CHAPTER IV

DATA COLLECTING AND PROCESSING

4.1 Data Collecting

Tokopedia is an Indonesian technology company with a mission to achieve digital economic equality. Since it was founded in 2009, Tokopedia has transformed into a unicorn that is influential not only in Indonesia but also in Southeast Asia. Tokopedia is known as market-place for customer to customer business, it plays role on the electronic commerce as online trading. The researcher conducts the research about electronic service quality analysis in Tokopedia.

In this research, the data were obtained from expert’s linguistic variables that has the similarity in subject of the research and result of questionnaire’s previous research. This research used dimensions and attributes of electronic service quality from previous research. Data were collected by previous research and literature. The purpose of the fuzzy rule is to make the value of fuzzy set and membership function for input of each level to determine the prioritized dimensions and attributes of electronic service quality framework. Electronic service quality (E-Servqual) consist of dimensions, and every dimension has the attributes. Thus, in order to know the prioritized dimensions and attribute, the researcher make the fuzzy set determination as the measurement of the linguistic variable based on the previous research. This fuzzy set determination is used for all the attributes and dimension, either input or output. Then, rule-based system is applied, the necessary of fuzzy rule is to define the score of the output which is being analyze the highest score to have the prioritized one. The data input of attribute is the mean score from the previous research, and the input of dimensions is the result of the
attribute’s output, thus, as the input of E-Servqual. The detailed data for this research will be shown below.

4.1.1 Framework

Electronic service quality frameworks consist of several dimensions and attributes. In E-Servqual practices consist of web design, responsiveness, confidentiality of security, approachability of access, efficiency, system availability, fulfillment, and merchandising. The complete dimensions and attributes of electronic service quality frameworks from Zeithaml et al (2009) and modified by the researcher then it is shown in Table 4.1.

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web Design</td>
<td>Satisfied with the directions guide in finding the search menu, login and others</td>
</tr>
<tr>
<td></td>
<td>Interface and appearance that spoils the customer’s look</td>
</tr>
<tr>
<td></td>
<td>Fast promptness of the presentation site</td>
</tr>
<tr>
<td></td>
<td>Up to date information that follows the demand of customer</td>
</tr>
<tr>
<td>Responsiveness</td>
<td>Customer service has the willingness to help every customer’s problems until it solved in simplest way</td>
</tr>
<tr>
<td></td>
<td>Readiness of the employee for the respond to the customer</td>
</tr>
<tr>
<td></td>
<td>Timeliness and speed while response and solve the problem</td>
</tr>
<tr>
<td>Confidentiality of security</td>
<td>Protect the privacy of customer in proper</td>
</tr>
<tr>
<td>Approachability of access</td>
<td>Protect the transaction of customer from the error/broken</td>
</tr>
<tr>
<td></td>
<td>Provide the contact access to control the problem and complain of customer</td>
</tr>
<tr>
<td></td>
<td>Provider has the customer service in online for 24 hours</td>
</tr>
<tr>
<td>Efficiency</td>
<td>Ease of finding what is needed by the customer</td>
</tr>
<tr>
<td></td>
<td>Loading less of the website</td>
</tr>
<tr>
<td>System availability</td>
<td>Web site systems run the offer accurately</td>
</tr>
<tr>
<td></td>
<td>The system is rarely having trouble or error</td>
</tr>
<tr>
<td>Fulfillment</td>
<td>Honest on every offer given by the provider to customer</td>
</tr>
<tr>
<td></td>
<td>fulfill the promises, provide shopping activities, safety and comfort</td>
</tr>
<tr>
<td>Merchandising</td>
<td>Large amount of promotion offered</td>
</tr>
<tr>
<td></td>
<td>Many variations of promotion such as discount, free delivery and others</td>
</tr>
</tbody>
</table>

In the table above is shown the dimensions and its attributes of electronic service quality framework that researcher chooses as the framework to define the prioritized dimensions and attributes of electronic service quality. This framework is concern on the electronic service quality aspect for improving the satisfaction of customer. Zeithaml et
al (2009) stated that there are five basic dimensions of electronic service quality that can be driven. As lack of specification on the basic service quality, Tubagus (2018) expanded the dimensions and its attributes in order to make the analysis more accurate and understandable.

### 4.1.2 Attributes and Mean Scores

In the previous research, data of the respondents is processing of validation test and reliability test. Therefore, the data can be categorized as reliable data and can be continued to be proceed in this research. The result is mean data of respondents from previous research Tubagus (2018), the mean data of the previous research is used to get dimensions value from the average of its attributes, this research using the mean data to have more propiate dimensions score that based on the rules, the result more accurate to derivate to its attributes, thus, the prioritized dimensions and attribute will be knows, that is shown in Table 4.2.

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Attribute</th>
<th>Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web Design</td>
<td>(1) Navigation Structure</td>
<td>3.93</td>
</tr>
<tr>
<td></td>
<td>(2) Interface/ Appearance</td>
<td>3.95</td>
</tr>
<tr>
<td></td>
<td>(3) Fast presentation</td>
<td>3.93</td>
</tr>
<tr>
<td></td>
<td>(4) Updated information</td>
<td>3.90</td>
</tr>
<tr>
<td>Responsiveness</td>
<td>(1) Willingness to help customer</td>
<td>3.76</td>
</tr>
<tr>
<td></td>
<td>(2) Readiness</td>
<td>3.97</td>
</tr>
<tr>
<td></td>
<td>(3) Promptness (Timeliness and speed)</td>
<td>3.88</td>
</tr>
<tr>
<td>Confidentially</td>
<td>(1) Physical security</td>
<td>4.10</td>
</tr>
<tr>
<td></td>
<td>(2) Financial security</td>
<td>4.10</td>
</tr>
<tr>
<td>Approachability</td>
<td>(1) Ease of contact</td>
<td>4.04</td>
</tr>
<tr>
<td></td>
<td>(2) Timely access</td>
<td>3.94</td>
</tr>
<tr>
<td>Efficiency</td>
<td>(1) Convenience</td>
<td>4.18</td>
</tr>
<tr>
<td></td>
<td>(2) Promptness</td>
<td>3.77</td>
</tr>
<tr>
<td>System availability</td>
<td>(1) Accurate order</td>
<td>3.99</td>
</tr>
<tr>
<td></td>
<td>(2) Error</td>
<td>3.67</td>
</tr>
<tr>
<td>Fulfillment</td>
<td>(1) Trustworthiness</td>
<td>4.08</td>
</tr>
<tr>
<td></td>
<td>(2) Reputation of service</td>
<td>4.09</td>
</tr>
<tr>
<td>Merchandising</td>
<td>(1) Number of offering</td>
<td>3.93</td>
</tr>
<tr>
<td></td>
<td>(2) Variety of offering</td>
<td>3.96</td>
</tr>
</tbody>
</table>

Based on the table above, the mean score is used for the input of each attributes to have the score for dimensions. Thus, the dimension’s mean score will be used for determining the highest score of dimensions E-Servqual.
4.2 Data Processing

4.2.1 Fuzzy Sets Determination

Fuzzy sets determination is used to determine the score of expert’s linguistic variable for each dimensions and attributes of electronic service quality frameworks for e-commerce Tokopedia. The figure of fuzzy sets determination is shown in Figure 4.1.

![Figure 4.1 Fuzzy Sets Determination from Mathlab](image)

The weights of fuzzy set are based on Likert Scale. The range of Likert scale are Very Poor is 1; Poor is 2; Moderate is 3; Quite Good is 4; Very Good is 5. Rating scales typically require the respondent to select their answer from range of verbal statement or numbers (Dawes, 2008). Likert scale is translated into 3 parameters. Likert scale is translated into Low with the weights of score are 1, 2 and 3; Medium weights score are 2, 3, and 4; and High weights score are 3, 4, and 5.

4.2.2 Membership Function

Membership function is used to find out each membership function of dimensions and attribute in electronic service quality frameworks. The membership function can be done after the create the fuzzy sets. Each of membership function for every dimension that consists of attributes will be detailed below.

1. Web Design

Web Design has 3 linguistic variables which are Very Poor is 1; Poor is 2; Moderate is 3; Quite Good is 4; Very Good is 5. Likert scale is translated into 3 parameters. Likert scale is translated into Low with the weights of score are 1, 2 and 3; Medium weights score are 2, 3, and 4; and High weights score are 3, 4, and 5. Membership function of Web Design is shown in Figure 4.2.
2. **Responsiveness**

Responsiveness has 3 linguistic variables which are Very Poor is 1; Poor is 2; Moderate is 3; Quite Good is 4; Very Good is 5. Likert scale is translated into 3 parameters. Likert scale is translated into Low with the weights of score are 1, 2 and 3; Medium weights score are 2, 3, and 4; and High weights score are 3, 4, and 5. Membership function of Responsiveness is shown in Figure 4.3.

3. **Security**

Security has 3 linguistic variables which are Very Poor is 1; Poor is 2; Moderate is 3; Quite Good is 4; Very Good is 5. Likert scale is translated into 3 parameters. Likert scale is translated into Low with the weights of score are 1, 2 and 3; Medium weights score are 2, 3, and 4; and High weights score are 3, 4, and 5. Membership function of Security is shown in Figure 4.4.
4. Efficiency

Efficiency has 3 linguistic variables which are Very Poor is 1; Poor is 2; Moderate is 3; Quite Good is 4; Very Good is 5. Likert scale is translated into 3 parameters. Likert scale is translated into Low with the weights of score are 1, 2 and 3; Medium weights score are 2, 3, and 4; and High weights score are 3, 4, and 5. Membership function of Efficiency is shown in Figure 4.5.

5. System Availability

System Availability has 3 linguistic variables which are Very Poor is 1; Poor is 2; Moderate is 3; Quite Good is 4; Very Good is 5. Likert scale is translated into 3 parameters. Likert scale is translated into Low with the weights of score are 1, 2 and 3; Medium weights score are 2, 3, and 4; and High weights score are 3, 4, and 5. Membership function of System Availability is shown in Figure 4.6.
6. Fulfillment

Fulfillment has 3 linguistic variables which are Very Poor is 1; Poor is 2; Moderate is 3; Quite Good is 4; Very Good is 5. Likert scale is translated into 3 parameters. Likert scale is translated into Low with the weights of score are 1, 2 and 3; Medium weights score are 2, 3, and 4; and High weights score are 3, 4, and 5. Membership function of Fulfilment is shown in Figure 4.7.

Figure 4.7 Membership Function of Fulfillment

7. Merchandising

Merchandising has 3 linguistic variables which are Very Poor is 1; Poor is 2; Moderate is 3; Quite Good is 4; Very Good is 5. Likert scale is translated into 3 parameters. Likert scale is translated into Low with the weights of score are 1, 2 and 3; Medium weights score are 2, 3, and 4; and High weights score are 3, 4, and 5. Membership function of Merchandising is shown in Figure 4.8.

Figure 4.8 Membership Function of Merchandising

4.2.3 Fuzzy Rule System

Development of fuzzy rule system using Mamdani Inference System. The general form of fuzzy rules is shown as below:
1. Web Design
   a. Web Design/Site Design = A
   b. Satisfied with the directions guide in finding the search menu, login and others = a1
   c. Interface and appearance that spoils the customer’s look = a2
   d. Fast promptness of the presentation site = a3
   e. Up to date information that follows the demand of customer = a4

R1 = IF a1 is LOW AND a2 is LOW AND a3 is LOW AND a4 is LOW THEN A is LOW
R2 = IF a1 is LOW AND a2 is MED AND a3 is LOW AND a4 is MED THEN A is LOW
R3 = IF a1 is LOW AND a3 is LOW THEN A is LOW
R4 = IF a1 is MED AND a2 is MED AND a3 is MED AND a4 is MED THEN A is MED
R5 = IF a1 is MED AND a2 is LOW AND a3 is MED AND a4 is LOW THEN A is MED
R6 = IF a1 is MED AND a2 is HIGH AND a3 is MED AND a4 is HIGH THEN A is MED
R7 = IF a1 is MED AND a3 is MED THEN A is MED
R8 = IF a1 is HIGH AND a2 is HIGH AND a3 is HIGH AND a4 is MED THEN A is HIGH
R9 = IF a1 is HIGH AND a2 is MED AND a3 is HIGH AND a4 is MED THEN A is HIGH
R10 = IF a1 is HIGH AND a3 is HIGH THEN A is HIGH
R11 = IF a1 is MED OR a2 is LOW OR a3 is HIGH OR a4 is LOW THEN A is LOW
R12 = IF a1 is HIGH AND a2 is NOT MED AND a3 is NOT LOW AND a4 is MED THEN A is LOW
R13 = IF a1 is LOW OR a2 is LOW AND a3 is LOW AND a4 is MED THEN A is LOW
R14 = IF a1 is LOW OR a2 is MED OR a3 is LOW OR a4 is MED THEN A is LOW
R15 = IF a1 is LOW AND a3 is LOW THEN A is LOW
R16 = IF a1 is MED OR a2 is MED OR a3 is MED OR a4 is MED THEN A is MED
R_{17} = \text{IF } a_1 \text{ is LOW AND } a_2 \text{ is MED AND } a_3 \text{ is NOT LOW AND } a_4 \text{ is MED THEN } A \text{ is NOT LOW}
R_{18} = \text{IF } a_1 \text{ is NOT LOW AND } a_2 \text{ is NOT LOW AND } a_3 \text{ is NOT LOW AND } a_4 \text{ is NOT LOW THEN } A \text{ is NOT LOW}
R_{19} = \text{IF } a_1 \text{ is LOW AND } a_2 \text{ is NOT LOW AND } a_3 \text{ is LOW AND } a_4 \text{ is NOT LOW THEN } A \text{ is LOW}
R_{20} = \text{IF } a_1 \text{ is NOT LOW AND } a_2 \text{ is NOT LOW AND } a_3 \text{ is MED AND } a_4 \text{ is NOT LOW THEN } A \text{ is MED}
R_{21} = \text{IF } a_1 \text{ is NOT LOW AND } a_3 \text{ is MED AND } a_4 \text{ is NOT LOW THEN } A \text{ is MED}
R_{22} = \text{IF } a_1 \text{ is NOT LOW OR } a_3 \text{ is MED OR } a_4 \text{ is HIGH THEN } A \text{ is MED}
R_{23} = \text{IF } a_1 \text{ is MED OR } a_2 \text{ is HIGH AND } a_3 \text{ is NOT LOW OR } a_4 \text{ is HIGH THEN } A \text{ is HIGH}

2. Responsiveness
   a. Responsiveness = B
   b. Readiness of the employee for the respond to the customer = b_1
   c. Timeliness and speed while response and solve the problem = b_2
   d. Customer service has the willingness to help every customer’s problems until it solved in simplest way = b_3
R_1 = \text{IF } b_1 \text{ is LOW AND } b_2 \text{ is LOW AND } b_3 \text{ is LOW THEN } B \text{ is LOW}
R_2 = \text{IF } b_1 \text{ is MED AND } b_2 \text{ is MED AND } b_3 \text{ is LOW THEN } B \text{ is MED}
R_3 = \text{IF } b_1 \text{ is LOW AND } b_2 \text{ is LOW THEN } B \text{ is LOW}
R_4 = \text{IF } b_1 \text{ is LOW AND } b_2 \text{ is LOW AND } b_3 \text{ is MED THEN } B \text{ is LOW}
R_5 = \text{IF } b_1 \text{ is MED AND } b_2 \text{ is MED AND } b_3 \text{ is MED THEN } B \text{ is MED}
R_6 = \text{IF } b_1 \text{ is MED AND } b_2 \text{ is MED AND } b_3 \text{ is HIGH THEN } B \text{ is MED}
R_7 = \text{IF } b_1 \text{ is HIGH AND } b_2 \text{ is MED AND } b_3 \text{ is HIGH THEN } B \text{ is MED}
R_8 = \text{IF } b_1 \text{ is HIGH AND } b_2 \text{ is HIGH AND } b_3 \text{ is HIGH THEN } B \text{ is HIGH}
R_9 = \text{IF } b_1 \text{ is HIGH AND } b_2 \text{ is HIGH AND } b_3 \text{ is MED THEN } B \text{ is HIGH}
R_{10} = \text{IF } b_1 \text{ is LOW OR } b_2 \text{ is LOW OR } b_3 \text{ is LOW THEN } B \text{ is LOW}
R_{11} = \text{IF } b_1 \text{ is NOT HIGH OR } b_2 \text{ is LOW OR } b_3 \text{ is NOT HIGH THEN } B \text{ is NOT HIGH}
R_{12} = \text{IF } b_1 \text{ is LOW AND } b_2 \text{ is NOT HIGH AND } b_3 \text{ is MED THEN } B \text{ is NOT HIGH}
R_{13} = \text{IF } b_1 \text{ is NOT HIGH AND } b_2 \text{ is LOW AND } b_3 \text{ is NOT HIGH THEN } B \text{ is NOT HIGH}
R_{14} = \text{IF } b_1 \text{ is NOT LOW OR } b_2 \text{ is MED OR } b_3 \text{ is HIGH THEN } B \text{ is NOT LOW}
R_{15} = \text{IF } b_1 \text{ is MED OR } b_2 \text{ is MED OR } b_3 \text{ is HIGH THEN } B \text{ is MED}

3. Confidentially of security
   a. Confidentially of security = C
   b. Protect the privacy of customer in proper = c_1
   c. Protect the transaction of customer from the error/broken = c_2
      R_1 = \text{IF } c_2 \text{ is LOW THEN } C \text{ is LOW}
      R_2 = \text{IF } c_1 \text{ is MED OR } c_2 \text{ is LOW THEN } C \text{ is LOW}
      R_3 = \text{IF } c_1 \text{ is LOW OR } c_2 \text{ is MED THEN } C \text{ is LOW}
      R_4 = \text{IF } c_1 \text{ is LOW AND } c_2 \text{ is LOW THEN } C \text{ is LOW}
      R_5 = \text{IF } c_1 \text{ is MED OR } c_2 \text{ is HIGH THEN } C \text{ is MED}
      R_6 = \text{IF } c_1 \text{ is HIGH AND } c_2 \text{ is MED THEN } C \text{ is MED}
      R_7 = \text{IF } c_1 \text{ is MED OR } c_2 \text{ is MED THEN } C \text{ is MED}
      R_8 = \text{IF } c_1 \text{ is HIGH OR } c_2 \text{ is HIGH THEN } C \text{ is HIGH}
      R_9 = \text{IF } c_1 \text{ is HIGH AND } c_2 \text{ is HIGH THEN } C \text{ is HIGH}
      R_{10} = \text{IF } c_1 \text{ is NOT LOW AND } c_2 \text{ is NOT LOW THEN } C \text{ is NOT LOW}
      R_{11} = \text{IF } c_1 \text{ is LOW THEN } C \text{ is LOW}
      R_{12} = \text{IF } c_1 \text{ is MED OR } c_2 \text{ is HIGH THEN } C \text{ is MED}
      R_{13} = \text{IF } c_1 \text{ is LOW AND } c_2 \text{ is HIGH THEN } C \text{ is MED}
      R_{14} = \text{IF } c_1 \text{ is MED AND } c_2 \text{ is LOW THEN } C \text{ is LOW}
      R_{15} = \text{IF } c_1 \text{ is MED AND } c_2 \text{ is NOT LOW THEN } C \text{ is MED}
      R_{16} = \text{IF } c_1 \text{ is MED OR } c_2 \text{ is NOT LOW THEN } C \text{ is MED}
      R_{17} = \text{IF } c_1 \text{ is HIGH OR } c_2 \text{ is NOT LOW THEN } C \text{ is MED}
      R_{18} = \text{IF } c_1 \text{ is NOT HIGH AND } c_2 \text{ is HIGH THEN } C \text{ is LOW}
      R_{19} = \text{IF } c_1 \text{ is NOT HIGH OR } c_2 \text{ is LOW THEN } C \text{ is LOW}
      R_{20} = \text{IF } c_1 \text{ is NOT HIGH OR } c_2 \text{ is MED THEN } C \text{ is MED}

4. Approachability of access
   a. Approachability of access = D
b. Provide the contact access to control the problem and complain of customer = d₁
   
c. Provider has the customer service in online for 24 hours = d₂
      
      \[ R₁ = \text{IF} \ d₁ \ \text{is LOW AND} \ d₂ \ \text{is LOW THEN} \ D \ \text{is LOW} \]
      \[ R₂ = \text{IF} \ d₂ \ \text{is LOW THEN} \ D \ \text{is LOW} \]
      \[ R₃ = \text{IF} \ d₁ \ \text{is MED AND} \ d₂ \ \text{is MED THEN} \ D \ \text{is MED} \]
      \[ R₄ = \text{IF} \ d₁ \ \text{is MED OR} \ d₂ \ \text{is MED THEN} \ D \ \text{is MED} \]
      \[ R₅ = \text{IF} \ d₁ \ \text{is HIGH AND} \ d₂ \ \text{is MED THEN} \ D \ \text{is MED} \]
      \[ R₆ = \text{IF} \ d₁ \ \text{is HIGH OR} \ d₂ \ \text{is HIGH THEN} \ D \ \text{is LOW} \]
      \[ R₇ = \text{IF} \ d₁ \ \text{is HIGH AND} \ d₂ \ \text{is HIGH THEN} \ D \ \text{is HIGH} \]
      \[ R₈ = \text{IF} \ d₁ \ \text{is LOW THEN} \ D \ \text{is LOW} \]
      \[ R₉ = \text{IF} \ d₁ \ \text{is MED AND} \ d₂ \ \text{is LOW THEN} \ D \ \text{is MED} \]
      \[ R₁₀ = \text{IF} \ d₁ \ \text{is MED OR} \ d₂ \ \text{is LOW THEN} \ D \ \text{is MED} \]
      \[ R₁₁ = \text{IF} \ d₁ \ \text{is HIGH OR} \ d₂ \ \text{is MED THEN} \ D \ \text{is MED} \]
      \[ R₁₂ = \text{IF} \ d₁ \ \text{is HIGH AND} \ d₂ \ \text{is MED THEN} \ D \ \text{is HIGH} \]

5. Efficiency
   
   a. Efficiency = E
   
   b. Ease of finding what is needed by the customer = e₁
   
   c. High speed of loading the website = e₂
      
      \[ R₁ = \text{IF} \ e₁ \ \text{is LOW AND} \ e₂ \ \text{is LOW THEN} \ E \ \text{is LOW} \]
      \[ R₂ = \text{IF} \ e₁ \ \text{is LOW OR} \ e₂ \ \text{is LOW THEN} \ E \ \text{is LOW} \]
      \[ R₃ = \text{IF} \ e₁ \ \text{is HIGH AND} \ e₂ \ \text{is NOT LOW THEN} \ E \ \text{is MED} \]
      \[ R₄ = \text{IF} \ e₁ \ \text{is MED AND} \ e₂ \ \text{is MED THEN} \ E \ \text{is MED} \]
      \[ R₅ = \text{IF} \ e₁ \ \text{is HIGH AND} \ e₂ \ \text{is HIGH THEN} \ E \ \text{is HIGH} \]
      \[ R₆ = \text{IF} \ e₁ \ \text{is HIGH AND} \ e₂ \ \text{is MED THEN} \ E \ \text{is MED} \]
      \[ R₇ = \text{IF} \ e₁ \ \text{is NOT LOW AND} \ e₂ \ \text{is NOT HIGH THEN} \ E \ \text{is NOT HIGH} \]
      \[ R₈ = \text{IF} \ e₁ \ \text{is MED AND} \ e₂ \ \text{is LOW THEN} \ E \ \text{is LOW} \]
      \[ R₉ = \text{IF} \ e₁ \ \text{is MED AND} \ e₂ \ \text{is HIGH THEN} \ E \ \text{is MED} \]
      \[ R₁₀ = \text{IF} \ e₁ \ \text{is MED OR} \ e₂ \ \text{is LOW THEN} \ E \ \text{is LOW} \]
      \[ R₁₁ = \text{IF} \ e₁ \ \text{is LOW OR} \ e₂ \ \text{is MED THEN} \ E \ \text{is LOW} \]

6. System availability
   
   a. System availability = F
b. Web site systems run the offer accurately = $f_1$

c. The system is rarely having trouble or error = $f_2$

\[
\begin{align*}
R_1 & = \text{IF } f_1 \text{ is LOW AND } f_2 \text{ is LOW THEN } F \text{ is LOW} \\
R_2 & = \text{IF } f_1 \text{ is LOW AND } f_2 \text{ is MED THEN } F \text{ is LOW} \\
R_3 & = \text{IF } f_1 \text{ is LOW AND } f_2 \text{ is HIGH THEN } F \text{ is LOW} \\
R_4 & = \text{IF } f_1 \text{ is MED AND } f_2 \text{ is HIGH THEN } F \text{ is MED} \\
R_5 & = \text{IF } f_1 \text{ is HIGH AND } f_2 \text{ is HIGH THEN } F \text{ is HIGH} \\
R_6 & = \text{IF } f_1 \text{ is HIGH AND } f_2 \text{ is MED THEN } F \text{ is MED} \\
R_7 & = \text{IF } f_1 \text{ is HIGH AND } f_2 \text{ is LOW THEN } F \text{ is LOW} \\
R_8 & = \text{IF } f_1 \text{ is MED OR } f_2 \text{ is LOW THEN } F \text{ is LOW} \\
R_9 & = \text{IF } f_1 \text{ is MED OR } f_2 \text{ is HIGH THEN } F \text{ is MED} \\
R_{10} & = \text{IF } f_1 \text{ is NOT LOW OR } f_2 \text{ is HIGH THEN } F \text{ is NOT LOW} \\
R_{11} & = \text{IF } f_1 \text{ is MED OR } f_2 \text{ is HIGH THEN } F \text{ is MED} \\
R_{12} & = \text{IF } f_1 \text{ is NOT HIGH AND } f_2 \text{ is MED THEN } F \text{ is NOT HIGH} \\
R_{13} & = \text{IF } f_1 \text{ is HIGH AND } f_2 \text{ is NOT LOW THEN } F \text{ is NOT LOW} \\
R_{14} & = \text{IF } f_1 \text{ is HIGH AND } f_2 \text{ is NOT LOW THEN } F \text{ is NOT LOW} \\
R_{15} & = \text{IF } f_1 \text{ is NOT LOW OR } f_2 \text{ is HIGH THEN } F \text{ is LOW} \\
R_{16} & = \text{IF } f_1 \text{ is NOT HIGH OR } f_2 \text{ is LOW THEN } F \text{ is LOW} \\
R_{17} & = \text{IF } f_1 \text{ is NOT LOW AND } f_2 \text{ is LOW THEN } F \text{ is LOW}
\end{align*}
\]

7. Fulfillment

a. Fulfillment = $G$

b. Honest on every offer given by the provider to customer = $g_1$

c. Fulfill the promises, provide shopping activities, safety and comfort = $g_2$

\[
\begin{align*}
R_1 & = \text{IF } g_1 \text{ is LOW AND } g_2 \text{ is LOW THEN } G \text{ is LOW} \\
R_2 & = \text{IF } g_1 \text{ is LOW OR } g_2 \text{ is LOW THEN } G \text{ is LOW} \\
R_3 & = \text{IF } g_1 \text{ is MED OR } g_2 \text{ is LOW THEN } G \text{ is LOW} \\
R_4 & = \text{IF } g_1 \text{ is LOW OR } g_2 \text{ is MED THEN } G \text{ is LOW} \\
R_5 & = \text{IF } g_1 \text{ is LOW AND } g_2 \text{ is LOW MED G is LOW} \\
R_6 & = \text{IF } g_1 \text{ is MED AND } g_2 \text{ is LOW THEN } G \text{ is LOW} \\
R_7 & = \text{IF } g_1 \text{ is MED AND } g_2 \text{ is MED THEN } G \text{ is MED} \\
R_8 & = \text{IF } g_1 \text{ is HIGH AND } g_2 \text{ is MED THEN } G \text{ is MED} \\
R_9 & = \text{IF } g_1 \text{ is HIGH AND } g_2 \text{ is HIGH THEN } G \text{ is HIGH}
\end{align*}
\]
R_{10} = \text{IF } g_1 \text{ is MED AND } g_2 \text{ is HIGH THEN } G \text{ is MED}
R_{11} = \text{IF } g_1 \text{ is MED OR } g_2 \text{ is HIGH THEN } G \text{ is MED}
R_{12} = \text{IF } g_1 \text{ is HIGH OR } g_2 \text{ is MED THEN } G \text{ is MED}
R_{13} = \text{IF } g_1 \text{ is NOT HIGH AND } g_2 \text{ is NOT HIGH THEN } G \text{ is NOT HIGH}
R_{14} = \text{IF } g_1 \text{ is NOT LOW AND } g_2 \text{ is HIGH THEN } G \text{ is NOT LOW}
R_{15} = \text{IF } g_1 \text{ is HIGH AND } g_2 \text{ is NOT LOW THEN } G \text{ is NOT LOW}
R_{16} = \text{IF } g_1 \text{ is LOW THEN } G \text{ is NOT HIGH}
R_{17} = \text{IF } g_1 \text{ is MED THEN } G \text{ is NOT HIGH}
R_{18} = \text{IF } g_2 \text{ is MED THEN } G \text{ is NOT HIGH}

8. Merchandising
   a. Merchandising = M
   b. Large amount of promotion offered = m_1
   c. Many variations of promotion such as discount, free delivery and others = m_2
      R_1 = \text{IF } m_1 \text{ is LOW AND } m_2 \text{ is LOW THEN } M \text{ is LOW}
      R_2 = \text{IF } m_1 \text{ is LOW OR } m_2 \text{ is LOW THEN } M \text{ is LOW}
      R_3 = \text{IF } m_1 \text{ is LOW AND } m_2 \text{ is MED THEN } M \text{ is LOW}
      R_4 = \text{IF } m_1 \text{ is MED AND } m_2 \text{ is LOW THEN } M \text{ is LOW}
      R_5 = \text{IF } m_1 \text{ is MED OR } m_2 \text{ is LOW THEN } M \text{ is LOW}
      R_6 = \text{IF } m_1 \text{ is LOW OR } m_2 \text{ is MED THEN } M \text{ is LOW}
      R_7 = \text{IF } m_1 \text{ is MED OR } m_2 \text{ is MED THEN } M \text{ is MED}
      R_8 = \text{IF } m_1 \text{ is HIGH OR } m_2 \text{ is MED THEN } M \text{ is MED}
      R_9 = \text{IF } m_1 \text{ is MED OR } m_2 \text{ is HIGH THEN } M \text{ is MED}
      R_{10} = \text{IF } m_1 \text{ is MED AND } m_2 \text{ is MED THEN } M \text{ is MED}
      R_{11} = \text{IF } m_1 \text{ is HIGH AND } m_2 \text{ is MED THEN } M \text{ is MED}
      R_{12} = \text{IF } m_1 \text{ is HIGH AND } m_2 \text{ is HIGH THEN } M \text{ is HIGH}
      R_{13} = \text{IF } m_1 \text{ is NOT LOW AND } m_2 \text{ is NOT LOW THEN } M \text{ is NOT LOW}
      R_{14} = \text{IF } m_1 \text{ is NOT HIGH AND } m_2 \text{ is NOT HIGH THEN } M \text{ is NOT HIGH}
      R_{15} = \text{IF } m_1 \text{ is NOT LOW AND } m_2 \text{ is MED THEN } M \text{ is MED}
      R_{16} = \text{IF } m_1 \text{ is MED OR } m_2 \text{ is NOT LOW THEN } M \text{ is MED}
      R_{17} = \text{IF } m_1 \text{ is MED AND } m_2 \text{ is NOT LOW THEN } M \text{ is MED}
4.2.4 Defuzzification

Defuzzification is used to obtain the result of final crisp output from fuzzy set. The output of fuzzy set from dimensions and attributes are shown as follows:

1. Web design/Site design

The calculation process of web design is 3.54. Satisfied with the directions guide in finding the search menu, login and others score is 3.93. Interface and appearance that spoils the customer’s look score is 3.95. Fast promptness of the presentation site score is 3.93. Up to date information that follows the demand of customer score is 3.90. The result form fuzzy rule is shown in Figure 4.9.

![Figure 4.9 Fuzzy Rule Output of Web Design](image)

2. Responsiveness

The calculation process of responsiveness is 3.29. Customer service has the willingness to help every customer’s problems until it solved in simplest way score is 3.76. Readiness of the employee for the respond to the customer score is 3.97. Timeliness and speed while response and solve the problem score is 3.88. The result form fuzzy rule is shown in Figure 4.10.
3. Confidentiality of security

The calculation process of confidentiality of security score is 3.77. Protect the privacy of customer in proper score is 4.11. Protect the transaction of customer from the error/broken score is 4.11. The result form fuzzy rule is shown in Figure 4.11.

4. Approachability of Access

The calculation process of approachability of access score is 3.77. Provide the contact access to control the problem and complain of customer score is 4.04.
Provider has the customer service in online for 24 hours score is 3.94. The result form fuzzy rule is shown in Figure 4.12.

![Figure 4.12 Fuzzy Rule Output of Approachability of Access](image)

5. **Efficiency**

The calculation process of efficiency score is 3.17. Ease of finding what is needed by the customer score is 4.18. Loading less of the website score is 3.77. The result form fuzzy rule is shown in Figure 4.13.

![Figure 4.13 Fuzzy Rule Output Efficiency](image)

6. **System availability**

The calculation process of system availability score is 3.72. Web site systems run the offer accurately score is 3.99. The system is rarely having trouble or error score is 3.67. The result form fuzzy rule is shown in Figure 4.14.
7. Fulfillment

The calculation process of fulfillment score is 3.72. Honest on every offer given by the provider to customer score is 3.99. Fulfill the promises, provide shopping activities, safety and comfort score is 3.67. The result form fuzzy rule is shown in Figure 4.15.
8. Merchandising

The calculation process of merchandising score is 3.6. Large amount of promotion offered score is 3.93. Many variations of promotion such as discount, free delivery and others score is 3.96. The result form fuzzy rule is shown in Figure 4.16.

![Figure 4.16 Fuzzy Rule Output of Merchandising](image)

### 4.2.5 Prioritize Attributes and Dimensions

As the result of defuzzication, the electronic service quality has the dimensions, each dimension consists of attributes. The highest dimensions of electronic service quality will be chosen as the prioritized dimensions based on the highest score. Therefore, there is two dimensions of electronic service quality that has the highest scores below:

1. Confidentiality of security

Confidentiality of security consist of 2 attributes. there are protect the privacy of customer in proper and protect the transaction of customer from the error/broken. The usability of dimensions and attributes are to suggest an action for e-commerce provider site in determining prioritized attributes for managing their business. In dimension of confidentiality of security, there are some rule to define the output of the score based on attribute’s input. In calculation, it can be seen that one of the highest scores output is confidentiality with score 3.77. The calculation based on the input of its attributes respectively for protect the privacy of customer in
proper score is 4.10 and protect the transaction of customer from the error/broken score is 4.10.

2. Approachability of access

Approachability of access consist of 2 attributes, there are provide the contact access to control the problem and complain of customer and provider has the customer service in online for 24 hours. The usability of dimensions and attributes are to suggest an action for e-commerce provider site in determining prioritized attributes for managing their business. In dimension of approachability of access, there are some rule to define the output score that based on the attribute’s input. In calculation, it can be derived that one of the highest scores output is approachability with score 3.77. The calculation based on the input of its attributes respectively for provide the contact access to control the problem and complain of customer score is 4.04 and provider has the customer service in online for 24 hours score is 3.94.