Design Development Strategy with Quality Function Deployment Approach : A Case Study in E-Commerce Industry

Rahmad Rezeki, Humiras Hardi Purba, Siti Aisyah

Abstract— **E-commerce is one of the growing business sectors in Indonesia. This can be seen by the increase in e-commerce transactions amounting to Rp 25.1 trillion in 2014 to 89 trillion in 2017, as well as the increase in e-commerce of companies which recorded 26.2 million. The number of e-commerce users in 2016 reached 25.1 million and is expected to continue to increase to 39.3 million users by 2020. The number of high e-commerce users in Indonesia does not always indicate that customers are satisfied with the quality of service from e-commerce. Further, there are 16 problems that cause complaints about e-commerce. Research shows that there are 5 main issues that cause e-commerce customers to complain. Based on the above data and phenomena it can be argued that products and services provided by e-commerce companies do not lead to customer satisfaction. Deployment Function Quality (QFD) is used to improve the quality of e-commerce services. The results show that the customers' voice seeks the following improvements to service quality including the delivery of order is on time, the goods that were delivered were according to orders, the physical status of goods are delivered according to the ones described in the website, the response to complaints is faster, and resolution of the complaints. The technical requirements that need to be improved to achieve customer satisfaction on the quality of e-commerce services are the presence of an order surveillance team, checking goods before delivery, call center for customer service, and clear standard operation procedures (SOPs) to resolve complaints/ disputes between markets and sellers.**

Index Terms— **Service Quality, E-Commerce, QFD, Indonesia.**

I. INTRODUCTION

E-commerce is one of the growing business sectors in Indonesia. This can be seen with the increase in e-commerce transactions from 2014 to 2017. E-commerce transactions in 2014 reached 25.1 IDR trillion. According to Rudiantara (Communications and Informatics Minister), the number of e-commerce transactions in 2015 reached 46 trillion 2016 reached 68 trillion and the number of transactions is estimated to increase to 89 trillion rupiahs in 2017 according to Kemenkominfo. E-commerce growth can be seen with the increase in companies running e-commerce business in Indonesia. BPS chairman Suhariyanto said the number of e-commerce companies in 2016 was 26.2 million. The growth of e-commerce companies is supported by an increase in internet users to support daily life activities affecting the rise of e-commerce users. Indonesia's Internet Service Provider Association (APJII) Internet user reports on 2016 totaled 132,7 million users while the number of e-commerce users according to data from Statista in 2016 reached 25.1 million users and is projected to increase to 39, 3 million users by 2020. Meanwhile, according to APJII survey data of 2016 from 256.2 million Indonesians 123, 5 million (51.08%) access commercial content on the internet. The frequently visited commercial contents are online stores with 82.2 million (62%), personal business 45.3 million (34.2%) and other 5 million (3.8%).

The high number of e-commerce users in Indonesia does not always indicate that customers are satisfied with the quality of the service from e-commerce. According to Putri et al., 2017[5] there are 16 problems that cause complaints about e-commerce that can be grouped into 8 aspects namely process aspect (slow response to customer service complaints; bookings; frauds, that the company only provides a place for advertising only and not the seller, the buyer to buy the goods contact the seller directly and not the advertising company), product aspect (less detailed product information; goods delivered are not orderly; corrupted or defective), human-related aspects (inspection of goods before delivery, delivery delay from delivery service), place aspect, cyberspace and time (system error and bug on the system), price aspect (unilateral booking cancellation, especially on e-commerce type market, the difference in shipping costs over the system and the costs that buyers need to buy on the courier side), promotional promo (misleading promotional material), physical evidence (item or packaging being delivered damaged or defective due to an error of delivery service, the restriction arises when the item is delivered by the warehouse in good condition but due to the delivery by the expedition of the parcel damaged or even the product is damaged), the productivity and quality aspects (the customer gets a physical product which does not match or exceeds the expectations of the goods received). In addition, the YLKI report (Yayasan Lembaga Konsumen Indonesia) reports shows that e-commerce complaints are on the 3rd stage in 2016 from the total number of complaints about 781 direct complaints and 1038 by telephone. Frequent complaints are that there are five main problems: unreliable goods, unilateral cancellations, repayment processes, misleading information and dispute resolution.

The occurrence of customer complaints about the quality of services due to the dimension of electronic services quality that have not been met by e-commerce companies. According to Bult, 2016[1], there are 4 dimensions of electronic service quality that must be met by e-commerce company that is website design (information quality, website aesthetics,

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website convenience, product selection, merchandise availability, price offerings, website personalization and system availability), fulfillment (timeliness of delivery, order accuracy and delivery condition), customer service (service level and return handling/policies) and security or privacy.

There are 3 dimensions that can be used to measure the quality of physical distribution services in the field of B2C that is product availability, on time delivery, and delivery quality [13]. According to Gera, 2011[2], using 12 attributes to measure e-service quality 5 attribute about website, 1 attributes about privacy and 5 attribute about service that is the service is prompt, the service is delivered in less time, the service has high variety of offering , the service is delivered as promised and the service provider is trustworthy.

Based on the data and complaints above there is a gap between expected quality with received quality. So it can be said that quality of services provided by e-commerce companies has not met customer satisfaction.

II. LITERATUR REVIEW

The success of B to C e-commerce business is strongly influenced by the quality of service provided and the company's differentiation strategy. This section is usually referred to as the quality of e-service and is defined as "the extent to which a website facilitates the shopping, purchasing, and delivery of efficient and effective products and services"[6]. Quality of service to e-commerce is different from the quality of service traditionally. Quality of service in e-commerce is known as E-quality service. E-quality services measure the overall support provided by an online service provider regardless of whether the support is delivered by the information systems department, new organizational unit or diverted to an Internet service provider [7]. Overall customer evaluation and assessment of the advantages and quality of e-service delivery in a virtual market are referred to as e-quality services. There are some differences between operational e-services and traditional service operations are e-services involving meetings between customers and virtual markets with virtual salespeople where customers and sellers do not meet face-to-face; second, there is no real component when compared to traditional markets; and third, customers learn how to serve themselves [8].

The customer's desire to do online shopping is influenced by several factors. Personality factors, perceptions of benefits, engagement, situations, lifestyles and beliefs influence customers to do online shopping [9]. Perceived usefulness, perceived ease to use, and perceived risk are factors that influence customers for online shopping [4]. Interface design, time and effort cost, ease of use, shopping experience, service quality, perceived quality, and delivery are factors that influence customers to make purchases online [16].

III. METHODS

A. *Quality Function Deployment (QFD)*

QFD is used to find the elements of quality and size management techniques that have the greatest impact on customer needs [10]. Quality Function Deployment (QFD) is a widely used technique for designing products and services, by combining the voice of the customer. The goal is to understand customer needs, prioritize design characteristics in the most appropriate order to meet the needs and then design a product or service system that is appropriate to ensure customer satisfaction [17]. A research tool or systematic method that can be used to provide the information needed to help modify the product to match the customer's expectations is Quality Function Deployment (QFD). The quality planning process to achieve some quality products whose characteristics in accordance with customer needs to be expressed and implied can be achieved by using Quality Function Deployment [11]. In quality management, QFD is known as a programming matrix in which several studies have proposed this method to achieve competitive advantage.

B. *House Of Quality (HOQ)*

House of Quality (HOQ) is the first matrix of QFD used in this study as a major part of the model [15]. HOQ uses matrix placement to move the customer's needs into a product or service feature [12]. HOQ is a tool of the QFD method used to identify customer needs to be transferred to design parameters and performance targets to help improve service quality [13]. There are 6 process stages in HOQ conducted in this research to improve the quality of e-commerce services. These are [3]:

Stage 1: Identify the quality issues of e-commerce services.

Stage 2: Identify customer needs or voice of customer by using the tree diagram.

Stage 3: Identify customer importance rate. Customer importance rate indicates the level of service quality expected by the customer. Customer importance rate using a scale of 1 to 5 with a high priority level is indicated by the number 5.

Stage 4 : Calculate and building planning matrix to evaluate the current level of quality of e-commerce services based on customer needs and determine the level of improvement that can meet customer satisfaction in accordance with the voice of customer. Stage in building a planning matrix by counting and determine [18] :

a. Improvement factor. Formula for importance factor that is:

$$\text{Importance factor} = \{(\text{Planned CS Rating} - \text{Existing CS Rating}) * 0.2\} + 1 \quad (1)$$

b. Sales point is a strategic marketing factor. Sales point rate is a number from 1 to 1.5 that is used to place emphasis on the customer need.

c. Overall weighting. Formula for importance factor that is:

$$\text{Overall weighting} = \text{Customer importance} \times \text{Improvement factor} \times \text{Sales point} \quad (2)$$

d. Percentage of total weighting. The percentage of total weighting is calculated to understand how much of the design or improvement effort should be placed on each of the customer needs. The percentage of total weighting si calculated by the formula :

$$\text{Percentage of total weighting} = (\text{Overall weighting} : \text{Sum of overall weighting}) \times 100 \quad (3)$$

Stage 5: Building interrelationships matrix and correlation matrix between technical requirements. Interrelationships matrix is used to show the relationship between the technical requirements with the voice of the customer. This relationship uses a 3 levels scale: 9 for a strongest relationship, 3 for medium relationship and 1 for weak relationship.

Stage 6: Calculate and determine technical Priorities. Technical Priorities indicates which technical requirements are prioritized to be implemented to improve the quality of e-commerce services to fit the voice of the customer. The formula of Technical priorities that is :

Technical priorities : Scale of the relationship x Overall weighting (4)

IV. RESULT AND DISCUSSION

Quality Function Deployment (QFD) is an approach to quality development. House of Quality (HOQ) is the core method used in QFD. The results of the quality design using QFD to improve the quality service of e-commerce as follows :

Stage 1: Identify the quality issues of e-commerce services The result of literature reviews for previous research Putri et al., 2017[5] and data from YLKI there are several issues of quality of e-commerce services identified as follows:

Process Issue

- A slow response to complaints from customer service
- The goods not delivered
- Unilateral order cancellation
- The length of time of disbursement of funds from the balance of e-money
- Fraud, which is a company that advertises not a seller so buyers to buy goods contact the seller directly and not the company that put the ads

Product Issue

- Less detailed product information
- The goods that delivered not match to order
- The goods or packaging of goods shipped damaged or defective
- Inventory of goods exhausted after ordering
- The customers get physical of products are not appropriate or out of expectation on the goods received

Price Issue

- The difference in the system's sending cost and the cost that the seller should have to spend on the courier

Information Issue

- The confusing promotional materials

Figure 1. Affinity Diagram for Service Quality E-Commerce

Stage 2: Identify customer needs or voice of customer by using the tree diagram. The voice of customer for the quality of e-commerce services are:

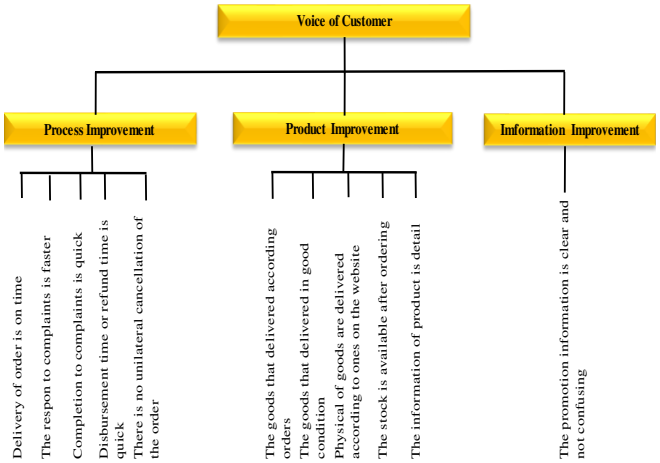


Figure 2. Tree Diagram for Service Quality E-Commerce

Stage 3: Identify customer importance rate. The result of analysis of previous research is customer importance rate for voice of customer:

Delivery of order is on time	5
The goods that delivered according orders	5
The goods that delivered in good condition	5
Physical of goods are delivered according to ones on the website	5
The stock is available after ordering	5
There is no unilateral cancellation of the order	5
The information of product is detail	5
The promotion information is clear and not confusing	4
The respon to complaints is faster	5
Completion to complaints is quick	5
Disbursement time or refund time is quick	4

Interrelationships Matrix

Planning Matrix

VOC - Customer Need

Customer Importance

Figure 3. Customer Importance of VOC

Stage 4 : Calculate and building planning matrix. According to Manalu et al., 2007[14] customer satisfaction rates for e-commerce services for delivery timeliness parameters, seller response speed, post-payment complaint handling, feedback speed from admin, the projection of images according to the website is 3. The following is a planning matrix for improving the quality of e-commerce services :

VOC - Customer Need

Planning Matrix

Delivery of order is on time	5	Interrelationships Matrix	3	5	1.4	1.5	10.50	10.11
The goods that delivered according orders	5		3	5	1.4	1.5	10.50	10.11
The goods that delivered in good condition	5		4	5	1.2	1.5	9.00	8.67
Physical of goods are delivered according to ones on the website	5		3	5	1.4	1.5	10.50	10.11
The stock is available after ordering	5		4	5	1.2	1.5	9.00	8.67
There is no unilateral cancellation of the order	5		3	5	1.4	1.5	10.50	10.11
The information of product is detail	5		3	5	1.4	1.5	10.50	10.11
The promotion information is clear and not confusing	4		4	4	1	1.4	5.60	5.39
The respon to complaints is faster	5		3	5	1.4	1.5	10.50	10.11
Completion to complaints is quick	5		3	5	1.4	1.5	10.50	10.11
Disbursement time or refund time is quick	4		3	4	1.2	1.4	6.72	6.47

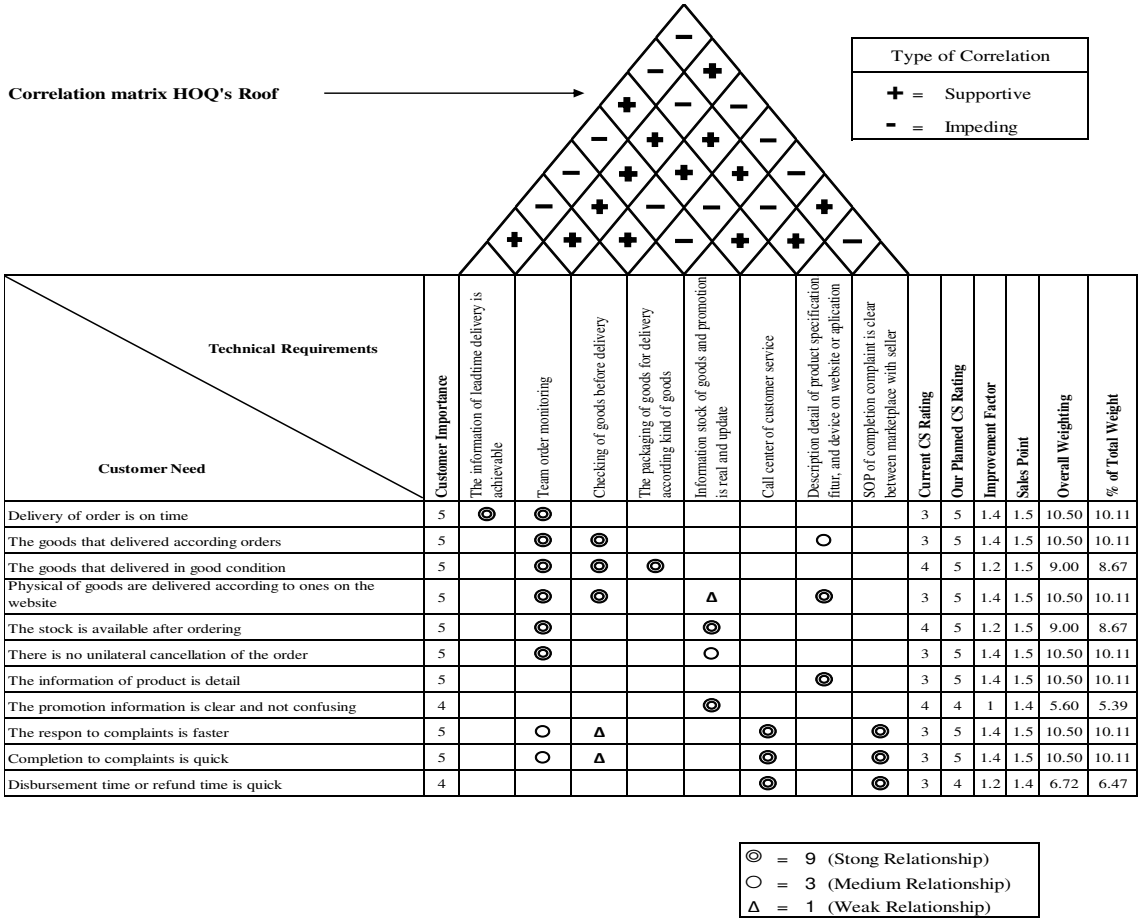
Customer Importance

Current CS Rating | Our Planned CS Rating | Improvement Factor | Sales Point | Overall Weighting | % of Total Weight

Figure 4. Planning Matrix for Service Quality E-Commerce

Stage 5: Building interrelationships matrix and correlation matrix between technical requirements. This matrix will produce the technical requirements which are needed to

improve the quality of service that suits the customer's needs. Matrix correlation shows a correlation between technical requirements in service quality improvement in accordance with voice of customer. Here are the interrelationships matrix and correlation matrix for improving the quality of e-commerce services.



Technical Requirements / Customer Need	Customer Importance	The information of leadtime delivery is achievable	Team order monitoring	Checking of goods before delivery	The packaging of goods for delivery according kind of goods	Information stock of goods and promotion is real and update	Call center of customer service	Description detail of product specification fitur, and device on website or aplication	SOP of completion complaint is clear between marketplace with seller	Current CS Rating	Our Planned CS Rating	Improvement Factor	Sales Point	Overall Weighting	% of Total Weight
Delivery of order is on time	5	◎	◎							3	5	1.4	1.5	10.50	10.11
The goods that delivered according orders	5		◎	◎				○		3	5	1.4	1.5	10.50	10.11
The goods that delivered in good condition	5		◎	◎	◎					4	5	1.2	1.5	9.00	8.67
Physical of goods are delivered according to ones on the website	5		◎	◎		Δ		◎		3	5	1.4	1.5	10.50	10.11
The stock is available after ordering	5		◎			◎				4	5	1.2	1.5	9.00	8.67
There is no unilateral cancellation of the order	5		◎			○				3	5	1.4	1.5	10.50	10.11
The information of product is detail	5							◎		3	5	1.4	1.5	10.50	10.11
The promotion information is clear and not confusing	4					◎				4	4	1	1.4	5.60	5.39
The respon to complaints is faster	5		○	Δ			◎		◎	3	5	1.4	1.5	10.50	10.11
Completion to complaints is quick	5		○	Δ			◎		◎	3	5	1.4	1.5	10.50	10.11
Disbursement time or refund time is quick	4						◎		◎	3	4	1.2	1.4	6.72	6.47

◎ = 9 (Stong Relationship)
○ = 3 (Medium Relationship)
Δ = 1 (Weak Relationship)

Figure 5. Interrelation Matrix and Correlation Matrix

The current conditions for voice of customers to have e-service satisfaction include delivery of order is on time; the goods that are delivered are according to the orders; physical status of goods are delivered according to ones on the website; there is no unilateral cancellation of the order; the information of product is detailed; the response to complaints is faster; resolution of complaints is quick; and disbursement time or refund time is quick. The CS rating is 3 as these are frequent complaints about e-commerce services. Whereas for the goods that are delivered in good condition; the stock is available after ordering; and the promotion information is clear and not confusing has CS rating of 4 because this problem is not too much of a major problem that leads customers to complain about e-commerce services. Based on the CS rating of the voice of customer, the current condition is planned to increase the CS rating as the target for the CS rating

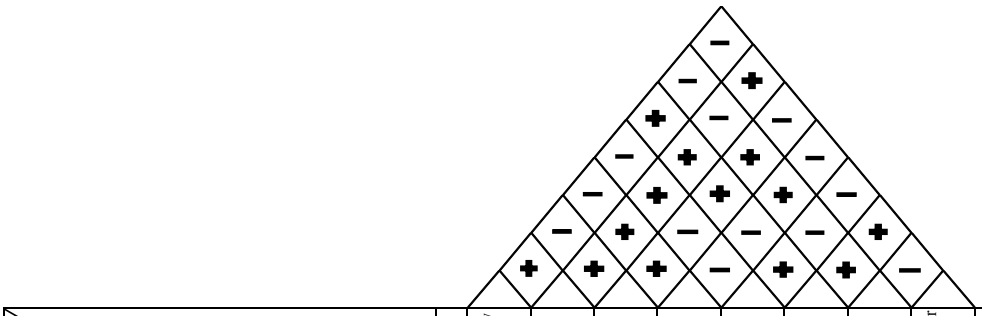
Improvement plan which is rating 5 for a ninth of the voice of customer and rating 4 for the voice of customer with respect to the factors: the promotion information is clear and not confusing and disbursement time or refund time is quick, because the voice of customer has no great effect on the quality of e-commerce services.

Based on the overall weighting of each voice of customer, the priority order for the process of improving the quality of e-commerce services is delivery of order on time; the goods that are delivered are according to orders; physical status of goods are delivered according to ones on the website; there is no unilateral cancellation of the order; the information of product is detailed; the response to complaints is faster; and completion of complaints is quick a top priority for improvement with the overall weighting value of 10.50. As for the goods that are delivered in good condition and the stock is available after ordering become the next priority that must be done with the improvement to the overall weighting 9.00.

Stage 6: Calculate and determine technical Priorities. Technical Priorities indicates which technical requirements are prioritized to be implemented to improve the quality of e-commerce services to fit the voice of the customer. Technical priorities are calculated by multiplying the scale of the relationship of overall weighting. For example, the value of technical priorities to a call center of customer service is obtained by the following stages:

For the response to complaints is faster = 9 x 10.50
For resolution of complaints is quick = 9 x 10.50
For disbursement time or refund time is quick = 9 x 7.84
The total for call center for customer service technical priorities is 259.56

Achieving the quality of e-commerce services in accordance with the voice of customer necessitates then the required technical parameters to improve the quality of the service. Technical requirements needed to improve the quality of e-commerce services based on voice of customer that has been described above with the priority value of each technique are team order monitoring (584.1), checking of goods before delivery (291), call center of customer service (259.26), SOP of completion complaint is clear between marketplace and seller (259.26), detailed description of product specification, fitur, and device on website or application (220.5), and Information about stock of goods and promotion is real and update (291) a top priority that must be met and applied to achieve the quality of e-commerce services in accordance with customer satisfaction. Below is an HOQ for quality improvement of e-commerce services.



Technical Requirements / Customer Need	Customer Importance	The information of leadtime delivery is achievable	Team order monitoring	Checking of goods before delivery	The packaging of goods for delivery according kind of goods	Information stock of goods and promotion is real and update	Call center of customer service	Description detail of product specification, fitur, and device on website or aplication	SOP of completion complaint is clear between marketplace with seller	Current CS Rating	Our Planned CS Rating	Improvement Factor	Sales Point	Overall Weighting	% of Total Weight
Delivery of order is on time	5	◎	◎							3	5	1	2	10.50	10.11
The goods that delivered according orders	5		◎	◎				○		3	5	1	2	10.50	10.11
The goods that delivered in good condition	5		◎	◎	◎					4	5	1	2	9.00	8.67
Physical of goods are delivered according to ones on the website	5		◎	◎		Δ		◎		3	5	1	2	10.50	10.11
The stock is available after ordering	5		◎			◎				4	5	1	2	9.00	8.67
There is no unilateral cancellation of the order	5		◎			○				3	5	1	2	10.50	10.11
The information of product is detail	5							◎		3	5	1	2	10.50	10.11
The promotion information is clear and not confusing	4					◎				4	4	1	1	5.60	5.39
The respon to complaints is faster	5		○	Δ			◎		◎	3	5	1	2	10.50	10.11
Completion to complaints is quick	5		○	Δ			◎		◎	3	5	1	2	10.50	10.11
Disbursement time or refund time is quick	4						◎		◎	3	4	1	1	6.72	6.47
Technical Priorities		94.50	603.00	291.00	81.00	173.40	249.48	220.50	249.48						
% of Total Priorities		4.82%	30.73%	14.83%	4.13%	8.84%	12.71%	11.24%	12.71%						
Priority		7	1	2	8	6	3	5	4						

◎ = 9 (Stong Relationship)
○ = 3 (Medium Relationship)
Δ = 1 (Weak Relationship)

Figure 6. House Of Quality for Service Quality E-Commerce

V. CONCLUSION

The quality of e-commerce services in Indonesia specifically for B to C and C to C e-commerce is still in line with customer expectations. This can be seen from the existence of complaints about service to customers provided by e-commerce. Quality of service should be a quest for e-commerce companies to ensure loyal customers conduct transactions with the company and become loyal customers. Quality of service is a serious concern since the growth of e-commerce is very high in Indonesia, and if an e-commerce company cannot provide services in line with customer expectations, then customers can only switch to other e-commerce companies.

Based on the analysis of service quality and voice of customer from e-commerce company in Indonesia then there are some quality parameters that must be improved so that the quality of e-commerce services provided for the customers is in accordance with their expectations. Some of the customers voice their concern that the delivery of order is on time should be improved; the goods that are delivered are according to orders; physical status of goods are delivered according to ones described in the website; there is no unilateral cancellation of the order; the information of product is detailed; the response to complaints is faster; resolution of complaints is quick; and disbursement time or refund time is quick. Achieving the quality of service in accordance with the voice of customer above, then needs that technical parameters was applied to the priority value of each: is team order monitoring (603), checking of goods before delivery (291), call center of customer service (249.48), SOP of resolution of

complaints is clear between marketplace and seller (249.48), detailed description of product specification, fitur, and device on website or application (220.5), and Information stock of goods and promotion is real and updated.

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