Measuring Service Quality of Halal Certification in Indonesia Food Industry using Fuzzy-SERVQUAL Method for Service Quality Improvement

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Abstract

Indonesia had made it mandatory for big food companies to halal-certificate their products. The request of halal certification has been increasing significantly in the last 8 years. Currently, lead time for completing a halal certification requires 97 days for local products and 117 days for imported products. Nonetheless, that service level is worse than some ASEAN countries. This research aims to identify dimensions/factors that play an important role in service quality improvement for halal certification in Indonesia food industry carried out by Indonesia halal certification agency through measuring service quality. This research used fuzzy-SERVQUAL method to extract significant factors affecting the quality of the services.

Keywords
Halal Certification, Fuzzy, SERVQUAL, Fuzzy, Food Industry

I. Introduction

Halal originates from Arabians meaning “allowed” or “accepted” and usually being referred to foods/drinks, goods, behavior, or actions. Being halal in Islamic religion means the thing is allowed by God for Muslims (Supian et. al., 2018). However, in the current era, halal does not only act as obligation for Muslims but also a strength indicator for industries (Africa Islamic Economic Foundation, 2013).

In the last several years, halal industries have become the fastest growing industry segment in the world with the annual growth rate of 5.2%. It is estimated to be valued USD 2.2 billion, making halal industries one of the most significant industry segment today (Dinar Standard, 2019). Among all sub-segment within Halal Industries, food is the second largest industries after sharia financials, thus the largest real sector industries based on estimated market value. Supported by the huge Muslims population of 1.8 billion people, Halal Food industry is estimated to have value of USD 1.37 billion with annual growth rate of 5.1% (Dinar Standard, 2009). A number of multinational companies look for this opportunity and start working on halal certification for their products and companies (Thomson Reuters, 2018). Nevertheless, based on The Assessment Institute for Foods, Drugs and Cosmetics Indonesian - Council of Ulama (TAIFDCI-ICU), the previous Indonesia halal certification board, 9 out of 10 product categories that can be halal certified comes from food industry.

One of the most important element of halal industry is infrastructure that supports halal certification. Studies show that halal label of a product is now important not only for Muslims for religious purpose, but also for consumers in general in way that halal label could act as label for quality assurance for a product and aligning with certain trend of lifestyle (Dinar Standard, 2019). Halal product is perceived as having good quality, save, and comply with ethical values. Therefore, halal certified products start gaining popularities which in turn increase the demand not only in Muslims society but also non- Muslims (Africa Islamic Economic Foundation, 2013; Shalihin & Hidayati, 2020).

In Indonesia, demand for halal certification has been growing consistently every year. Based on report by TAIFDCI-ICU, number of products certified exceeds 274,000 products during the course of 2019. This number is even estimated to continue growing amid the approval of 2 new policies: Act no. 34 of 2014 of Halal Product guarantee and Act and...
the newest act of Omnibus Law. In both bills, there are policies that make halal certification to be mandatory for all food, drugs, and cosmetics products. Those policies also encourage the Halal Certification Board to issue the halal certificate no longer than 21 days. Previously all the certification process may take up to 117 days.

The purpose of conducting this research is to identify dimensions/factors that play an important role in service quality improvement for halal certification in Indonesia food industry carried out by Indonesia halal certification agency through measuring service quality.

II. Literature Review

2.1 Halal Certification

Halal certification is an inspection process starting from preparation, slaughter, cleaning, handling, disinfection, storage, transportation and management practices. In business, the halal certification process involves all stages “from farm to table” (Asnidar Hanim Yusuf et al., 2017; Noordin et al., 2009). In Arabic, Halal means permitted, or acceptable where this word is indicated for food/drink, objects, behavior, and actions that are mandatory for all Muslims (Supian et al., 2018; Wilson & Liu, 2010). According to Badruldin et al., (2012) halal is not only a religious obligation but is also understood as new alternatives in lifestyle. Even some believes Halal promotes sustainability, environmental awareness, food safety and animal welfare. Currently halal is considered as certification standard for quality. Halal quality standards are applied to the procurement and production of products that include processed food, cosmetics, pharmaceuticals and medical products and have been extended to services related to the logistics of halal products (Noordin et al., 2014).

Halal certification is an important symbol for Muslim consumers because it is used as a guide to believe in halal manufacturing, processing, storage, transportation, provision, maintenance, cleanliness, quality and halal status based on the principles set out by Islam. Products with a halal certificate logo are more easily accepted by consumers, both Muslim and non-Muslim. Furthermore, halal certification is not only mandatory label to the product but also giving the product some added-value.

2.2 Halal Certification in Indonesia

Halal certification in Indonesia began in 2001 when the Decree of the Minister of Religion was issued which strengthened The Assessment Institute for Foods, Drugs and Cosmetics Indonesian Council of Ulama as a halal certification body to carry out the function of halal certification, conduct inspections/audits, make fatwa, and issue halal certificates. In the process and implementation of halal certification, The Assessment Institute for Foods, Drugs and Cosmetics Indonesian - Council of Ulama collaborates with various ministries, universities, and several institutions such as the National Standardization Agency, the Indonesian Chamber of Commerce and Industry of the Middle East Committee, GS1 Indonesia, and Research in Motion (Blackberry). Currently, the certification system and halal assurance system designed and implemented by The Assessment Institute for Foods, Drugs and Cosmetics Indonesian Council of Ulama (HAS 23000) have been made standard in the international forum of the World Halal Food Council (WHFC) and adopted by several halal certification board in the world.

In 2014, the Ministry of Religion issued Act no. 34 of 2014 which is the regulation for implementation of halal product guarantee in Indonesia. In this act there is also a policy that halal certification is mandatory for all products that enter, circulate and are traded in the territory of Indonesia. In addition, there is also a transfer of authority in issuing halal certificates where the implementation of halal product guarantee is carried out by Halal Certification Agency under the Ministry of Religion. In carrying out its duties, Halal Certification Agency collaborates with related ministries and/or institutions, Halal Inspection Agency as inspector and or product testing, and Indonesian Ulama Council as fatwa issuer.

2.3 Service Quality (SERVQUAL)

With the increase of global competition in recent years has influenced many companies or organizations where these companies and organizations are competing to have quality services in order to satisfy their customers and achieve customer loyalty (Sari et al., 2015). According to (Dachyar et al., 2018), Measurement of service quality can assist a company or organization in fulfilling customer wants and satisfaction. Moreover, service quality is also the key in
building and maintaining customer relationships (Dachyar & Siva, 2016). Service quality is one of measurement tool that can be used to improve the services provided by the service industry. By knowing the quality of service, service providers can identify things that have not meet customer expectations. The shift in the focus of the concept of quality from goods to services shows the importance of service quality in the service industry (Akdere et al., 2018). Service quality is the fulfillment of customer needs and expectations (Asubonteng et al., 1996; Lewis & Mitchell, 1990; Parasuraman et al., 1988; Wisniewski & Donnelly, 1996). Service quality can also be defined as the gap between customer expectations and perceptions of the service obtained. If customer expectations are smaller than service performance, the quality perceived by customers will be satisfactory, and vice versa (Akdere et al., 2018; Badruldin et al., 2012; Lewis & Mitchell, 1990; Parasuraman et al., 1985).

Customers are not only judge a service by feeling, but there are real factors to consider. Parasuraman, Valarie Zeithaml, and Leonard Berry who are the pioneer of research related to service quality have identified 5 factors or dimensions that can be applied to various service contexts. The five dimensions include reliability, empathy, responsiveness, tangibles, and assurance (Zeithaml et al., 2017).

The Service Delivery Quality (SDQ) can be calculated using the formula suggested by Zeithaml, et., Al (1990):

$$SDQ = P_i - E_i$$

2.3 Fuzzy-SERVQUAL

The measurement of service quality is complex and difficult to measure accurately. Service quality does not only consist of tangible attributes but also intangible and subjective measurement such as safety, comfort, and satisfaction (Pandey, 2016). Service quality is often measured using numerical linguistic variables (Pandey, 2016). However, the assessment of human preferences cannot be described clearly and be described with a definite numerical value (Stefano et al., 2015). Therefore, judgments using numerical linguistic variables often produce inconsistent, imprecise, and unclear results. Assessment using interval values (Pandey, 2016) and the use of linguistic terms to describe the desired value (such as low, low, high, high) are recommended (Stefano et al., 2015).

Because the measurement of service quality is complex, complicated and subjective, several studies suggest using fuzzy set theory (Hu et al., 2010; Pandey, 2016; Stefano et al., 2015; Yu et al., 2015). Fuzzy is an appropriate and effective approach to solving problems related to uncertainty (Stefano et al., 2015; Yu et al., 2015). This method is usually used in situations where we need to measure a person's complex and often ambiguous thought processes. Fuzzy theory provides consistent measurement results in situations like this (Hu et al., 2010). Fuzzy logic works by capturing information in the form of human (natural) language which is then converted into numerical form so that it is easy to operate by computers (Stefano et al., 2015).

In a crisp set, each member of the set is strictly defined as single number (e.g., number 5 denotes a value of 5). On the other hand, in order to explain fuzzy variables, we must consider $U$, a real number, where a fuzzy is defined as a set of number $A$ that satisfies;

$$A = \{(u, u_A(x))||u \in U\}$$

where $u_A(x): U \rightarrow [0,1]$ is called membership function of fuzzy number $A$ (Hu et al., 2010)

Membership function $A$ maps elements of fuzzy set to a value called grade. Grade can be interpreted as a probabilistic value assign to each element denotes the probability for that element to represent the fuzzy set. If an element is mapped to 0, meaning the element is not included in the fuzzy set. Meanwhile grade value equal to 1 meaning the element is fully represent the fuzzy set or equivalent with crisp set (a single number). The real-world interpretation of the fuzzy set is then the integrated value of all the elements with each of their grade value. A fuzzy set an its grade mapping can be illustrated with a fuzzy triangle as follows (Hu et al., 2010).

The fuzzy triangle illustrates the limit of which elements a fuzzy set might be represented by. As an example, when we measure body weight and height, we can write our measurement as a single exact number, setting aside the
measurement uncertainty. However, when we measure intangible metrics such as a person’s opinion via certain linguistic variables, we cannot quantify it as a single number since every respondent might have different perspective of the questions and different experience of the matters. Two respondents that give same answer might have had different experience and vice versa, two respondents might as well have had same experience but give different answer.

Fuzzy-SERVQUAL tries to address this issue by quantifying a linguistic variable not as a single score value, but as set of possible scores values mapped by a probabilistic function, the triangular function \( u(x) \). Final score value can be obtained by integrating all the fuzzy set members with respect to their probability value; 

\[
A = \int u(x) \, du, \quad u \in U \tag{3}
\]

or can be written for a discrete set;

\[
A = \frac{u_1(x)}{u_1} + \frac{u_2(x)}{u_2} + \cdots + \frac{u_k(x)}{u_k} \tag{4}
\]

Based in the theory of fuzzy set, arithmetic operations are well defined. If two fuzzy sets are defined as \( A_1 = a_1 + b_1 + c_1 \) and \( A_2 = a_2 + b_2 + c_2 \), then addition and subtraction of the two fuzzy sets can be defined as follows;

1. Addition

\[
A_1 + A_2 = a_1 + a_2, b_1 + b_2, c_1 + c_2 \tag{5}
\]

2. Subtraction

\[
A_1 - A_2 = a_1 - c_2, b_1 - b_2, c_1 - a_2 \tag{6}
\]

In calculating the quality gap, the fuzzy triangular numbers are considered in the form of linguistic variables. Examples of linguistic variables are shown in Table 1.

<table>
<thead>
<tr>
<th>Linguistic Variable</th>
<th>Membership Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very bad</td>
<td>(1, 1, 3)</td>
</tr>
<tr>
<td>Bad</td>
<td>(1, 3, 5)</td>
</tr>
<tr>
<td>Fair enough</td>
<td>(3, 5, 7)</td>
</tr>
<tr>
<td>Good</td>
<td>(5, 7, 9)</td>
</tr>
<tr>
<td>Excellent</td>
<td>(7, 9, 9)</td>
</tr>
</tbody>
</table>

In the research, assessment with linguistic variables will be carried out by the research subject. If the research subject chooses \( A_e = (a_e, b_e, c_e) \) as the expectation and \( A_p = (a_p, b_p, c_p) \) as the perception, the service quality value is the gap between perception and expectation and defined as follow;

\[
\Delta_{fuzzy} = A_p - A_e = (a_p - c_e, b_p - b_e, c_p - a_e) = (\Delta a, \Delta b, \Delta c) \tag{7}
\]

The \( \Delta_{fuzzy} \) is called the fuzzy-gap because it is still in the form of fuzzy number. The following equation then applied to convert the value into a single number of service quality score. This process is called defuzzification.

\[
\Delta_{defuzzified} = \frac{1}{6} (\Delta a + 4\Delta b + \Delta c) \tag{8}
\]

### III. Research Methodology

This research consists of five stages. In the first stage, topic selection is carried out based on phenomena in the field, namely the current halal certification process in Indonesia then followed by a literature study related to halal certification to identify existing problems, preparation of research background, objectives of research and related methods. The next stage is to collecting data from food and beverage industry in Indonesia. In the fourth stage, data processing is carried out using the Fuzzy-SERVQUAL method. The results of the fuzzy-SERVQUAL processing are the quality dimensions that must be improved. Finally, analysis and discussion of the results of data processing are carried out. Making conclusions is based on the analysis carried out.
3.1 Questionnaire Design and Data Collection

The questionnaire was prepared by identifying the dimensions and attributes of service quality questions based on the SERVQUAL dimension through literature studies. Before the questionnaire is distributed to respondents, the author must test the validity of the dimensions and attributes of the question. This validation is conducted to see whether the questionnaire measures relevant parameters (Siregar, 2014). The questionnaire for this validity test will be given to experts to then assess whether the questionnaire to be given to respondents will match the current conditions of halal certification in Indonesia. Experts who took part in the validity test of this questionnaire were as follows:

1. Expert 1: Industry representative
2. Expert 2: Industry representative
3. Expert 4: Industry representative
4. Expert 4: Vice director of The Assessment Institute for Foods, Drugs and Cosmetics Indonesian - Council of Ulama
5. Expert 5: Head of Registration and Certification Indonesia Halal Certification Agency

The results of the expert judgment are then processed using the geomean method. The result shows that there are 25 attributes that were ready to be distributed to respondents. Table 2. shows 25 selected attributes.

<table>
<thead>
<tr>
<th>No</th>
<th>Dimension</th>
<th>Attribute</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tangibles</td>
<td>Physical facilities at the Halal Certification Agency office such as waiting rooms, toilets, lactation rooms, air conditioning and other physical facilities have a good appearance</td>
<td>T2</td>
</tr>
<tr>
<td>2</td>
<td>Tangibles</td>
<td>Halal Certification Agency has facilities and equipment with the latest technology</td>
<td>T3</td>
</tr>
<tr>
<td>3</td>
<td>Tangibles</td>
<td>Physical facilities at the Halal Certification Agency office are clean and comfortable</td>
<td>T4</td>
</tr>
<tr>
<td>4</td>
<td>Tangibles</td>
<td>Completeness of information media such as information counters, instructions, info boxes, information monitors, brochures, suggestion boxes, and others</td>
<td>T5</td>
</tr>
<tr>
<td>5</td>
<td>Tangibles</td>
<td>Availability and adequacy of facilities such as waiting rooms, toilets, lactation rooms, air conditioning, canteens and other physical facilities</td>
<td>T6</td>
</tr>
<tr>
<td>6</td>
<td>Reliability</td>
<td>Halal Certification Agency has a service with a high level of accuracy, without any errors</td>
<td>RL1</td>
</tr>
<tr>
<td>7</td>
<td>Reliability</td>
<td>Halal Certification Agency is committed to customers</td>
<td>RL2</td>
</tr>
<tr>
<td>8</td>
<td>Reliability</td>
<td>Halal Certification Agency is able to issue halal certification at the promised time</td>
<td>RL3</td>
</tr>
<tr>
<td>9</td>
<td>Reliability</td>
<td>Halal Certification Agency can solve problems experienced by customers</td>
<td>RL4</td>
</tr>
<tr>
<td>10</td>
<td>Reliability</td>
<td>Halal Certification Agency is a reliable institution</td>
<td>RL5</td>
</tr>
<tr>
<td>11</td>
<td>Reliability</td>
<td>The cost of halal certification issued by Halal Certification Agency is within a reasonable range</td>
<td>RL6</td>
</tr>
<tr>
<td>12</td>
<td>Responsiveness</td>
<td>Halal Certification Agency can provide fast response to customer requests</td>
<td>RS1</td>
</tr>
<tr>
<td>13</td>
<td>Responsiveness</td>
<td>Halal Certification Agency is always willing to provide assistance to customers</td>
<td>RS2</td>
</tr>
<tr>
<td>14</td>
<td>Responsiveness</td>
<td>Halal Certification Agency informs customers about service availability</td>
<td>RS3</td>
</tr>
<tr>
<td>15</td>
<td>Responsiveness</td>
<td>Halal Certification Agency provides assurance to customers regarding the service time of halal certification</td>
<td>RS4</td>
</tr>
<tr>
<td>16</td>
<td>Responsiveness</td>
<td>The speed of the halal certification service officer in facing the request of the applicant</td>
<td>RS5</td>
</tr>
<tr>
<td>17</td>
<td>Assurance</td>
<td>Halal Certification Agency employees have extensive knowledge of the services provided</td>
<td>A1</td>
</tr>
<tr>
<td>18</td>
<td>Assurance</td>
<td>Halal Certification Agency employees behave politely towards their customers</td>
<td>A2</td>
</tr>
<tr>
<td>19</td>
<td>Assurance</td>
<td>Information regarding customer data is kept confidential and securely stored by Halal Certification Agency</td>
<td>A3</td>
</tr>
<tr>
<td>20</td>
<td>Assurance</td>
<td>Halal Certification Agency provides a sense of security and comfort to its customers during the halal certification process</td>
<td>A4</td>
</tr>
<tr>
<td>21</td>
<td>Assurance</td>
<td>Halal Certification Agency is a trustworthy institution with high credibility</td>
<td>A5</td>
</tr>
<tr>
<td>22</td>
<td>Assurance</td>
<td>Halal Certification Agency is always ready to serve customers when needed</td>
<td>A6</td>
</tr>
<tr>
<td>23</td>
<td>Empathy</td>
<td>Halal Certification Agency understands and can provide services for special / specific needs desired by customers</td>
<td>E2</td>
</tr>
<tr>
<td>24</td>
<td>Empathy</td>
<td>Halal Certification Agency employees respect and treat their customers well</td>
<td>E3</td>
</tr>
</tbody>
</table>

Table 2. 25 Selected Attributes
3.2 Data Collection

The questionnaire was distributed to food and beverage industry companies in Indonesia with the criteria of respondents as follow: people who works in food and beverage industry and those who have competence in applying for halal certification. In this paper, we used both primary and secondary data. Primary data is data obtained from respondent data through questionnaire and interview research instruments, while secondary data is data obtained from reports related to halal certification in Indonesia. Primary data was collected through an online questionnaire using Google Form. The questionnaire consists of 3 parts; the first part contains general data of respondents; the second part contains 25 question attributes on respondents' perceptions; and the third part contains 25 question attributes to customer expectations.

IV. Result and Discussion

4.1 Demographic Information

Table 3 shows the demographic data of the respondents. A total of 30 respondents completed the questionnaire. Based on the survey results, 50% of the total respondents have working experience for 1-4 years. Respondents who filled out this questionnaire were professionals who worked under the Regulations, Research and Development, and Quality Assurance departments. Almost all respondents have an educational background as undergraduate and there are only 8.33% with postgraduate education background.

<table>
<thead>
<tr>
<th>Working Experience</th>
<th>Job Title</th>
<th>Education Background</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 4 years</td>
<td>Regulatory</td>
<td>33.33% Undergraduate</td>
</tr>
<tr>
<td>4 - 7 years</td>
<td>Research and Development</td>
<td>16.67% Graduate</td>
</tr>
<tr>
<td>7 - 10 years</td>
<td>Quality Assurance</td>
<td>50.00%</td>
</tr>
<tr>
<td>&gt; 10 years</td>
<td></td>
<td>8.33%</td>
</tr>
</tbody>
</table>

4.2 Analysis of each SERVQUAL dimension

4.2.1 Tangible

Table 4 shows the gap from the fuzzy values given by the respondents from Tangible dimensions of halal certification service quality questionnaire. This dimension measures how the customers perceive sufficiency of physical facilities supporting the service provider. Based on the results, the attribute with code T3, namely Halal Certification Agency has the latest technology facilities and equipment, has the value of -1.55, the largest gap value among other tangible attributes. This is given away by the absence of an online system for submitting the request and tracking the progress of the certification process. Meanwhile, the T4 attribute is talking about cleanliness and comfortability of Halal Certification Agency office.

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>$A_p$</th>
<th>$A_e$</th>
<th>$\Delta_{fuzzy}$</th>
<th>$\Delta_{defuzzified}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>T2</td>
<td>(3.52, 5.52, 7.45)</td>
<td>(4.61, 6.61, 8.29)</td>
<td>(-4.77, -1.1, 2.84)</td>
<td>-1.05</td>
</tr>
<tr>
<td>2</td>
<td>T3</td>
<td>(2.42, 4.29, 6.29)</td>
<td>(3.97, 5.9, 7.58)</td>
<td>(-5.16, -1.61, 2.32)</td>
<td>-1.55</td>
</tr>
<tr>
<td>3</td>
<td>T4</td>
<td>(4.29, 6.29, 8.23)</td>
<td>(4.81, 6.81, 8.48)</td>
<td>(-4.19, -0.52, 3.42)</td>
<td>-0.47</td>
</tr>
<tr>
<td>4</td>
<td>T5</td>
<td>(3.19, 5.19, 7.06)</td>
<td>(4.48, 6.48, 8.16)</td>
<td>(-4.97, -1.29, 2.58)</td>
<td>-1.26</td>
</tr>
<tr>
<td>5</td>
<td>T6</td>
<td>(3.71, 5.71, 7.71)</td>
<td>(4.55, 6.55, 8.23)</td>
<td>(-4.52, -0.84, 3.16)</td>
<td>-0.78</td>
</tr>
</tbody>
</table>
4.2.2 Reliability

The reliability dimension shows the ability of a service provider to provide reliable and accurate services. As can be seen in Table 5, all attributes in this dimension have gap value below 0, which means that the customers are not satisfied enough with the services provided by Halal Certification Agency (Badruldin et al., 2012). The biggest gap value in this attribute is shown by the RL4 attribute, that is, Halal Certification Agency can solve problems experienced by customers while the attribute with the smallest gap is owned by the RL6 attribute, which is talking about the cost of halal certification issued by Halal Certification Agency.

Table 5. SERVQUAL Gap score for Reliability Dimension

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>( A_p )</th>
<th>( A_e )</th>
<th>( \Delta_{fuzzy} )</th>
<th>( \Delta_{defuzzified} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RL1</td>
<td>(2.55, 4.48, 6.42)</td>
<td>(3.9, 5.9, 7.52)</td>
<td>(-4.97, -1.42, 2.52)</td>
<td>-1.35</td>
</tr>
<tr>
<td>2</td>
<td>RL2</td>
<td>(3.58, 5.58, 7.32)</td>
<td>(4.55, 5.55, 8.16)</td>
<td>(-4.58, -0.97, 2.77)</td>
<td>-0.95</td>
</tr>
<tr>
<td>3</td>
<td>RL3</td>
<td>(2.87, 4.68, 6.61)</td>
<td>(4.16, 6.16, 7.65)</td>
<td>(-4.77, -1.48, 2.45)</td>
<td>-1.38</td>
</tr>
<tr>
<td>4</td>
<td>RL4</td>
<td>(2.74, 4.68, 6.61)</td>
<td>(4.35, 6.29, 7.9)</td>
<td>(-5.16, -1.61, 2.26)</td>
<td>-1.56</td>
</tr>
<tr>
<td>5</td>
<td>RL5</td>
<td>(2.94, 4.87, 7.32)</td>
<td>(4.16, 6.16, 7.77)</td>
<td>(-4.84, -1.29, 2.58)</td>
<td>-1.24</td>
</tr>
<tr>
<td>6</td>
<td>RL6</td>
<td>(3.39, 5.32, 7.32)</td>
<td>(4.29, 6.23, 7.84)</td>
<td>(-4.45, -0.9, 3.03)</td>
<td>-0.84</td>
</tr>
</tbody>
</table>

4.2.3 Responsiveness

This dimension consists of 6 attributes that describe the willingness of services to help and provide fast service. The essence of this dimension is to emphasize attention and punctuality in handling requests, questions, complaints, and problems experienced by customers. Among other dimensions, this dimension has the widest gap attribute value. This is shown in table 6 where the RS1 attribute (Halal Certification Agency can provide a fast response to customer requests) has a gap value of -1.72. According to Akdere et al. (2018), responsiveness is one of the most important dimensions of service quality.

Table 6. SERVQUAL Gap score for Responsiveness Dimension

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>( A_p )</th>
<th>( A_e )</th>
<th>( \Delta_{fuzzy} )</th>
<th>( \Delta_{defuzzified} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RS1</td>
<td>(2.61, 4.42, 6.35)</td>
<td>(4.23, 6.23, 7.84)</td>
<td>(-5.23, -1.81, 2.13)</td>
<td>-1.72</td>
</tr>
<tr>
<td>2</td>
<td>RS2</td>
<td>(3.13, 5, 6.94)</td>
<td>(4.42, 6.42, 8.03)</td>
<td>(-4.9, -1.42, 2.52)</td>
<td>-1.34</td>
</tr>
<tr>
<td>3</td>
<td>RS3</td>
<td>(3.39, 5.32, 7.26)</td>
<td>(4.61, 6.61, 8.23)</td>
<td>(-4.84, -1.29, 2.65)</td>
<td>-1.23</td>
</tr>
<tr>
<td>4</td>
<td>RS4</td>
<td>(3.32, 5.26, 7.13)</td>
<td>(4.23, 6.23, 7.84)</td>
<td>(-4.52, -0.97, 2.9)</td>
<td>-0.91</td>
</tr>
<tr>
<td>5</td>
<td>RS5</td>
<td>(2.87, 4.68, 6.61)</td>
<td>(4.29, 6.29, 7.84)</td>
<td>(-4.97, -1.61, 2.32)</td>
<td>-1.52</td>
</tr>
</tbody>
</table>

4.2.4 Assurance

Apart from responsiveness, assurance is also the most important dimension of service quality (Akdere et al. 2018). This dimension indicates the ability and courtesy of service personnel of a company as well as the ability of the company and its employees to foster trust and confidence in customers. Table 7 shows the fuzzy gap of the dimensions. It can be seen that the biggest gap in this dimension is found in the A4 attribute, Halal Certification Agency provides a sense of security and comfort to its customers during the halal certification process with a gap value of -1.34 while the A2 attribute, namely Halal Certification Agency employees behaving politely towards customers has the smallest fuzzy gap value at this dimension is -0.40.

Table 7. SERVQUAL Gap score for Assurance Dimension

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>( A_p )</th>
<th>( A_e )</th>
<th>( \Delta_{fuzzy} )</th>
<th>( \Delta_{defuzzified} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A1</td>
<td>(3.26, 5.13, 7)</td>
<td>(4.23, 6.16, 7.77)</td>
<td>(-4.52, -1.03, 2.77)</td>
<td>-0.98</td>
</tr>
<tr>
<td>2</td>
<td>A2</td>
<td>(4.61, 6.61, 8.35)</td>
<td>(5.06, 7.06, 8.48)</td>
<td>(-3.87, -0.45, 3.29)</td>
<td>-0.40</td>
</tr>
<tr>
<td>3</td>
<td>A3</td>
<td>(4.16, 6.16, 8.03)</td>
<td>(4.74, 6.74, 8.29)</td>
<td>(-4.13, -0.58, 3.29)</td>
<td>-0.53</td>
</tr>
</tbody>
</table>
4.2.5 Empathy

In the dimension of empathy, E6 is the attribute that has the greatest fuzzy gap value. This E6 attribute talks about the care of Halal Certification Agency towards customers’ problem. This attribute explains the service provider can position himself as a customer and considers all the problems experienced by customers are important. It can be seen in table 8 that this attribute has a gap value of -1.30. This gap value illustrates that Halal Certification Agency officers still treat customers as separate parties from customers and do not position themselves as customers.

Table 8. SERVQUAL Gap score for Empathy Dimension

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>$A_p$</th>
<th>$A_e$</th>
<th>$\Delta_{fuzzy}$</th>
<th>$\Delta_{defuzzified}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>A4</td>
<td>(3.32, 5.26, 7.19)</td>
<td>(4.68, 6.68, 8.23)</td>
<td>(-4.9, -1.42, 2.52)</td>
<td>-1.34</td>
</tr>
<tr>
<td>5</td>
<td>A5</td>
<td>(3.26, 5.26, 7.19)</td>
<td>(4.35, 6.35, 7.97)</td>
<td>(-4.71, -1.1, 2.84)</td>
<td>-1.04</td>
</tr>
<tr>
<td>6</td>
<td>A6</td>
<td>(3.52, 5.45, 7.39)</td>
<td>(4.55, 6.55, 8.03)</td>
<td>(-4.52, -1.1, 2.84)</td>
<td>-1.01</td>
</tr>
</tbody>
</table>

4.3 The chosen priority based on the most negative gap

From the dimension table above, we selected 5 attributes with the most negative gap values. We also calculated the value of statistical significance and all of the five gaps are significant under 95% confidence interval that can be seen on Table 9.

Table 9. Five Attributes with The Biggest Gap

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Gap</th>
<th>Z-Score</th>
<th>P-Value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RS1</td>
<td>-1.72</td>
<td>-2.90</td>
<td>0.0070</td>
<td>Significant</td>
</tr>
<tr>
<td>2</td>
<td>RL4</td>
<td>-1.56</td>
<td>-2.94</td>
<td>0.0064</td>
<td>Significant</td>
</tr>
<tr>
<td>3</td>
<td>T3</td>
<td>-1.55</td>
<td>-3.15</td>
<td>0.0038</td>
<td>Significant</td>
</tr>
<tr>
<td>4</td>
<td>RS5</td>
<td>-1.52</td>
<td>-2.18</td>
<td>0.0372</td>
<td>Significant</td>
</tr>
<tr>
<td>5</td>
<td>RL3</td>
<td>-1.38</td>
<td>-2.62</td>
<td>0.0138</td>
<td>Significant</td>
</tr>
</tbody>
</table>

From the table, it can be seen that the responsiveness dimension dominates the list of attributes with the largest gap value. RS1 explains the speed at which Halal Certification Agency can provide fast responses to customer inquiries and RS5 describes the speed of service officers in completing the entire process of halal certification completion. From these two attributes, it can be seen that speed is the main attribute most expected in terms of responsiveness.

Apart from the responsiveness dimension, there are also other dimensions such as the reliability dimension with the second largest gap value in the RL4 attribute which explains Halal Certification Agency's ability to solve problems experienced by customers. Every customer has a unique or specific problem that will impact the issuance of his halal certificate. The large gap value in the reliability dimension shows that Halal Certification Agency employees have not been able to become consultants for customers who have certain problems. Looking up the fact that there is an obligation for a halal certificate in the work copyright Omnibus law bill, the quality of the Indonesian halal certificate is questionable. So that in this case, industry players will be at a disadvantage. Aside from that, RL3 attribute also stand in the 5 most negative values. This attribute talks the ability of Halal Certification Agency to issue halal certification at the promised time.

Nevertheless, besides all the intangible aspects, we also have tangible aspect in the top-5 widest service quality gap. The T3 attribute discusses about the use of modern technology in the halal certification process. It includes technology applications such as user-friendliness of online portals, progress tracking, communication channels for consult, documentation, etc. In this pandemic situation, adaptation of new technology is mandatory to support operation of
service providers. The use of technology will also help improve the responsiveness dimensions which mostly talk about response speed and accessibility to help and information.

V. Conclusions

We have demonstrated that SERVQUAL procedure can be used to measure service quality of a halal certification provider. Because SERVQUAL rely on subject’s opinion about the research object, fuzzy number is a better approach to quantify the linguistic variables. Through this method, we have measure service quality gap of 25 attributes from 5 service quality dimensions. We have reduced the 25 attributes into the top 5 with the widest gap, which consist of 2 intangible dimensions, namely responsiveness and reliability, and 1 tangible dimension discussing about the use of technology. We can also see this reduction as a means of prioritization in order to design improvement plan for better service delivery.

References


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Biographies

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