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Analysis of customer satisfaction in freight forwarder industry using Servqual, IPA and FMEA methods

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ABSTRACT

A company service's higher quality is indicated by its service performance's effectiveness and efficiency. This can increase customers' satisfaction, thus leads to the increase of company income. This research objective was to know the effects of 5 dimensions constructing service quality, including the effects of service quality on customers' satisfaction in freight forwarder industry. Current research collected data through purposive sampling, by distributing questionnaire to 86 customers continued by data processing by measuring the gap and tested statistically using SmartPLS program, priority scale mapping using Importance Performance Analysis, and improvement using Failure Mode and Effect Analysis. The first findings obtained from this research was analysis result using IPA discovering 10 indicators which require improvement in which 7 indicators were found the same through GAP measurement. The second finding was the biggest component which needs improvement in freight forwarder service in Indonesia, which is reliability dimension. Therefore, concerns need to be given to these matters so that more accurate and reliable service can be provided.

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1 Introduction

Economy growth affects logistic business development in Indonesia, indicated by the increase of Indonesian people consumption capacity. However, this matter is not in accordance with the high cost of logistic and low quality of performance. Based on data issued by World Bank in 2018, Logistics Performance Index (LPI) rank of Indonesia was forty six, in which 33% respondents claimed that freight forwarder competence and service quality level in Indonesia was high or higher (Bank, 2018). This value is far from the percentage value of neighboring countries, including Malaysia (50%) and Singapore (75%).

Based on information above, if benchmarks are provided to several world companies as listed in American Customer Satisfaction Index (ACSI) for consumer shipping, for example UPS in 2018, its customers' satisfaction index was 82% from 100% with company's baseline target was 82%, therefore freight forwarder service satisfaction in Indonesia still requires much improvement.

Based on the previous studies, possible reasons of low service quality of freight forwarder companies were the lack of updated information regarding the applicable regulation in export-import process, lack of understanding related to customs tariffs, failure in goods declaration process, and information delivery to customers which do not pay attention to good grammar (Chatapa, 2017).

Another reason of why local freight forwarder companies service quality is not as good and professional as foreign freight forwarder company is because local companies only compete by decreasing price without adjusting the standard and do not improve its service quality (Truong, 2016).

Gap between the customers' perception and expectation also possibly causes customers' dissatisfaction, for example delay in delivery, lack of understanding related to the documents' preparation so that document errors often occur, discrepancy between agents' policy and applicable regulation, damaged or loss product during delivery, and high cost for customers (Limoubpratum et al., 2020).

Therefore, this research carried out investigation whether the five dimensions, including tangible, empathy, responsiveness, reliability and assurance are components constructing service quality as mentioned in previous studies (Kilibarda et al., 2016) as well as to know the effects of service quality on customers' satisfaction according to previous studies (Subhashini & Preetha, 2018).

2 Literature review

According to (Tjiptono, 2019), product quality (goods or service) significantly contributes to customers' satisfaction, customers' retention, word-of-mouth communication, repurchasing, customers' loyalty, market share, and profitability. Research project often employed service quality analysis model of Servqual 5 gaps model which determines the differences between customers' perception and customers' expectation (Zeithaml et al., 1990).

Additionally (Tjiptono, 2019), customers' satisfaction is differences between performance and customers' expectation. Customers' satisfaction indicated that service quality provider must continuously improve their service quality (Ahmed, F, Farooq Jan, M, Ozturk, 2018). Customers' satisfaction is customers' feeling as a result of comparison between performance assessment and customers' expectation over product/service used (Lin et al., 2017).

Freight forwarding is a service related to goods handling, packaging, transporting, storage, consolidation, distribution, and other services and is not limited only to issues related to customs, fiscal, document, and assurance of goods (Watanuki, 2015). Freight forwarding also provides specific service to customers including preparing documents, booking ship/plane ticker, moving goods from the initial point to destination, customs process, information related to applied regulation, insurance process, LC, and others (Grant, 2012).

Structural Equation Modelling (SEM) Partial Least Square (PLS) or SEM-PLS analysis consists of 2 (two) sub-models. The first sub-model is measurement model or outer model which indicates how manifest variable represents latent variable to be measured. The second sub-model is structural model or inner model which shows estimation strength between the latent or construct vari-

ables. Furthermore, latent variable formed in SEM-PLS has reflective and formative indicators (Gozhali & Latan, 2015).

Importance Performance Analysis (IPA) method was proposed by (Martilla & James, 1977). Current research also used IPA approach to determine whether the service quality assessed by customers need to be improved (Ding & Tsai, 2012). Other studies also employed IPA in identifying prioritized items that need improvement based on the measurement result and service quality analysis in healthcare (Chang et al., 2019). Therefore, the main purpose of Importance Performance Analysis was to easily identify the attributes based on the interest whether the service has good or bad performance. Failure Mode and Effect Analysis (FMEA) is a method used to completely identify and comprehend causes and potential failure, as well as failure effects on system or user, for a product or a process; to evaluate risk related to identified failure, effect and cause, as well as to prioritize issues for corrective action; and to identify and carry out corrective action to handle an issue (Carlson, 2012). FMEA is also a technique in the processes of analyzing, defining, and removing potential failure related to process or system before reaching the customers (Andrejić & Kilibarda, 2017).

Based on the above literature review, hypotheses proposed in this research are:

Hypothesis (H1): Tangible is one of the components constructing the service quality dimension in the application of freight forwarder industry.

Hypothesis (H2): Empathy is one of the components constructing the service quality dimension in the application of freight forwarder industry.

Hypothesis (H3): Reliability is one of the components constructing the service quality dimension in the application of freight forwarder industry.

Hypothesis (H4): Responsiveness is one of the components constructing the service quality dimension in the application of freight forwarder industry.

Hypothesis (H5): Assurance is one of the components constructing the service quality dimension in the application of freight forwarder industry.

Hypothesis (H6): Service quality has significant effect on customer satisfaction.

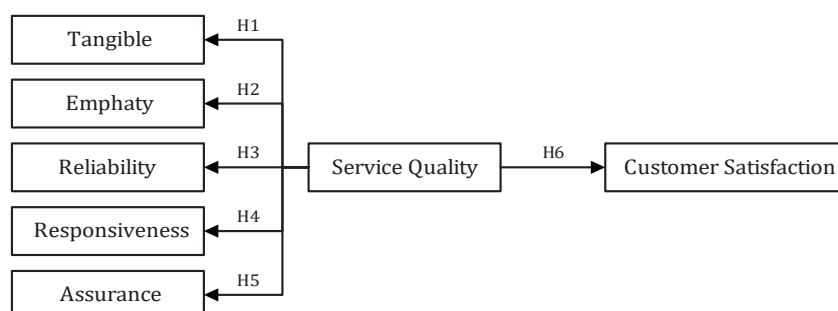


Figure 1 Conceptual framework

Table 1 Variable, dimension, and indicator constructing questionnaire

Variable	Dimension	Indicator	References
Service quality (Parasuraman et al., 1988)	Tangible	X1.1-X1.10	(Sramkova et al., 2018)
	Empathy	X2.1-X2.8	(Song & Yeo, 2017); (Subhashini & Preetha, 2018)
	Reliability	X3.1-X3.10	(Sramkova et al., 2018)
	Responsiveness	X4.1-X4.9	(Sramkova et al., 2018)
	Assurance	X5.1-X5.9	(Sramkova et al., 2018)
Customer satisfaction (Riitho, 2018); (Bayraktar et al., 2012)	Repeat purchase	Y1-Y2	(Riitho, 2018)
	Positive word of mouth	Y3	(Riitho, 2018)
	Refferal to other customers	Y4	(Riitho, 2018)
	Brand loyalty	Y5-Y7	(Riitho, 2018)

Source: Authors

3 Method

This research employed purposive sampling technique with respondents involved were 86 people chosen from freight forwarder users data in 2019 in one of subsidiary port service companies engaged in freight forwarder industry in Jakarta. Current research collected data by using questionnaire consisting of general data of respondents and 53 question items using likert scale of 1-5. This then continued by data analysis based on the gap and tested statistically using SmartPLS for its inner and outer model. Furthermore, mapping was also performed by using IPA

in addition to improvement on the risks emerged by using FMEA method. Table 1 presents questions variables, dimensions, and indicators.

4 Result and Discussion

4.1 Respondent’s characteristics

Based on questionnaire result from 86 respondents involved in the current research, majority of them came from national private companies (54.65%) which engaged as importing companies (39.54%) with the respondents’

Table 2 Characteristics of the respondents

No	Variables	Respondents (n = 86)	
		Number (people)	Percentage (%)
1	Gender		
	Male	61	70.93
	Female	25	20.07
2	Age (years old)		
	21-30 years	15	17.44
	31-40 years	33	38.37
	41-50 years	25	29.07
	Over 50 years	13	15.12
3	Educational level		
	Diploma	19	22.09
	Bachelor	61	70.93
	Master	6	6.98
4	Company characteristics		
	State-owned company	26	30.23
	Foreign company	13	15.12
	National private company	47	54.65
5	Characteristics of length of work		
	3 years and under	15	17.44
	3-5 years	11	12.79
	6-10 years	19	22.09
	11-15 years	24	27.91
	Over 15 years	17	19.77

No	Variables	Respondents (n = 86)	
		Number (people)	Percentage (%)
6	Position characteristics		
	Staff	18	20.93
	Supervisor	25	29.07
	Manager	29	33.72
	General manager	5	5.81
	Director	5	5.81
	Owner	4	4.65
7	Industrial status characteristics		
	Exporter	1	1.16
	Importer	34	39.54
	Exporter/Importer	21	24.42
	Customs service management	18	20.93
	Sea/air cargo expedition	12	13.95
8	Characteristics of monthly use intensity		
	5 times and under	20	23.25
	6-10 times	21	24.42
	11-20 times	24	27.91
	Over 20 times	21	24.42

Source: Authors

Table 3 Gap analysis test result

Dimension	Mean performance	Mean expectation	Gap
Tangible	3.87	4.45	-0.59
Empathy	3.88	4.47	-0.59
Reliability	3.82	4.46	-0.64
Responsiveness	3.82	4.42	-0.60
Assurance	3.83	4.39	-0.57

Source: Authors

Table 4 Test result with the biggest gap value

Code	Description	Gap value
X1.5	Ability to meet the customers' urgent demand	-0.81
X3.6	Flexibility in choosing the ship schedule, transit, and delivery frequencies	-0.78
X3.4	Punctuality in cargo document release process	-0.77
X3.5	Punctuality in delivering the arrival and delay schedule	-0.74
X5.7	Easiness and fastness in claim process	-0.73
X4.6	Willingness to negotiate tariff or giving discount	-0.73
X2.2	Active in solving problem and finding solution	-0.72
X4.8	Punctuality between the contract time and realization in field	-0.71
X5.2	Availability of update control for customers	-0.70
X3.1	Punctuality in delivering goods	-0.69

Source: Authors

position level was manager (33.72%), and had been working for the company for 11-15 years (27.91%). Furthermore, following table (Table 2) shows detail characteristics of the respondents.

4.2 Gap analysis

The testing used gap analysis by calculating questionnaire result using Microsoft excel application. Table 3 presents overall gap analysis result for 5 service quality dimensions, with the biggest gap value was reliability dimension of -0.64. The negative value in gap evaluation indicates differences between performance and customers' expectation. Therefore, checking was done on all indicators of 5 service quality dimensions, obtaining 10 indicators in which the highest gap value was.

Table 4 as follow shows gap measurement in all indicators obtaining highest gap value in ability to meet customers' urgent demand with gap value of -0.81. Among the 10 biggest gap values, 4 indicators were from reliability dimension, those are X3.1, X3.4, X3.5 dan X3.6.

4.3 Outer model analysis

Next stage is processing questionnaire result data using SmartPLS program (Ringle et al., 2015). Outer model measured obtained following results.



Figure 2 Outer model

Source: Authors

Figure 2 shows that each indicator has outer loading value of more than 0.7 so that they were valid (Chin, 1998).

Table 5 Composite reliability (CR), rho-A, cronbach's alpha, and average variance extracted (AVE)

	Cronbach's alpha	rho_A	CR	AVE
Tangible	0.925	0.927	0.938	0.627
Empathy	0.934	0.934	0.945	0.684
Reliability	0.946	0.947	0.954	0.674
Responsiveness	0.951	0.953	0.959	0.721
Assurance	0.932	0.934	0.943	0.649
Service quality	0.984	0.984	0.984	0.603
Customer satisfaction	0.950	0.952	0.959	0.770

Source: Authors

Based on Table 5 above, composite reliability (CR), cronbach alpha, and rho_A values for all variables obtained above standard value of more than 0.70 (Chin, 1998), thus they met the reliability requirement. Similarly, average variance extracted (AVE) values of all variables also obtained values above standard value of 0.50 (Chin, 1998), thus they met the validity requirements.

4.4 Inner model analysis

SmartPLS analysis used inner model measurement to know the effects of each variable. The following figure 3 is inner model measurement result.

The following Table 6 regarding H1, H2, H3, H4, H5, and H6 hypotheses testing obtained that assurance, empathy, reliability, tangible and responsiveness dimensions construct service quality with 5% significance. Likewise, service quality also significantly affected customers' satisfaction. The testing result can also be seen from t-statistic values of all variables, obtaining value >1.96. Therefore, this result encourages previous studies result from (Le et al., 2019) and (Suprpto & Jani, 2020). This indicates that freight forwarder companies need to seriously concern with five service quality dimensions so that customers' satisfaction is achieved.



Figure 3 Inner model

Source: Authors

Table 6 Coefficient and test of structural model effects

	Original sample	P-value	T-statistic	Remaks
Service quality → Tangible	0.929	0.000	63.144	Accepted
Service quality → Empathy	0.917	0.000	38.467	Accepted
Service quality → Reliability	0.964	0.000	123.531	Accepted
Service quality → Responsiveness	0.956	0.000	90.133	Accepted
Service quality → Assurance	0.910	0.000	43.350	Accepted
Service quality → Customer satisfaction	0.866	0.000	29.096	Accepted

Source: Authors

R-square measurement obtained that all constructs generally had R^2 values ≥ 0.75 (Chin, 1998), thus it was considered as having high/strong predictive accuracy. Likewise in predictive relevance measurement (Q^2), tangible, empathy, reliability, responsiveness, assurance and customer satisfaction were also categorized as strong because they have criteria from predictive relevancy measurement if Q^2 value = 0.35 has strong predictive relevance (Chin, 1998). The following table 7 shows measurement results of R-square and predictive relevance.

Table 7 Coefficient determination (R^2) and predictive relevance (Q^2)

	R^2	Q^2
Tangible	0.863	0.532
Empathy	0.841	0.568
Reliability	0.929	0.619
Responsiveness	0.914	0.628
Assurance	0.829	0.526
Customer satisfaction	0.750	0.560

Source: Authors

Meanwhile, table 8 presents f-square measurement result, obtaining that service quality has strong effect or good effect towards the five dimensions of tangible, empathy, reliability, responsiveness, and assurance. Likewise, service quality effect on customer satisfaction, obtained 2.992, indicating that it has good or strong effect. The criteria determination in f^2 effect size measurement is f^2 value = 0.02, having small or bad effect size, then if f^2 value = 0.15 has moderate effect size and if f^2 value = 0.35 has strong or good effect size (Chin, 1998).

Table 8 f^2 effect size

	Service quality
Tangible	6.294
Empathy	5.304
Reliability	13.119
Responsiveness	10.598
Assurance	4.842
Customer satisfaction	2.992

Source: Authors

4.5 Importance performance analysis

To see the interest level of each indicator, mapping process was needed by using Importance Performance Analysis (IPA) method which was by comparing performance and expectation of each indicator. IPA analysis process was done by using Microsoft excel application, so that axis x value (performance) obtained 3.8444, while axis y (expectation) obtained 4.4153. furthermore, from axis x and y obtained 10 indicators in quadrant A which is a quadrant considered as important by customers, but companies do not provide good service so that it needs serious attention for improvement. The quadrant mapping is presented in figure 4 below.

Table 9 explains detail of 10 indicators belong to quadrant A as follow. Mapping result using IPA for measuring risk number 2 which is All workers' competence and knowledge regarding *freight forwarder* is in accordance with previous research result from (Ding & Tsai, 2012). Then, among 10 improvement prioritized indicators, reliability dimension need much attention for its improvement because there are 3 indicators belong to quadrant A, those are X3.4, X3.5, and X3.6.

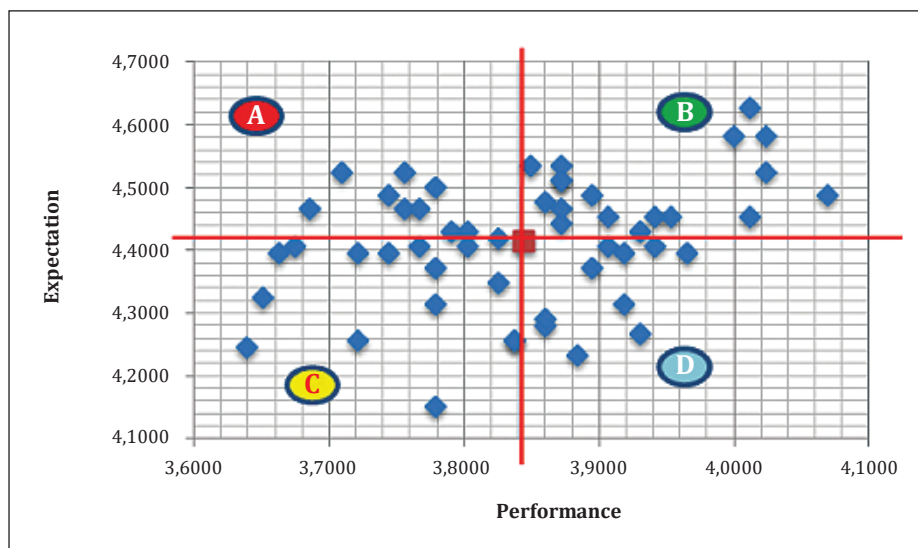


Figure 4 Cartesian diagram

Source: Authors

Table 9 Indicators of quadrant A (improvement priority)

Risk	Code	Description
Risk 1	X1.5	Ability to meet the customers' urgent demand
Risk 2	X1.10	Flexibility in choosing the ship schedule, transit, and delivery frequencies
Risk 3	X2.2	Active in solving problem and finding solution
Risk 4	X3.4	Punctuality in cargo document release process
Risk 5	X3.5	Punctuality in delivering the arrival and delay schedule
Risk 6	X4.6	Willingness to negotiate tariff or giving discount
Risk 7	X4.2	Fastness in responding to the customers' requirement
Risk 8	X4.8	Punctuality between the contract time and realization in field
Risk 9	X5.2	Availability of update control for customers
Risk 10	X5.5	Recent cargo information and security system

Source: Authors

4.6 Failure mode and effect analysis

The improvement process of 10 mapping result indicators using IPA obtained identification, improvement, and risk assessment of issues using FMEA. Risk assessment of each failure was based on occurrence, severity, and detection level. Table 10 below presents measurement result using FMEA.

After the identification and improvement stages, next process is comparing *risk priority number* (RPN) value before and after improvement. Such comparison is presented in Table 11.

Table 10 Risk identification and improvement using FMEA

Risk	Effect of risk	Effect	Control	Improvement
Risk 1	Cost	Inaccurate planning	Asking for delivery planning	Making monthly and annual forecast
Risk 2	Bad service	Lack of training	Providing good internal and external training	Making schedule for periodical internal and external training
Risk 3	Disrupted operation	No mitigation and procedure if there is discrepancies	Making process flow chart	Making procedure and analysis of problems solving, for example: FMEA
Risk 4	Delay and cost	No document checking, causing errors	Asking for draft document and preparing earlier	Making standard document
Risk 5	Cost	Cargo is not tracked	Asking for information of <i>Notice of Arrival</i> and <i>Notice of Delay</i> to shipping/airline agents	Making online cargo tracking system
Risk 6	Cost	Limited transportation means	Choosing schedule and booking long before	Making long-term contract with the airlines or <i>shipping line</i>
Risk 7	Customers shift to competitors	High workload	Sharing workload to other workers	Making <i>Service Level Agreement</i> (SLA)
Risk 8	Penalties	Discrepancies between SLA in contract	Performing training, technical guidelines, and control for each process stage	Making alert system so that the time is met
Risk 9	Customers unable to track	No update provided	Choosing <i>Person In Charge</i> (PIC) to give update to customers	Making dashboard for cargo report which can be accessed by the customers
Risk 10	Cost	Differences in the amount of cargo and delivery errors	Making <i>shipping marks</i> and <i>seal</i> for each package	Making <i>shipping marks</i> system and barcode

Source: Authors

Table 11 Comparison of RPN assessment between before and after improvement

Risk	Initial assessment					Improvement assessment				
	S	O	D	RPN	Categories	S	O	D	RPN	Categories
Risk 1	8	8	4	256	M	6	4	7	168	L-M
Risk 2	8	7	5	280	M	3	5	7	105	L
Risk 3	7	7	5	245	L-M	4	4	6	96	VL-L
Risk 4	9	8	4	288	M	5	6	7	210	M
Risk 5	8	8	4	256	M	3	6	6	108	L
Risk 6	8	8	5	320	M	4	4	6	96	VL-L
Risk 7	8	8	4	256	M	5	5	6	150	L
Risk 8	8	6	3	144	L	5	4	5	100	VL-L
Risk 9	7	7	5	245	L-M	4	5	6	120	L
Risk 10	7	7	5	245	L-M	3	4	6	72	VL-L

Source: Authors

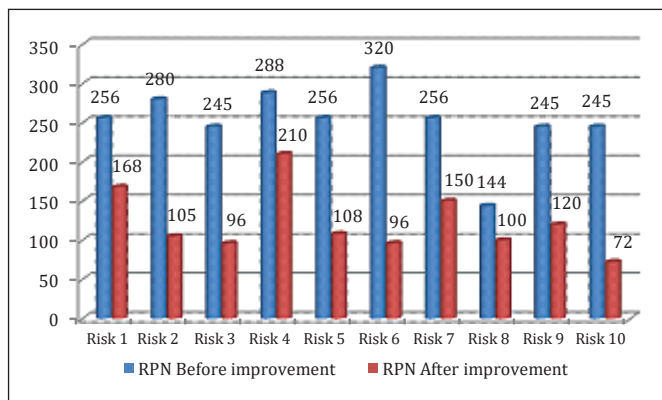


Figure 5 Comparison of RPN values before and after improvement

Source: Authors

Figure 5 shows significant decrease of RPN value and categories before improvement and after improvement (García et al., 2001). This indicates that improvement is effective to decrease possible risk. Therefore the use of FMEA in this research is accordingly and encourages previous research, that FMEA is needed to identify potential risk from logistic provider (Andrejić & Kilibarda, 2017).

5 Conclusion

Based on results of the current research, it summed up that SmartPLS program successfully proved that tangible, empathy, reliability, responsiveness, and assurance are dimensions constructing service quality in freight forwarder industry. This is indicated by positive path coefficient obtained. Furthermore, service quality also has positive affect on customer satisfaction. In the test using IPA, there were ten indicators belong to quadrant A so that they need prioritized attention to be improved. Based on the IPA measurement on the ten indicators, there were seven same prioritized indicators

from the gap measurement result which needs improvement. Thus, identification, problem solving, and risk assessment using FMEA were done on ten of the indicators. Based on FMEA testing, results obtained are significant decrease from RPN value and categories between before and after improvement. Thus shows that improvement efforts are effective in decreasing risk. Furthermore, testing using gap and IPA obtained that the biggest component needs improvement in freight forwarder service in Indonesia, particularly in reliability dimension. Therefore this needs attention so that accurate and reliable service can be provided.

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Author Contributions: research design, concept, data collection, statistical analysis, and writing of the article, NN; checking and reviewing the article, ER

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