</td>
<td>Laptop Service</td>
<td>0.1</td>
<td>0.06</td>
<td>0.03</td>
</tr>
</tbody>
</table>

4. Calculating the Distance to the Ideal Solution (D+) and the Distance to the Ideal Solution (D−)

\[ D^+_i = \sqrt{\sum_{j=1}^{N} (y_{ij} - y_{ij}^*)^2} \]
\[ D^-_i = \sqrt{\sum_{j=1}^{N} (y_{ij}^* - y_{ij})^2} \]

So the values for the ideal solution (A+) and ideal solution (A−) are as follows:

Table 9 Ideal Solution

<table>
<thead>
<tr>
<th>No</th>
<th>Alternative (R)</th>
<th>K1</th>
<th>K2</th>
<th>K3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pen</td>
<td>0.4</td>
<td>0.06</td>
<td>0.03</td>
</tr>
<tr>
<td>2</td>
<td>Paper</td>
<td>0.4</td>
<td>0.17</td>
<td>0.03</td>
</tr>
<tr>
<td>3</td>
<td>Flashdisk</td>
<td>0.4</td>
<td>0.28</td>
<td>0.03</td>
</tr>
<tr>
<td>4</td>
<td>Glue</td>
<td>0.4</td>
<td>0.06</td>
<td>0.03</td>
</tr>
<tr>
<td>5</td>
<td>Mouse</td>
<td>0.4</td>
<td>0.17</td>
<td>0.03</td>
</tr>
<tr>
<td>6</td>
<td>Keyboard</td>
<td>0.4</td>
<td>0.23</td>
<td>0.03</td>
</tr>
<tr>
<td>7</td>
<td>Scans</td>
<td>0.1</td>
<td>0.06</td>
<td>0.1</td>
</tr>
<tr>
<td>8</td>
<td>Photocopy</td>
<td>0.1</td>
<td>0.11</td>
<td>0.14</td>
</tr>
<tr>
<td>9</td>
<td>Volume</td>
<td>0.1</td>
<td>0.06</td>
<td>0.03</td>
</tr>
<tr>
<td>10</td>
<td>Laptop Service</td>
<td>0.1</td>
<td>0.06</td>
<td>0.03</td>
</tr>
</tbody>
</table>
\[ D^+_\nu = (\nu_1 - 0.4)^2 + (\nu_2 - 0.23)^2 + (\nu_3 - 0.03)^2 \]
\[ D^-_\nu = (\nu_1 - 0.09)^2 + (\nu_2 - 0.03)^2 + (\nu_3 + 0.12)^2 \]
\[ D^+_\nu = (\nu_1 - 0.4)^2 + (\nu_2 - 0.23)^2 + (\nu_3 - 0.03)^2 \]
\[ D^-_\nu = (\nu_1 - 0.09)^2 + (\nu_2 - 0.03)^2 + (\nu_3 + 0.12)^2 \]
\[ v_1 = \frac{D^+_\nu}{D^+_\nu + D^-_\nu} = 0.25 \]
\[ v_2 = \frac{D^+_\nu}{D^+_\nu + D^-_\nu} = 0.32 \]
\[ v_3 = \frac{D^+_\nu}{D^+_\nu + D^-_\nu} = 0.37 \]
\[ v_4 = \frac{D^+_\nu}{D^+_\nu + D^-_\nu} = 0.3 \]
\[ v_5 = \frac{D^+_\nu}{D^+_\nu + D^-_\nu} = 0.32 \]
\[ v_6 = \frac{D^+_\nu}{D^+_\nu + D^-_\nu} = 0.34 \]
\[ v_7 = \frac{D^+_\nu}{D^+_\nu + D^-_\nu} = 0.07 \]
\[ v_8 = \frac{D^+_\nu}{D^+_\nu + D^-_\nu} = 0.1 \]
\[ v_9 = \frac{D^+_\nu}{D^+_\nu + D^-_\nu} = 0 \]
\[ v_{10} = \frac{D^+_\nu}{D^+_\nu + D^-_\nu} = 0.17 \]

5. Calculating the Preference Value of each Alternative

6. Ranking Results

<table>
<thead>
<tr>
<th>No</th>
<th>Trans name</th>
<th>Results</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flashdisk</td>
<td>0.78</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Keyboard</td>
<td>0.74</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Paper</td>
<td>0.68</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Mouse</td>
<td>0.68</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Pen</td>
<td>0.55</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>Glue</td>
<td>0.55</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>Laptop Service</td>
<td>0.34</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>Photocopy</td>
<td>0.22</td>
<td>8</td>
</tr>
<tr>
<td>9</td>
<td>Scans</td>
<td>0.16</td>
<td>9</td>
</tr>
<tr>
<td>10</td>
<td>Volume</td>
<td>0</td>
<td>10</td>
</tr>
</tbody>
</table>

From the ranking results, the result that has the highest preference value is the Flashdisk alternative with a value of 0.78.

3.1 System Testing

This page is the first page seen by cashiers and admins when opening the website. Before entering the home page, you must first log in by entering the username and password that has been registered in the database.

The sales data page will display sales data on the Metacom Store. This sales data is obtained from the sales data input made by the cashier. The sales data page can be seen in the admin and cashier.

This page will display data on goods available at the Metacom Store. Here the admin can also add new item data, make changes to item data, and delete existing item data.
This page will display goods and sales report data. Admin can view goods and sales reports. Apart from that, admins can also print existing sales reports.

On this page we can input the name of the criteria, the type of criteria and weight from the criteria to perform the Topsis process.

On this page we can input the item number, give the item name and determine the weight of the goods based on the weight of predetermined criteria.

The following is an example of the results of inputting a list of goods which are referred to as the decision matrix (x):

4. Conclusion

Using the TOPSIS method in the Customer Relationship Management (CRM) system, 10 data tables are obtained, where calculations are carried out, the recommended results are 2 out of 10, so that Metacom Store owners can find out which products are high in price and are not in demand so that product marketing can be improved. This way if the purchase of the product is more than 1 then a discount will be given at a price determined by the shop owner as formed to maintain customers at the store. Metacom Stores can build relationships with customer-buyers so that regular customers are formed who always shop at Metacom Stores. This of course increases sales while keeping customers always shopping at Metacom Stores.

References


