PAPER – OPEN ACCESS

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Author : Nofriani Fajrah dan Yogi Perdana
DOI : 10.32734/ee.v2i3.789
Electronic ISSN : 2654-704X
Print ISSN : 2654-7031

Volume 2 Issue 3 – 2019 TALENTA Conference Series: Energy & Engineering (EE)

EE Conference Series 02 (2019)
TALENTA Conference Series
Available online at https://talentaconfseries.usu.ac.id

The Analysis of Determine the Criteria of Car Painting Service Quality

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Abstrak

Pertumbuhan kendaraan bermotor memberikan kesempatan kepada bisnis bengkel pengecatan mobil. Dewasa ini bisnis bengkel pengecatan mobil meningkat dan persaingan untuk memenuhi keinginan konsumen. Persaingan bisnis bengkel pengecatan mobil semakin ketat karena keinginan konsumen yang dinamis. Hal ini dikarenakan bisnis bengkel pengecatan mobil menawarkan pilihan jasa pengecatan sesuai dengan permintaan konsumen. Ogick Paint Art merupakan salah satu bengkel pengecatan mobil, perbaikan kendaraan dan modifikasi yang menerima hampir semua pengerjaan pengecatan seperti sepeda motor, mobil, dan aksesoris kendaraan bermotor lainnya. Tujuan dai penelitian ini adalah untuk mengidentifikasi bagaimana memperoleh kriteria kualitas yang sesuai dengan keinginan konsumen menggunakan kuesioner Voice of Customer (VoC). Data yang telah diperoleh dari kuesioner Voice of Customer (VoC) kemudian akan digunakan sebagai panduan dalam membangun House of Quality (HoQ). Berdasarkan perhitungan House of Quality (HoQ) diketahui bahwa kriteria kualitas yang memiliki nilai prioritas paling tinggi adalah daya tahan kilap dan daya tahan intensitas warna yang memperoleh nilai 5 dari nilai tingkat kepentingan konsumen. Sedangkan peringkat kepentingan spefikasi teknis tertinggi adalah 251.29 dengan nilai kepentingan absolut dan nilai kepentingan relatif secara berutut-turut adalah 81,87 dan 7,23% untuk spesifikasi teknis kesesuaian rasio pernis dan *hardener*.

Kata kunci: House of Quality (HoQ), Kriteria Kualitas Pelayanan, Quality Function Deployment (QFD), Voice of Customer (VoC),

Abstract

The growth of motorized vehicles provides an opportunity for car painting workshop business. Today's car painting workshop business is increasing and competing to satisfy customers. Competition in the car painting workshop business is getting tougher because of the desire of dynamic customers. This is because the car painting workshop business is offers the choices according to customer's wishes. Ogick Paint Art is one of the car painting workshop business for painting, vehicle repairs and modifications that accepts almost all painting jobs such as motorcycles, cars, and other vehicle accessories. The purpose of this study is to find out how to get quality criteria in accordance with the customer's desires by using the Voice of Customer (VoC) questionnaire. Data obtained from the Voice of Customer (VoC) questionnaire was then used as a reference for building the House of Quality (HoQ). based on calculations in House of Quality (HoQ) it is known that the quality criteria has the highest priority value is the durability of glossy and durability of colour intensity are getting 5 of customer importance value. While the highest technical importance rating is 251.29 with absolute value importance and relative importance respectively 81.87 and 7.23% in the suitability ratio of varnish and hardener.

Keywords: Criteria of Service Quality, Quality Function Deployment (QFD), Voice of Customer (VoC), House of Quality (HoQ)

Selection and peer-review under responsibility of The 3nd National Conference on Industrial Engineering (NCIE) 2019
p-ISSN: 2654-7031, e-ISSN: 2654-704X, DOI: 10.32734/ee.v2i3.789

1. Introduction

Increasing the growth of motorized vehicles provides opportunities for service businesses such as paint workshops. The paint workshops service business is currently increasing and continues to compete to excel in satisfying customers. However, market share competition from the service business is increasingly tight due to dynamic customer desires. This is because the paint shop business offers choices in accordance with the wishes of the customers. According to the Central Bureau of Statistics data on the growth rate of motor vehicles in Indonesia from 2012 - 2016 was 26.83% where the growth rate of passenger cars was 8.73%, buses 2.26 %, 8.32% motorbikes and 7.52% trucks.

Ogick Paint Art Workshop is one of the workshops that is engaged in painting, repairing and modifying vehicles that accept almost all vehicle painting jobs such as motorcycles, cars, and other vehicle accessories both with airbrush, water slide decal, or plain painting methods. Ogick Paint Art only uses testimonials from customers in maintaining the consistency of the quality of the painting done. Thus the Ogick Paint Art paint shop gets criticism and suggestions directly from customers that are both positive and negative. However, the Ogick Paint Art workshop does not yet have standard quality criteria so that it cannot increase customer satisfaction.

In the process of painting the car, defects that generally occur are orange peel (Orange peel), melt (Runs), porous (Pin holing), loss of adhesive power (Peeling), striped when finished polishing (Polishing Marks), thinner or hardener not fused (Solvent Pop), stripes caused by metallic particles float (Mottling), loss of gloss (Matting), old paint that lifts or curling (Lifting), bubbling (Blistering), cracking (cracking), colors that are not the same or striped (Color mismatch and damage that forms like an island and shrinks (Shrinkage).

2. Literature Review

According to [1] formulating services is that every action or performance offered by one party to another on an intangible basis does not cause any transfer of ownership. Its production can be related and can also not be tied to a physical product. While Berry, as quoted by [2] defines the service as a deeds (actions, procedures, activities) processes and work for intangible ones. Formulating services as economic activities that have a number of intangible elements (values or benefits) related to them, which involve a number of interactions with customers or with property, but do not result in ownership transfers. Changes in conditions can arise and the production of a service may or may not have a connection with physical products.

Definitely services are activities that can be offered by one party to another, which are basically intangible and do not result in any ownership, and service production may be related or may not be related to physical [3]. The service component can be a small part or a major part of the overall offer. [4] distinguishes this sector offer into five categories. The first is called the offering of pure tangible goods, whose supply consists only of tangible goods, and no services accompanying the product offered. Both are called tangible goods offerings accompanied by services. This offer consists of tangible goods accompanied by one or a number of services to enhance customer attractiveness .

According to [5], "A satisfaction is a person 's feelings of pleasure or dissapointment that results from comparing a product' s perceived performance or outcome to expectations. If the performance falls short of expectations, the outcome is dissatisfied. If it matches expectations, the customer is satisfied or delighted ". The concept of QFD was created in Japan in 1960 after World War 2 was completed. The concept of QFD was used by Japan to imitate products. Along with the development of the times, QFD was used to develop new product concepts and not imitation products. house of quality (HoQ). The matrix contains the needs of the customer on the left side and the characteristics of the technique at the top. Each part of the matrix contains important things. The matrix is usually compiled and completed by the team. Figure 1 shows the matrix parts of house of quality [6]. The QFD method is divided into 7 stages, that is:

a. Identify and establish customer expectations.
   The first and critical step in the QFD process is to identify customer expectations. At this stage, requests, expectations and complaints are identified and determined. The process of identifying customer expectation can be done through the distribution of questionnaires [7] or focus group discussions [8]. Some of another methods can be use to identify customer expectations is customer panels, structured interviews, unstructured

interviews, in-depth customer observation, customer complaint lists, compliment database lists of repairs and input from sales staff [9].

b. Customer Competitive Evaluation
   At this stage, a strategic assessment or competitive assessment of each customer expectation is outlined in the form of a table. Customers are asked to express their perceptions of the quality of the company's products and competitors [10].
c. Establishing the technical requirements
   At this stage, customer expectations are translated into technical requirements. The aim is to translate each customer's expectations into one or more technical requirements. Each technical requirement must be measurable and meet customer expectations. Step 1 and 2 are done by using the question "what" to the customer. Step 3 is a continuation of steps 1 and 2 by asking the word "how" to each customer's expectations. In other words, companies must be find the manner to meet customer expectations [11].
d. Looking for relationships among technical requirements
   The roof of HoQ is designed cross correlate or the correlation among technical requirements items. There are many possibilities for correlation among technical requirements. Improving a technical characteristic or requirement might have an impact or correlation to other characteristics or technical requirements. Double circles show a very strong positive correlation. A single circle shows a weak positive correlation. Multiple cross show a strong negative correlation. Single cross show a weak negative correlation [12].
e. Determine the correlation among the technical requirements and customer expectations or requirements.
   To make a correlation matrix between customer requirements and technical requirements, the relationship between both of that must be established. The relationship of requirements is determined by using 3 categories, it is strong, medium and weak. Strong categories are expressed value is 9. Medium categories value is 3. Weak categories value is 1. In addition, the category of correlation strength also can be expressed by using a sign [13].
f. Determine of heaviness
   Heaviness is determined for each technical requirement. The heaviness is a function or a combination of the level of customer interest and the strength of the relationship. This heaviness is the result of multiplication between strengths and interests [14].
g. Quality planning
   After the calculation of the weight is done, the first step that must be done is to improve the performance of the technical requirements so that businesses or resources need to be concentrated on important technical requirements [15].

Data adequacy test is carried out to find the sample data has been taken enough to represent the population. The ideal is to make measurements / observations that are quite a lot. However, this is not possible considering the time, energy and cost factors. By use the formula as follows:

$$N' = \frac{k/s\sqrt{N\sum x^2 - (\sum x)^2}}{\sum x} \quad (1)$$

Remarks :
k: Level of confidence
s: Degree of accuracy
N: Amount of observation data
N ': Amount of theoretical data
x: Observation data
If N' $\leq$ N then the data is considered sufficient, but if N' > N data is not enough (less) and need to add data.

3. Research Methods

The purpose of this study is to find out how to get quality criteria in accordance with the customer's desires by using the Voice of Customer (VoC) questionnaire. This research was carried out in Ogick Paint Art located at Batu

Besar RT 04 RW 01 No. 14 Ex. Nongsa - Batam. The independent variables of this study are customer desires. While the dependent variable in this study is the car painting quality criteria. The population of this study is all of the workshop customers paint Ogick Paint Art, which is as many as 45 customers. The sampling technique of this study is using a simple random sampling technique where all members of the population have the same probability of being sampled. The formula used in determining the number of samples using the Slovin method as follows:

$$n = \frac{N}{1+ (N.e^2)} \quad (2)$$

Remarks :
n: Number of Samples
N: Total Population
e: Level of confidence

This research was conducted by direct observation, discussion and VoC questionnaire. Direct observation and discussion was carried out to obtain information on the quality criteria desired by respondents. Every respondent was asked to give a statement about the desired car painting quality criteria. All statements of quality criteria obtained were then recapitulated and grouped to make a VoC questionnaire. The VoC questionnaire was used to identify the priority level or importance of every selected car painting quality criterion. The scoring scores on the VoC questionnaire used a Likert scale, start from 1 to 5. Data that has been collected will be analyzed to be able to obtain the results of the research that has been done. The data analysis method uses the Quality Function Deployment (QFD) method where the steps are:

1. Collection of car painting quality criteria data by identifying car painting quality criteria through direct observation and discussion to respondents.
2. Grouping of painting quality criteria from the recapitulation of identification of car painting quality criteria given by the respondent.
3. The collection of Voice of Customer (VoC) questionnaire data indicated by filling the priority values for each criterion to 36 respondents according to the sampling calculation.
4. The results of the VoC questionnaire were then recapitulated and the data adequacy test was carried out.
5. Processing data from the Voice of Customer (VoC) questionnaire on priority values by calculating the average value.
6. Develop House of Quality (HoQ)
   As for the preparation of the House of Quality (HoQ) there are several supporting variables as follows:
   a. Compilation of customer requirements attributes This data is obtained from the results of questionnaire data collection from Voice of Customer. The 10 attributes of customer requirements were obtained.
   b. Preparation of technical specifications
      This data is compiled based on the results of the preparation of each attribute of customer requirements. Based on 10 customer requirements attributes, 21 technical specifications were obtained. Determination of the relationship matrix between attributes of customer requirements to technical specifications. The attributes of customer requirements that have been obtained will be measured in relation to technical specifications. The relationship between the two consists of 3 criteria, namely:
      ● Full Black Circle: Strong Relationship: 9
      ⭘ Blank Black Circle: Medium Relationship: 3
      △ Empty Triangle: Weak Relationship: 1
   c. Determination of the correlation matrix between one technical specification to the other technical specifications
      The correlation between one technical specification and the other technical specifications consists of 3 criteria, namely:
      ++ : Strong Correlation
      + : Weak Correlation
      - : Correlation None
   d. Compilation of the assessment matrix against the criteria for customer requirements for competitors

The criteria for customer requirements that have been obtained are the quality criteria that will be assessed by the customer (respondent) on the services owned by competitors.

e. Preparation of a matrix of assessments of service technical specifications for competitors
The technical specifications of the services owned by competitors are also assessed on the competitor's ability to meet the service quality criteria desired by the customer.

f. Priority determination by calculating the value of Absolute Importance (AI) and Relative Importance (RI)
Determination of absolute importance and relative importance is to determine the technical response that has priority to be implemented first. Absolute Importance (AI) is a parameter that shows priority to be carried out, by looking at the relationship between the technical response, customer requirements and the level of customer interest. Absolute Importance (AI) = Total Importance level that is related to technical response to the relationship value. Relative Importance is the value of absolute importance is expressed by the cumulative percentage. Relative Importance (RI) = (AI value for 1 item Technical Response) / (Total from AI for all Technical Response).

4. Results and Discussion

Identification of quality criteria is carried out by direct observation and discussion methods. Direct observation and discussion is carried out to obtain information on quality criteria desired by customers. All statements of quality criteria obtained from observations and direct discussions with customers were then recapitulated and grouped to make VoC questionnaires.

a. VoC Questionnaire

Based on the results of identification of car painting quality criteria by observing the VoC questionnaire can be prepared. The VoC questionnaire was used to identify the priority level or interest expected from each painting quality criteria for the selected car. Scoring scores on the VoC questionnaire used a Likert scale, which is a scale of 1 to 5. Table 1 shows the results of the VoC questionnaire conducted by observation.

Table 1. Voice of Customer Questionnaire

No		Criteria for Quality of Preferred Painting	Priority Level				
			1	2	3	4	5
1	Colour	Durability of Colour Intensity					
		Colour Application Does Not Strip					
		Colour Selection According to					
		Durability of putty					
		Putty in accordance with the Car Body Contour					
		Long Lasting Glossy					
		Scratch Resistant Varnish					
2.	Technical	The Result of Painting are not easy to peel off					

Information:
1 = Very No Priority 3 = Priority 5 = Very Priority
2 = No Priority 4 = Very Priority

The data adequacy test is used to determine that the number of samples of data taken is sufficient to do the next process. In this test Slovin equation is used. The calculation results show N '<N, then the voice of customer data on the painting quality criteria desired by the customer is sufficient, namely N' = 19 <N = 36.

$$k = 2\ ;\ s = 5\% \approx 0{,}05;\ N = 36$$

b. Calculation of the Mean Value of each Quality Criteria

Calculation of mean values for each expected quality criterion for car painting is based on data on the VoC questionnaire. This calculation data will be a value of importance or priority value in House of Quality for each quality criterion so that the Absolute Improtenace (AI) value can be known. Table 4.2 shows the results of calculating the Mean value of each quality criterion. Calculation Example: Mean Value for long-lasting color intensity. Therefore, the priority value for the desired quality criteria for long-lasting color intensity is 5.

c. House of Quality (HoQ)

Customer Specifications

Customer specifications or customer requirements contain structured data or information about customer needs and desires based on research results from VoC questionnaires on the criteria for quality of painting services in Ogick Paint Art painting workshops. Based on the results of data collection can be identified the importance of customer specifications for each painting quality criteria expected / desired by customers (respondents) using the VoC questionnaire.

Technical response

Technical response consists of technical characteristics to be able to meet customer specifications from the voice of the customer, simply can be arranged with the help of the model "What vs How". The technical response from customer specifications is shown in Table 3. Based on the results of the analysis 21 technical responses were obtained for each customer specification.

Table 2. Functional Requirements

No	Functional Requirements
1	Suitability for the selection of paint pigments
2	The painting technique is done correctly and evenly
3	The thickness of every layer is same
4	Mixing the right pigment
5	Provides colour samples with several variants
6	Comparison between suitable putty and hardener
7	Good preparation of surfaces that will be putty
8	Correct puttying technique
9	Use the appropriate equipment
10	Correct sanding technique
11	Use appropriate varnish material
12	Appropriate varnish application techniques
13	The right temperature at the time of applying varnish
14	Comparison of varnish and hardener accordingly
15	Proper air pressure
16	Application of ceramic coating
17	Use of primary or epoxy before and after caulking
18	The exact painting time of each layer
19	Work is done carefully
20	Experienced Painter
21	Painting is done in the painting booth

Relationship of Customer Specifications to Technical Responses

Based on the results of the analysis of the relationship between customer specifications and technical responses, we know the relationship with the three criteria.

Inter-Technical Response Correlation

Based on the results of the identification of technical responses to customer specifications to finding the customer criteria, it is necessary to identify the correlation between technical responses. Correlation between technical responses shows the company's steps in carrying out the process or providing services to customers.

Priority of Technical Response

Based on the evaluation results of the relationship between customer specifications and technical response, it can be determined absolute and relative importance for each technical response. Example calculation for Technical Response: Suitability of Selection of Paint Pigments

Technical Importance Rating = Percentage of Total Relative Weight Customer Requirement x Value of Relationship Each Criteria

TIR = [(14% x 9) + (10% x 3) + (13% x 1)] x 100 = 166.73

Absolute Importance (AI) = Total from Importance level which is related to technical response to the value of the relationship.

AI = (5 x 9) + (3 x 3) + (4 x 1) = 58

Relative Importance (RI) = (AI Value for 1 item Technical Response) / (Total from AI for all Technical Response)

RI = 58/1132 x 100% = 4.8%

Technical Target

Technical targets show the results of house of quality evaluation from technical responses to customer specifications. This technical target must be considered by the company in improving service quality.

d. Discussion

Based on the research that has been done with the design of the House of Quality in determining the quality criteria for Ogick Paint Art car painting workshop business. The results of the study show that the service quality criteria that have the highest priority are durability color intensity and durability gloss. The value of customer importance for the two highest quality criteria is 5. Durability color intensity is one of the highest quality criteria because it affects the customer's financial ability to repaint repeatedly. The more durable the level of color intensity, the customer can save budget for painting. On the other hand, durability glossiness is one of the highest quality criteria because it affects the aesthetic results of painting. The more durable gloss power, the higher the aesthetic value of painting results for customers. While the service quality criteria which have the lowest priority are scratch resistant varnish which is equal to 1. This is due to the fact that at this time there are additional quality coatings, namely ceramic coating. Based on the research, it is also known that the highest technical importance rating is 251.29 with absolute importance and relative importance, respectively 81.87 and 7.23%. Whereas, the lowest value of technical importance rating is 53.267 with the value of absolute importance and relative importance respectively 17.35 and 1.53%. The highest technical importance rating is for the technical response of the corresponding comparison of varnish and hardener. This is due to the lack of hardener when mixing, the result of varnish becomes soft and long dry. While the lowest technical importance rating is for the appropriate technical response of air pressure. This is caused by air pressure does not affect the quality of painting.

5. Conclusions

Based on the results of the research, it can be seen that the service quality criteria by using Voice of Customer (VoC) in the car painting workshop business for the Ogick Paint Art painting workshop. The service quality criteria desired by the customer are durability gloss with a customer importance value of 5 and durability intensity of color intensity with a customer importance value of 5. While the service quality criteria that have the lowest customer importance value are scratch resistant varnish which is equal to 1 This is due to the fact that at this time there are additional quality coatings, namely ceramic coating. Based on the research, it is known that the highest technical importance rating is 251.29 with absolute importance and relative importance, respectively 81.87 and 7.23% in the

corresponding ratio of varnish and hardener. Meanwhile, the lowest technical importance rating is 53.267 with absolute importance and relative importance respectively 17.35 and 1.53% at the right air pressure.

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