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Article

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OPERATIONS, INFORMATION & TECHNOLOGY | RESEARCH ARTICLE

The effect of logistic service quality on customer satisfaction and loyalty using kansei engineering during the COVID-19 pandemic

Dian Palupi Restuputri^{1*}, Tri Ratna Indriani¹ and Ilyas Masudin¹

Abstract: This article identifies the influence of logistics service quality in Indonesia on customer satisfaction and loyalty during the COVID-19 pandemic and customer trust as a moderating variable. In this study, the service quality consists of three variables: the quality of staff service, quality of operational service, and technical service quality. In this study, a conceptual model was generated by providing four other variables: customer satisfaction, customer trust, customer loyalty, and customer commitment. The 300 respondents were selected to fill out the formal questionnaire, while 30 respondents were as a trial for the formal questionnaire. The questionnaire trial analysis was assisted by SPSS 23, while the formal questionnaire analysis was carried out with SmartPLS 3.0. This study resulted in four hypotheses accepted from the ten proposed hypotheses. The results show that the quality of staff service and technical service quality significantly affects customer satisfaction. It is also found that customer satisfaction and customer trust have

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PUBLIC INTEREST STATEMENT

Capturing the voice of consumers towards the attribute quality of logistics services has become an interesting issue to be discussed lately. This article identifies influence of logistics service quality in Indonesia on customer satisfaction and loyalty during the COVID-19 pandemic and customer trust as a moderating variable. In this study, a conceptual model was generated by providing four other variables: customer satisfaction, customer trust, customer loyalty, and customer commitment. The results show that the quality of staff service and technical service quality significantly affects customer satisfaction. It is also found that customer satisfaction and customer trust have a significant effect on customer loyalty. The use of Kansei Engineering in this study will provide a different perspective to describe customer services during the COVID-19 pandemic.

a significant effect on customer loyalty. The use of Kansei in this study will provide a different perspective to describe customer services during the COVID-19 pandemic.

Subjects: Industrial Design; Quality Control & Reliability; Supply Chain Management; Supply Chain Management; Engineering Economics

Keywords: Logistics services quality; COVID-19 pandemic; Kansei engineering; customer trust; customer loyalty; customer satisfaction

1. Introduction

In the logistics management concept, customer satisfaction is the crucial factor in providing service quality. Meidutė-Kavaliauskienė et al. (2014) argued that logistics service providers must provide services under customer expectations for logistics service providers. In the logistics sector, humans need to develop proactive plans that including procurement, storage, transportation, and other activities (Nikbakhsh and Farahani (2011). Since December 2019, the world has been hit by the COVID-19 Pandemic (Cai et al., 2020). This outbreak is caused by coronavirus respiratory syndrome, a virus that causes various deadly diseases to become a public health concern (Rothan & Byrareddy, 2020). This plague makes a decline in social-economic conditions and the recession in many countries, especially in Indonesia. The steps taken by the government to prevent the spread of this epidemic, especially in Indonesia, are lockdowns, industrial restrictions, social distancing, self-quarantine, and others (del Rio-Chanona, Mealy, Pichler, Lafond, & Farmer). In the logistics sector, lockdowns make the logistics system hampered (Biswas & Das, 2020), decreasing customer satisfaction and loyalty to logistics service providers (Tedjakusuma et al., 2020). Esper (2020) examined logistical activities during the COVID-19 pandemic for the community's welfare. The results are community demands in terms of security, the role of local government, and the necessary supervision until the product arrives the store. It is a challenge to be faced by the industrial sector so that the government and business actors jointly find solutions to make the industry survive amid the ongoing pandemic (Rajah & Grenville, 2020).

Several studies related to the logistics service quality before the COVID-19 outbreak conducted by Lisińska-Kuśnierz and Gajewska (2014) explained that companies must get customer satisfaction and loyalty by evaluating the timeliness, completeness, and accuracy in delivery. Another study conducted by Teresa and Evangelos (2015) states that the essential attribute in displaying logistics services is those evaluates the services provided to customers. This research was performed using the Kansei Engineering method. A study conducted by Restuputri et al. (2020) discusses customer perceptions of the logistics service quality using the Kansei Kata approach. The result is that providers' logistics service quality in Indonesia significantly affects customer satisfaction and loyalty. Chen et al. (2015) applied Kansei engineering-based logistics design to develop international express services and concluded that global express logistics managers should prioritize service designs to attract future customers. From the research that discusses logistics service quality and its effect on customer satisfaction and loyalty, there has been no study on the impact of logistics service quality on customer satisfaction and commitment during the COVID-19 pandemic, resulting in a variable logistics service before the COVID-19 pandemic. After COVID-19, it can change due to different conditions. Therefore it is necessary to analyze how the logistics service quality affects the quality of logistics to provide customer satisfaction and loyalty at the time of the COVID-19 incident in a logistics service company that uses the Kansei engineering approach to express customer wishes. This method is chosen because the product developments that occur make customers provide a subjective assessment of the products. Therefore, this method is used to translate images and how customers feel to improve service quality for logistics service providers. Nagamachi (1995) argued that this method had been successfully applied to industrial companies in Japan. This study focuses on "The effect of the relationship between the logistics service quality on customer satisfaction and loyalty during the COVID-19 pandemic using the Kansei technique approach.

2. Literature review

2.1. Logistics service quality

Novack et al. (1992) defined logistics as an activity that involves managing facilities, transportation, meeting the third party's needs, and information within a company. Logistics that provide the best quality to customers will provide greater customer satisfaction and loyalty (Saura et al., 2008). Chiu (1995) said that logistics companies need to have various product features, short order cycle times, reliable delivery, low-cost delivery, customer service orientation, low inventory levels and fast inventory turnover, and precise, accurate, and immediate information. Stank et al. (1998) said that logistics companies need to monitor quality and price as it is hard to beat competitors. Besides, logistic expertise is a competitive advantage to deliver the right goods at the right time as an innovative way to compete with competitors. Market segmentation in logistics services corresponds to customers' physical services as long as the offer still contains logistical elements (Clegg et al., 2010).

2.2. Logistics service quality scale

Measuring the quality of logistics service results must be operationalized with measurable indicators. Hence, it is assessable as a basis for construction development (Clegg et al., 2010). Comrey and Lee (1992) identified the crucial logistics service quality criteria for manufacturing companies and verified them through surveys. The results show that there are still many opportunities untapped by service providers to increase competitiveness. Bienstock et al. (1997) developed the logistics service quality scale in nine constructs, namely the information quality, procedures in order, number of order releases, order conditions, timeliness, accuracy in given orders, order quality, handling provided with the approval of nonconformities in the order, and the quality of service by the person. Parasuraman et al. (1988) developed SERVQUAL into five dimensions of service quality summarized in Table 1.

2.3. The Relationship between staff service quality, operational, technical logistics service providers, customer satisfaction, and loyalty during the COVID-19 Pandemic

Sricharoenpramong (2018), in his research, concluded that an employee must be reliable, punctual, and careful at work. Besides, an employee must have effective communication skills, courteous, and ready to serve. Juga et al. (2010) stated that staff must have a sense of concern for customers, expertise in their fields, and be easy to find. He also explained that the quality of operations service from source to customers must be well-coordinated, on time, and with

Table 1. Quality dimension instruments

Dimension	Description
Tangibles	It consists of the physical facilities display, employee appearance, equipment, and communications of the service company (Brown et al., 1993; Culiberg & Rojšek, 2010).
Reliability	The ability of service providers to perform services in a fast and reliable way (Cronin & Taylor, 1992; Gupta & Chen, 1995)
Responsiveness	The capabilities that service providers must have to respond and meet customer needs in a fast, timely, and flexible way (Iberahim et al., 2016; Kang & James, 2004)
Assurance	The ability of service provider employees to convince customers, as well as have the courtesy and knowledge to give customers trust (Bojanic & Drew Rosen, 1994; Cronin & Taylor, 1992)
Empathy	Having a sense of concern for customers (Crompton & Mackay, 1989; Mangold & Babakus, 1991)

Table 2. Structural model evaluation criteria

Model construct	Construct Description	Indicator
R-square	The coefficient of determination is an index to measure the R-square of each endogenous variable (Lee & Che, 2013).	The value of explanatory power is said to be substantial if the value of 0.67 is strong; 0.33 is moderate; 0.19 is weak (Chin, 1998)
Path Coefficient	A model is used to verify the significance level of a relationship by considering the relevance of the connection (Joe F Hair et al., 2014).	<ul style="list-style-type: none"> The hypothesis can be accepted or because there is a relationship effect if the t-statistic \geq t-table. T-table 1.96 with a significance level of 5% Value < 0.15 is weak; 0.15–0.45 is moderate, > 0.45 is weak

appropriate transportation capacity. No damage occurs to the customer's property. He classified logistics technical services as having the correct information, accuracy, and good logistics structure in technical services. Masudin (2013) explained a significant relationship between staff, operational, and technical services in the humanitarian logistics sector with customer satisfaction and loyalty. Hence, the following hypotheses can be made:

H1: The quality of staff service during the COVID-19 pandemic has a significant effect on customer satisfaction.

H2: The quality of operational service during the COVID-19 pandemic has a significant effect on customer satisfaction.

H3: The quality of technical service during the COVID-19 pandemic has a significant effect on customer satisfaction.

H4: The quality of staff service during the COVID-19 pandemic has a significant effect on customer loyalty.

H5: The quality of operational service during the COVID-19 pandemic has a significant effect on customer loyalty.

H6: The quality of technical service during the COVID-19 pandemic has a significant effect on customer loyalty.

2.4. The relationship between customer satisfaction and loyalty during the COVID-19 Pandemic

High purchase rates due to customer loyalty will positively impact the company, including creating a positive image for our products so that customers will value our products to other customers, exchange other products, and increase the potential of cross-buying (Bruhn & Grund, 2000). Customer dissatisfaction is usually caused by poor service; the providers do not provide new service improvements but still use the same model as before. Service providers feel that the services used are acceptable to customers but no longer meet customer expectations because of increasing market competition and changing customer tastes (Rust & Zahorik, 1993).

Loyalty from customers will create increased profit by increasing revenue, lowering costs to attract customer attention, and decreasing price sensitivity (Hallowell, 1996). Gronholdt et al. (2000) conducted a study that increased market share can reduce customer satisfaction. It is

more difficult to satisfy customers who consist of many segments rather than those with small ones. Bowen and Chen (2001) suggested that there are three approaches to take in measuring customer loyalty and satisfaction as follows:

(1) Measurement of customer behavior

It can be assessed from customer behavior in making repeat purchases.

(2) Measurement of customer attitudes

Measurement of customer attitudes is found in the customers' psychological atmosphere attached to loyalty to the company

(3) Composite measurements

Composite measurement is a combination of behavior measurement and customer characteristics in product preferences, product switching probability, and purchase frequency.

Attributes that support customer loyalty to sellers or services are customers giving positive opinions to logistics service providers related to service providers' best services to customers. Customers will reuse the logistics service provider, and customers will provide these services to other customers for using this logistics service provider. The logistics service provider's customer is one of the leading choices (Juga et al., 2010). Hart and Johnson (1999) stated that customer loyalty lies in total satisfaction, so it can be hypothetically-tested that customer satisfaction has a significant relationship with customer loyalty. The following is the proposed hypothesis:

H7: Customer satisfaction has a significant effect on customer loyalty during the COVID-19 pandemic.

2.5. Customer trust moderates the relationship between customer satisfaction and customer loyalty to logistics service providers during the COVID-19 pandemic

Customer trust is one of the moderating variables between customer satisfaction and customer loyalty, one of the keys to successful corporate marketing (Morgan & Hunt, 1994). Customer trust is one factor affecting a seller's ability or service to influence prospects (Swan et al., 1985). For companies that sell products or services, the benefit of gaining customer trust is a long-term relationship between the customer and the seller that can positively impact the seller. In general, customer trust has two components: influence and cognition. Influence is the feeling of security that a customer has for a seller of a product or service and is dependent on the seller. Cognition is the belief that customers give to product sellers who have the competence and motivation for products that customers need to rely on. Therefore, the following hypotheses can be tested:

H8: Customer trust moderates the relationship between customer satisfaction and customer loyalty

2.6. Customer trust has a significant effect on customer loyalty during the COVID-19 pandemic

Customer trust and customer loyalty are critical factors for service quality (Sarwar et al., 2012). Trust is a fundamental and essential element that has a significant influence on every relationship and behavior. Therefore, customer trust is a crucial factor that can affect service quality in all aspects. Harris and Goode (2004) have researched the relationship between customer trust and customer loyalty. The result is that there is a positive relationship between customer trust and customer loyalty. From this statement, a hypothesis can be made regarding the relationship between customer trust and customer loyalty during the COVID-19 pandemic as follows:

H9: Customer trust has a significant effect on customer loyalty during the COVID-19 pandemic.

2.7 Customer commitment has a significant effect on customer loyalty to logistics service providers during the COVID-19 pandemic.

Luarn and Lin (2003) explained a significant relationship between customer commitment and customer loyalty. Customer commitment is a customer's willingness to maintain a long and valuable relationship with a seller of a product or service, which means that the customer is not easily influenced by other, more attractive, or effective sellers (Morgan & Hunt, 1994). Customer commitment to service or product providers involves a psychological state and motivation to maintain relationships, commitment, and dedication to service and product providers (Jones et al., 2010). Customer commitment to the marketing sector is generalized into three dimensions, namely:

(1) Affective

Affective commitment is defined as a customer's psychological attachment to a service organization based on how much benefits consumers get from the service organization (Gruen et al., 2000). Affective commitment can represent consumers' desire to establish relationships with service providers consistently. Consumers and service companies are expected to correlate with consumer's favorable responses to service providers positively. Therefore, customers must have positive feelings toward service providers (Tabrani et al., 2018).

(2) Normative

Normative commitment is defined as a customer's psychological attachment to a service organization based on the consumer's sense of obligation to the service provider (Gruen et al., 2000). The obligation that consumers feel to establish relationships with service providers is caused by social pressure to do a certain way according to the existing standard of circumstances (Meyer & Allen, 1997). Some attributes become the customer's obligation to cooperate with logistics service providers (Tabrani et al., 2018).

(3) Calculative

Calculative commitment is a psychological relationship between customers and service providers based on the perceived cost of a disconnection between the customer and the service provider (Gruen et al., 2000). Geyskens et al. (1996) define consumer involvement with service providers as realizing benefits, which are sacrificed and can cause loss when the relationship ends. A customer who has a high calculative commitment has considered the benefits obtained by consumers with service providers. Besides, consumers have thought about the costs to incur, such as searching for suitable, more effective alternatives than consumers' potential profit. Thus, the high level of calculative commitment will result in a higher level of commitment (Jones et al., 2010). Tabrani et al. (2018) stated that the attributes associated with calculative commitment are the benefits received by customers from relationships with logistics service providers, which means more significant customer costs. Therefore, the following hypothesis can be proposed:

H10: Commitment has a significant effect on customer satisfaction and loyalty during the COVID-19 pandemic.

2.8. Logistics Service Elements

The elements contained in logistics services are as written below:

(1) Logistics Service Providers

Logistics Service Providers (LSPs) are defined as providers whose activities are inventory management services, information services such as messaging, and value-added services (Berglund et al., 1999).

Today, many businesses have shifted their activities to LSPs to offer speed and accuracy in service to customers (McGinnis & Kohn, 2002). LSPs must have superior performance in cargo, consulting services, and cargo bill payments management (Murphy & Poist, 2000). An LSP is vital to improve service capabilities to meet customers' needs, which often change according to their conditions. They are always superior to other competitors and gain trust in customers' eyes. Thus, LSP must have the ability to offer the best range of services they have following their needs (Lai, 2004).

(2) Information System

The flow of information in logistics activities is vital and valuable because logistics activities are more complicated and time-consuming. It involves many channel members so that an efficient and effective flow of information is needed (Closs et al., 1997). Logistics information systems (LIS) are required to easily and quickly access the tracking and validation of logistics. There are two plans to do in logistics: the planning application and the application to carry out logistics implementation. The application functions to monitor logistics activities ranging from tracking the status of goods, managing materials, and providing financial-related information. It involves all parties in logistics activities, where logistics activities are in different database systems and various companies to increase the time of product quickly reaches the customer and reduce costs. Besides, all logistics players should better manage resources to increase future needs (Helo & Szekeley, 2005). Information system supports logistics activities during the current pandemic where all logistical activities can be easily and quickly accessed by logistics actors (Liu et al., 2020). Companies in this condition use LIS to supervise and control logistical activities in making strategic decisions to increase operational efficiency and strength (Gołemska & Gołembski, 2020).

2.9. Logistics during the COVID-19 pandemic

Logistical problems during the COVID-19 pandemic are included in emergency handling that requires risk mitigation, preparation, emergency response activities, and post-disaster recovery (Yu et al., 2020). In their book, Liu et al. (2020) designed a logistics network model in the emergency state to respond to an unpredictable pandemic. In the book, they propose an allocation model that SEIR (Susceptible Exposed Infected Recovered). This model can consider customer demand satisfaction and higher emergency operating costs, at least, simultaneously and can be used as a decision-making tool to improve logistical efficiency during the current pandemic. Yu et al. (2020) stated that the logistics network design during a pandemic has a reasonably short time limit, planned for only a few weeks to several months. The government has an essential role in this regard as they must provide a logistics policy as a solution due to the current pandemic, namely COVID-19. As has been done previously, the government has made a "green subsidy" policy for the supply chain. The government must also issue policy logistics related to the COVID-19 outbreak (Choi, 2020). During the COVID-19 pandemic, an excellent way to deliver goods is needed because it can help maintain social distancing to prevent coronavirus spread (Singh et al., 2020). Sacramento et al. (2019) proposed to increase the package weight on drones during the COVID-19 pandemic to reduce the number of vehicles and outdoor activities. As a result of COVID-19, several areas have experienced lockdown. Problems related to logistics arise due to transportation restrictions, absence of workforce, inaccessible areas due to red zones so that logistics are disrupted. Thus, it is necessary to evaluate logistics and warehouse routes (Singh et al., 2020).

2.10. Kansei engineering

Kansei Engineering is a method for developing products that focus on the feelings and needs that customers need and want (Nagamachi, 1995). The Kansei engineering process's basic concept is a semantic description and a description of customers' product/service map (Chen, Hsu et al., 2015). [figure 1](#) is the Kansei Engineering process to form a new product design, in this case, the product:

The Kansei engineering basic methodology is as follow (Schütte* et al., 2004):

Figure 1. The Kansei engineering process.



- (1) Select a domain by identifying a population following the provisions of the research object.
- (2) Collect the Kansei words describing the domain. This stage is carried out by distributing questionnaires, interviews, or others to identify Kansei words and get information about customers' emotional impressions.
- (3) Doing Kansei word grouping according to service attributes in the form of consumer responses or emotions to a product or service it affects.

Kansei engineering has been carried out in various types of activities, one of which is logistics. In logistics, Kansei engineering can translate customer images to improve service quality to logistics service providers (Yeh & Chen, 2018).

3. Research methods

This study was conducted using quantitative research. Bock (1960) explained that quantitative research is a technique used to analyze data to provide numerical values by maximizing the relationship between observational measures and data analysis models. This study is based on the logistics service quality in logistics service providers. The literature study is carried out by looking for references through books or similar research journals that previous researchers have previously conducted. The aim is to serve as a source of information and data to prepare this research. A word check was carried out on logistics service management during the COVID-19 pandemic using an open questionnaire in this study. This questionnaire would be distributed to 30 customers who have experience using logistics services during the COVID-19 pandemic. Respondents shared their experiences in using logistics services during this pandemic by writing them down. Then, the Kansei words would be obtained from those often written by respondents because they represent feelings. Masudin (2013) used 30 respondents as a questionnaire trial in the research conducted. Thus, in this trial, a questionnaire trial is conducted with 30 respondents to see if they could understand the questionnaire questions. The questions could be adequately verified before respondents distribute questionnaires to conduct research related to logistics services. From the questionnaires distributed to respondents, validity and reliability tests will be carried out to see whether the questionnaire is valid—the validity and reliability testing in this study using SPSS software. The questionnaire words are said to be accurate with a calculated value of $> r$ table, and the questionnaire is said to be reliable with a Cronbach's alpha value of > 0.6 (Sujarweni, 2014). Comrey and Lee (1992) stated that the number of respondents of 50 is awful, 100 is said to be low, 200 is moderate, the number of 300 is good, and 500 or more is said to be very good. Because there are different opinions between previous studies regarding the number of samples, 300 samples were taken. The respondents' determination refers to previous research conducted by Hameed et al. (2020) by using 300 respondents. Then the structural model was tested using the SEM (Structural Equation Model) technique. The method for analyzing and trying SEM was done with the help of smart PLS (Partial Least Square) with the following criteria as shown in Table 2.

SEM is usually used to take measurements related to companies, events, and individuals (Hox & Bechger, 1998). Briere et al. (2010) stated that SEM consists of two variables: exogenous variables and endogenous variables. Exogenous variables cannot be relied upon, while endogenous variables are variables that influence other variables.

3.1. Operational variables

In the study on the logistics service quality, 13 Kansei words were collected from 30 questionnaires that defined customer feelings as the expectations they would like to get from logistics service

Figure 2. Conceptual logistics service quality model during the COVID-19 pandemic.

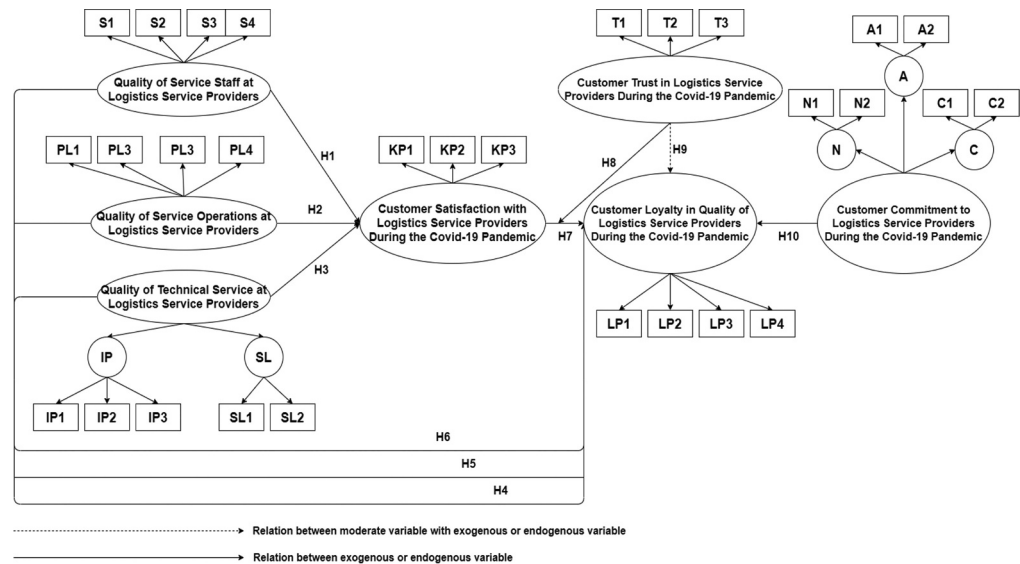
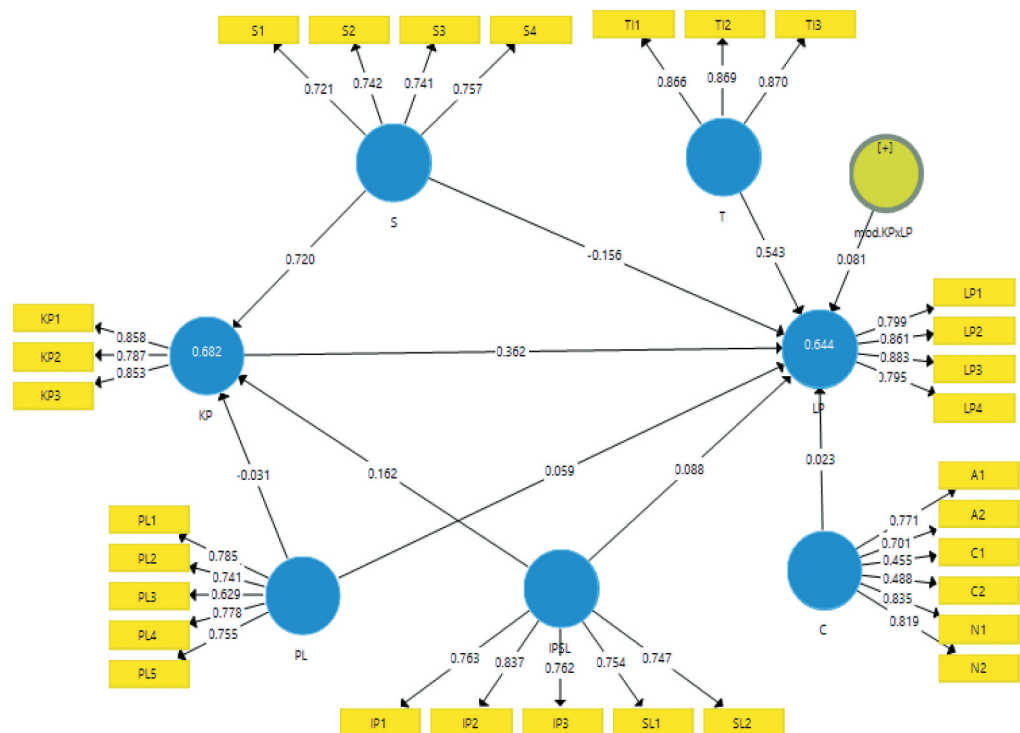


Figure 3. Output path diagram.



providers during the COVID-19 pandemic. The Kansei words were then grouped into the variables shown in Table 3.

3.2. Conceptual model and hypotheses

The conceptual model describes the relationship between logistics service providers' service quality during the COVID-19 pandemic and customer satisfaction and loyalty. This conceptual model

Table 3. Variables in the Kansei logistics service quality during the COVID-19 pandemic

Variable	Dimensions	Indicators	
Quality of Staff Services at Logistics Service Providers During the COVID-19 Pandemic (S) (Beatson et al., 2008; Chow et al., 2006)		S1	Staff must have a sense of concern for the services provided to customers
		S2	Service provider staff must have expertise in their field
		S3	Staff are easily accessible to customers
		S4	Staff adhere to the COVID-19 protocol (Obtained from Kansei words)
Quality of Operational Services at Logistics Service Providers During the COVID-19 Pandemic (PL) (Gummesson, 1998)	Processes and activities related to logistics (PL) = a necessity in fulfilling requests, scheduling, customer service, procurement of goods, and demand management	PL1	The entire logistical process from source to destination must be well-coordinated
		PL2	All logistical processes from source to destination must comply with the COVID-19 protocols.
		PL3	Delivery must be in accordance and on time in the hands of the customers
		PL4	Appropriate transportation capacity so that the goods are not defective or damaged when they arrive in the hands of customers
		PL5	Logistics service providers must be responsive to the requests desired by customers (obtained from Kansei words)
Quality of Technical Services of Logistics Service Providers During the COVID-19 Pandemic (IPSL) (Martínez & Rodríguez, 1997)	<ul style="list-style-type: none"> Quality of reporting and information systems represent the information systems, planning, coordination, control, and organizational design for logistics service providers (Esper et al., 2003). 	IP1	The quality of information relating to everything must be accurate
		IP2	Information related to deliveries must be promptly-provided to customer
		IP3	The availability of loyal information that the customer wants to find
	Logistics Structure (Tabrani et al.) = organizations that participate during processing, distribution, and warehousing	SL1	Logistics service providers must have branches in each region so that they are easily accessible to customers
		SL2	The process of delivering goods to the destination must be systematic (Obtained from Kansei word)

(Continued)

Variable	Dimensions	Indicators	
Customer Satisfaction With Logistics Service Providers During the COVID-19 Pandemic (KP) (Akbar & Parvez, 2009; Wang et al., 2004)		KP1	Customers get the best service from logistics service providers.
		KP2	Services provided are following the price paid by the customer.
		KP3	The service obtained by customers makes customers feel happy (Juga et al., 2010)
Customer Loyalty to Logistics Service Providers During the COVID-19 Pandemic (LP). (Akbar & Parvez, 2009; Wang et al., 2004)		LP1	Customers give logistics service providers positive opinions regarding the best services that service providers to customers have provided.
		LP2	Customers will reuse the logistics service providers
		LP3	Customers will introduce these services to other customers and persuade them to use the logistics service provider
		LP4	Customers who provide logistics services are one of the leading choices (Juga et al., 2010).
Customer Trust in Logistics Service Providers During the COVID-19 Pandemic/Trust (T). (Akbar & Parvez, 2009; Wang et al., 2004)		T1	Customers will continue to commit to using these logistics service providers
		T2	Customers acknowledge the capabilities possessed by logistics service providers during the logistics operational process from upstream to downstream.
		T3	Customers provide a positive perspective and image to logistics service providers (Marakanon & Panjakajornsak, 2017)

(Continued)

Table 3. (Continued)

Variable	Dimensions	Indicators	
Customer Commitment to Logistics Service Providers During the COVID-19 Pandemic (C). (Jacoby & Kyner, 1973; Luarn & Lin, 2003)	<ul style="list-style-type: none"> Normative commitment = the obligation for an individual to establish a relationship with an organization (Meyer & Allen, 1991) 	N1	The customer has to strengthen relationships with logistics service providers.
		N2	The customer commits to maintaining relationships with logistics service providers is based on a sense of obligation to do so
	<ul style="list-style-type: none"> Affective commitment = emotional attachment between an individual and an organization so that an individual has a strong commitment to being involved in the organization. (Kanter, 1968) 	A1	Customers have positive feelings towards logistics service providers.
		A2	I feel emotionally attached to the logistics service provider.
	<ul style="list-style-type: none"> Calculative commitment = an engagement between individuals and an organization as a realization that is felt to provide benefits and disadvantages of the relationship ends. (Geyskens et al., 1996) 	C1	The benefits the customer receives from a relationship with a logistics service provider outweigh the customer's costs.
		C2	Based on economic considerations, namely on the customer's profit or loss. (Tabrani et al., 2018)

Table 4. Results of validity test staff for service quality

Item	R count the quality of staff service	R Table	Evidence
S1	0.942	0.361	Valid
S2	0.886	0.361	Valid
S3	0.818	0.361	Valid
S4	0.76	0.361	Valid

provides information about target variables and indicators that most influence customer satisfaction and loyalty to logistics service providers during the COVID-19 pandemic. Therefore, each attribute and service design's evaluation can be carried out and proposed under the customers' wishes. The relationship between the variables and the indicators is presented in the image below:

Figure 2 describes the relationship between service quality and customer satisfaction and loyalty as independent variables. As a moderating variable, the trust variable can increase and weaken the relationship between customer satisfaction and loyalty.

4. Findings and discussions

This research was conducted using Smart PLS 3 to examine the relationship between variables and their constructs and variables with other variables on customer satisfaction and loyalty to logistics

service providers during the COVID-19 pandemic and test the validity and reliability of Kansei using SPSS.23 to generate descriptive value statistics.

4.1. Test recapitulation

This study's results were obtained from distributing formal questionnaires to 100 respondents with the requirement that respondents had used a logistics service provider during the Covid-19 pandemic at least once.

4.1.1. Validity Test of the Pilot Test

The validation test on the pilot test was used to determine the questionnaire's validity distributed to 30 respondents (Table 4). The questionnaire's indicator is valid if the R count value > from the R table. This test was carried out by analyzing the 2-tailed statistical test with a predetermined alpha value of 5%, which means the error rate is 5%, and the r-value in the table is known to be 0.361.

Based on Table 5, it can be said that all items are valid as the R count values on the quality of staff service > from the R table value. The highest validity value is in item S1 as it has an R count value of 0.942, which is higher than the R table value of 0.361. It means that item S1 is said to be very capable of representing customer feelings. As all matters are said to be valid, further testing can be conducted, namely the reliability test.

Based on Table 6, it can be said that all items are valid as the R-count values on the quality of staff service > from the R-table value. The highest validity value is in item PL1, as it has an R-count value of 0.899, which is higher than the R-table value of 0.361. It means that item PL1 is said to be very capable of representing customer feelings. As all matters are said to be valid, further testing can be conducted, namely the reliability test.

Based on Table 7, it can be said that all items are valid as the R-count values on the quality of information service > from the R-table value. The highest validity value is in item SL1 and SL2 as they have the R-count value of 0.957, which is higher than the R-table value of 0.361. It means that items LP1 and LP2 are said to be very capable of representing customer feelings. As all values are valid, further testing can be conducted, namely, the reliability test.

Based on Table 8, it can be said that all items are valid as the R-count values on customer satisfaction > from the R-table value. The highest validity value is in item KP3 as it has an R-count value of 0.941, which is higher than the R-table value of 0.361. It means that item KP3 is said to be very capable of representing customer feelings. As all matters are said to be valid, further testing can be conducted, namely the reliability test.

Based on Table 9, it can be said that all items are valid as the R-count values on the customer loyalty > from the R-table value. The highest validity value is in item LP3, as it has an R-count value of 0.94, which is higher than the R-table value of 0.361. It means that item LP3 is said to be very

Table 5. Results of operational service quality validity test

Item	R count the quality of operational service	R Table	Evidence
PL1	0.899	0.361	Valid
PL2	0.786	0.361	Valid
PL3	0.789	0.361	Valid
PL4	0.856	0.361	Valid
PL5	0.740	0.361	Valid

Table 6. Results of technical service quality validity test

Item	R count the quality of technical service	R Table	Evidence
IP1	0.868	0.361	Valid
IP2	0.93	0.361	Valid
IP3	0.905	0.361	Valid
SL1	0.957	0.361	Valid
SL2	0.957	0.361	Valid

Table 7. Results of customer satisfaction validity test

Item	R count customer satisfaction	R Table	Evidence
KP1	0.876	0.361	Valid
KP2	0.909	0.361	Valid
KP3	0.941	0.361	Valid

Table 8. Results of customer loyalty validity test

Item	R count customer loyalty	R Table	Evidence
LP1	0.881	0.361	Valid
LP2	0.932	0.361	Valid
LP3	0.94	0.361	Valid
LP4	0.883	0.361	Valid

Table 9. Results of customer trust validity test

Item	R count customer trust	R Table	Evidence
TI1	0.692	0.361	Valid
TI2	0.87	0.361	Valid
TI3	0.774	0.361	Valid

capable of representing customer feelings. As all values are valid, further testing can be conducted, namely, the reliability test.

Based on [Table 10](#), it can be said that all items are valid as the R-count values on the customer trust $t >$ from the R-table value. The highest validity value is in item T12, as it has an R-count value of 0.87, which is higher than the R-table value of 0.361. It means that item T12 is said to be very capable of representing customer feelings. As all values are valid, further testing can be done, namely, the reliability test.

Table 10. Results of customer commitment validity test

Item	R-count customer commitment	R-table	Evidence
N1	0.955	0.361	Valid
N2	0.956	0.361	Valid
A1	0.872	0.361	Valid
A2	0.889	0.361	Valid
C1	0.907	0.361	Valid
C2	0.846	0.361	Valid

Based on [Table 11](#), it can be said that all items are valid as the R-count values on the customer commitment > from the R-table value. The highest validity value is in item N2, as it has an R-count value of 0.956, which is higher than the R-table value of 0.361. It means that item N2 is said to be very capable of representing customer feelings. As all matters are said to be valid, further testing can be conducted, namely the reliability test.

4.1.2. Reliability test from the testing

The reliability test testing is used to determine the level of consistency of answers given by respondents. The questionnaire is reliable if the Cronbach alpha value is > 0.6 (Ndayizigamiye et al., 2020). Based on [Table 12](#), it is known that all items have a “reliable” value, meaning that the measurements made in this questionnaire are reliable because they can consistently measure even though they are repeated in the same conditions. In the table above, it is known that the effective item has the highest Cronbach alpha value of 0.906, where the value is > 0.6, so it is

Table 11. Results of Cronbach Alpha recapitulation

Variable	Cronbach Alpha	R-table	N of Item	Evidence
Quality of staff service (S)	0.869	0.6	4	Reliable
Quality of operational service (PL)	0.869	0.6	5	Reliable
Quality of technical service (IPSL):				
a. Information Systems (IP)	0.885	0.6	3	Reliable
a. Logistics structure (LP)	0.908	0.6	2	Reliable
Customer satisfaction (KP)	0.894	0.6	3	Reliable
Customer loyalty (LP)	0.93	0.6	4	Reliable
Customer trust (TI)	0.733	0.6	3	Reliable
Customer commitment (C)				
a. Normative (N)	0.71	0.6	2	Reliable
a. Affective (A)	0.906	0.6	2	Reliable
a. Calculative (C)	0.692	0.6	2	Reliable

Table 12. Respondent profile

Profile	Frequency	Percentage (%)
Gender:		
Male	107	36%
Female	193	64%
Age:		
11–20 years old	61	20%
21–30 years old	201	67%
31–40 years old	20	7%
>40 years old	18	6%
Last education:		
Junior High School	4	1%
Senior High School	195	65%
Diploma I	2	1%
Diploma II	1	0%
Diploma III	23	8%
Diploma IV	5	2%
Bachelor I	67	22%
Bachelor II	3	1%
Type of work:		
Housewife	11	4%
College Student	183	61%
Government Employees	22	7%
Entrepreneur	5	2%
General employees	46	15%
Other	33	11%

said to be reliable. Because all items on the questionnaire are reliable, it can be continued in the formal questionnaire processing.

4.2. Respondent profile

Based on the distribution results of 300 samples used as material for analysis, the respondent profile data was obtained, which has been summarized in Table 12.

Table 12 shows that 64% of respondents are female. For the respondents' age, the highest percentage is between 21–30 years old, with a rate of 67%. Most of the respondents' last education is high school, with a total share of 65%. Meanwhile, most respondents are college students, with a percentage of 61% for the type of occupation.

4.3. Descriptive statistics assessment

The descriptive statistics section below describes the minimum value, average value, maximum value, and standard deviation of each variable's indicator.

Table 13 above is a descriptive statistics analysis. It is known that the average value of the staff service quality is 4.475, and the standard deviation value is 1. It means that the variation in construct indicators is not too considerable because the variation level is less than 30%. The average value of the quality of staff service indicator is said to be responded positively by respondents. The descriptive statistics analysis of the operational services quality shows an average value of 4.533 and a standard deviation of 0.634. It means that the construct indicators' variation is not too considerable because the variation level is less than 30%. The average value of the quality of operational service indicator is said to be responded positively by respondents.

Moreover, the descriptive statistics analysis of technical service quality shows an average value of 4.461 and a standard deviation of 0.629. It means that the construct indicators' variation is not too significant because the variation level is less than 30%. The average value of the quality of technical service indicator is said to be responded positively by respondents. It also indicates in the descriptive statistics analysis of customer satisfaction shows an average value of 4.373 and a standard deviation of 0.69. It means that the construct indicators' variation is not too considerable because the variation level is less than 30%. The average value of the customer satisfaction indicator is said to be responded positively by respondents.

Table 13 represents the descriptive statistics analysis of customer loyalty shows an average value of 4.136 and a standard deviation of 0.72. It means that the construct indicators' variation is not too significant because the variation level is less than 30%. The average value of the customer loyalty indicator is said to be responded positively by respondents. The descriptive statistics analysis of customer trust shown in Table 13 indicates an average value of 3.966 and a standard deviation of 0.72. It means that the construct indicators' variation is not too significant because the variation level is less than 30%. The average value of the customer trust indicator is said to be responded positively by respondents. The descriptive statistics analysis of customer commitment shows an average value of 3.937 and a standard deviation of 0.74. It means that the construct indicators' variation is not too considerable because the variation level is less than 30%. The average value of the customer commitment indicator is said to be responded positively by respondents.

4.4. PLS-SEM analysis

PLS-SEM (Partial Least Square—Structural Equation Modeling) is a tool used to perform analysis related to the collected Kansei words, which will then be depicted in a path diagram describing the relationship between indicators, as well as variables with other variables.

In this study, an indicator analysis can be carried out using the Kansei method, and previous research tested for reliability and validity so that formal questionnaires can be distributed. The validity of the formal questionnaire results will be tested to see what indicators are valid and valid for whom (Muawanah & Tentama, 2020). Meanwhile, Khoi and Ngan (2019) use SmartPLS software for the reliability test to see the consistency level of construct indicators using different times and places.

Table 13. Descriptive statistics results

Variable	Item	N	Mean Value	Mean	Min	Max	Standard deviation
Quality of Staff Service	S1	30	4.590	4.475	2	5	0.567
	S2	30	4.250		1	5	0.817
	S3	30	4.600		1	5	0.632
	S4	30	4.460		2	5	0.655
Quality of Operational Service	PL1	30	4.607	4.533	2	5	0.576
	PL2	30	4.532		2	5	0.613
	PL3	30	4.487		2	5	0.695
	PL4	30	4.600		1	5	0.632
	PL5	30	4.440		2	5	0.658
Quality of technical service	IP1	30	4.610	4.461	2	5	0.533
	IP2	30	4.457		2	5	0.644
	IP3	30	4.387		1	5	0.676
	SL1	30	4.463		2	5	0.644
	SL2	30	4.387		3	5	0.651
Customer satisfaction	KP1	30	4.427	4.373	2	5	0.652
	KP2	30	4.250		1	5	0.817
	KP3	30	4.443		3	5	0.627
Customer loyalty	LP1	30	4.303	4.136	2	5	0.636
	LP2	30	4.190		2	5	0.712
	LP3	30	4.073		2	5	0.762
	LP4	30	3.977		2	5	0.772
Customer trust	TI1	30	3.797	3.966	2	5	0.822
	TI2	30	4.030		2	5	0.680
	TI3	30	4.070		2	5	0.687
Customer commitment	N1	30	3.677	3.937	1	5	0.871
	N2	30	3.737		2	5	0.817
	A1	30	3.970		2	5	0.685
	A2	30	3.497		1	5	0.866
	C1	30	4.427		2	5	0.609
	C2	30	4.313		2	5	0.618

4.4.1. Path Diagram

Path diagram illustrates the relationship between variables and other variables, or variables with their indicators. The path diagram picture between the variables and indicators has different shapes. The variables are blue circles; the indicators are yellow squares, while the relationship is represented in a black arrow. Each form of indicator or variable is coded or named so that the diagram is easier to read (Ramayah et al., 2018).

Figure 3 illustrates that arrows are drawn between latent variables and other latent variables. It shows a hypothetical relationship. This figure explains that each latent variable has an indicator that is a common cause between correlations. Variable and each indicator is measured from several item scores, which indicate the level of consistency, reliability, and convergent validity.

4.4.2. Validity and Reliability Testing

Validity and reliability are used as correlation measures in the same construct (Joe F Hair et al., 2017). The relative validity between construct indicators on a variable can be calculated from the value of outer loading, AVE (Average Variant Extraction), and reliability indicators. The higher the outer loading value, the more general the indicators' characteristics in a show construct (Joe F Hair et al., 2017). The outer loading value must be significant, but the outer loading significance indicator can still be weak. Therefore, it is determined that the outer loading must be above 0.7 (Joe F Hair et al. (2020).

Table 14 shows three indicators with the outer loading values of < 0.7 , namely the PL3 indicator, which has an external loading value of $0.629 < 0.7$, the C1 indicator, which has an outer loading value of $0.455 < 0.7$, and the C2 indicator, which has an external loading value of $0.488 < 0.7$. Therefore, these indicators can be said to be insignificant that they are not suitable for use. According to some researchers, the value of outer loading is often < 0.7 (Hulland, 1999). Hair

Table 14. The results of the validity test on the indicator construct with variables

Variable	Indicator	Outer Loading	AVE	Evidence
Quality of staff service	S1	0.721	0.548	Valid
	S2	0.42		Valid
	S3	0.741		Valid
	S4	0.757		Valid
Quality of operational service	PL1	0.785	0.547	Valid
	PL2	0.741		Valid
	PL3	0.629		Invalid
	PL4	0.778		Valid
	PL5	0.755		Valid
Quality of technical service	IP1	0.763	0.598	Valid
	IP2	0.837		Valid
	IP3	0.762		Valid
	SL1	0.754		Valid
	SL2	0.747		Valid
Customer satisfaction	KP1	0.858	0.695	Valid
	KP2	0.787		Valid
	KP3	0.853		Valid
Customer loyalty	LP1	0.799	0.698	Valid
	LP2	0.861		Valid
	LP3	0.883		Valid
	LP4	0.795		Valid
Customer trust	T1	0.866	0.754	Valid
	T2	0.869		Valid
	T3	0.870		Valid
Customer commitment	N1	0.835	0.483	Valid
	N2	0.819		Valid
	A1	0.771		Valid
	A2	0.701		Valid
	C1	0.455		Invalid
	C2	0.488		Invalid
Var.mod	KP x LP	1.153	1.000	Valid

et al. (2017) argued that to automatically eliminate indicators that have outer loading values of < 0.7 , you must pay attention to the composite reliability value, Cronbach's alpha, and AVE (Average Variant Extraction) value. Meanwhile, indicators with an outer loading value of < 0.4 must be automatically eliminated because they are considered very weak and not feasible. The value on AVE (Average Variant Extraction) must be greater than or equal to 0.5, meaning that an indicator in a variant with an AVE (Average Variant Extraction) value of 0.5 or more can be explained by its construct of 50% or more (Afthanorhan, 2013). The weight on composite reliability and Cronbach's alpha must be > 0.7 (Hamutoğlu et al., 2020). However, research conducted by Masudin (2013) and Restuputri et al. (2020) conducted an indicator analysis of a variable, where the value is said to be valid if the outer loading value is > 0.6 . Thus, in this case, indicators with an outer loading of < 0.4 will be automatically removed, while indicators with an outer loading value of > 0.6 will be reconsidered on the condition that they have composite reliability and a Cronbach alpha value of > 0.7 and the AVE value must be > 0.5 . The Cronbach alpha and composite reliability values can be seen in Table 15.

Table 15 shows that all variables are reliable as they have reliable Cronbach alpha value and composite value of > 0.7 so that the variable is declared feasible and can be further analyzed. In addition to seeing reliable Cronbach alpha and composite values, the AVE value must also be considered. If the AVE value is < 0.5 , then the indicator must be automatically removed. In Table 14, the AVE value on the quality of the operational service variable with the PL3 indicator has an AVE value of > 0.5 . The indicator is suitable for further analysis and use. This case study will eliminate two indicators because they are considered unsuitable, namely the indicator C1 and indicator C2, which will then be re-analyzed without using the removed indicators.

4.5. Partial structural equation modeling (PLS-SEM) evaluation

PLS-SEM evaluation is carried out after re-estimating the indicators and eliminating indicators C1 and C2 to be re-analyzed. The obtained information is about the correlation of variables with their construct indicators. The following is a case study re-estimating the relationship between customer satisfaction and loyalty to logistics service providers during the COVID-19 pandemic after eliminating C1 and C2.

4.5.1. Path Diagram

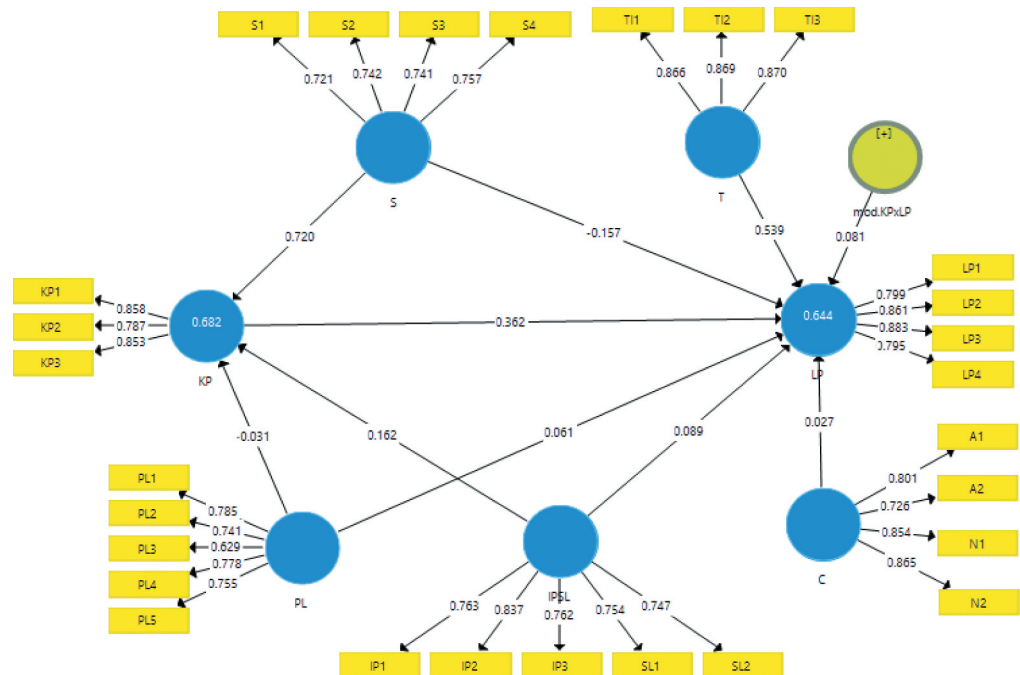
Below is a re-estimated path diagram picture. It provides information related to the outer loading value and the R-square value.

Figure 4 is a re-estimated path diagram image. The picture above explains the relationship between variables with variables and variables with their construction indicators. The blue round

Table 15. The results of reliability on variables

Variable	Cronbach's Alpha	Composite reliability	Evidence
Customer commitment (C)	0.770	0.842	Reliable
Quality technical service (IPSL)	0.832	0.881	Reliable
Customer satisfaction (KP)	0.780	0.872	Reliable
Customer loyalty (LP)	0.855	0.902	Reliable
Quality of operational service (PL)	0.792	0.857	Reliable
Quality of staff service (S)	0.732	0.829	Reliable
Customer trust (T)	0.837	0.902	Reliable
Var.mod	1.000	1.000	Reliable

Figure 4. The output path diagram after re-estimation.



shape in the diagram depicts the variables, while the yellow box is a construct indicator for each variable.

4.5.2. Measurement Model Analysis (External Model)

The external model analysis is conducted to evaluate the relationship between latent variables and their construct indicators. The external model is used to assess the reflective model of an indicator classified in convergent validity, including construct reliability, discriminant validity, and AVE (Average Variant Extraction). They are used as a tool to measure the correlation between constructs and latent variables (Maria et al., 2020; Vinzi et al., 2010).

4.5.3. Convergent validity

Convergent validity is a measure to calculate the correlation value of variables and construct indicators (MacKillop et al., 2006). Convergent validity can be seen from the outer loading value and the AVE (Average Variant Extraction) value to analyze each variable's indicators (Joe F Hair et al., 2017). The indicator is said to be significant if the outer loading value is > 0.7 and the AVE (Average Variant Extraction) value is > 0.5 (Joe F Hair et al., 2020). However, indicators with a loading factor value of 0.50–0.60 can still be tolerated as long as the t-statistic value is above 1.96 or the p-value is < 0.05 (Hair et al., 2011). Below is the output after re-estimating the previous model analysis by testing the validity of outer loading, AVE (Average Variant Extraction), composite reliability, and Cronbach alpha for each variable and indicator in this regard.

In Table 16, the quality of staff service variable has an outer loading value of 0.721–0.757, and an AVE value of 0.548, the quality of operational service has an outer loading value of 0.629–0.785, and an AVE value of 0.547, the quality of technical service has an outer loading value of 0.747–0.837 and an AVE value of 0.598. Customer satisfaction has an outer loading value of 0.787–0.858 and an AVE value of 0.695. Customer loyalty has an outer loading value of 0.795–0.883 and an AVE value of 0.698; customer trust has an outer loading value of 0.866–0.870 and an AVE value of 0.754; customer commitment has an outer loading value of 0.726–0.865 and an AVE value of 0.662. KPxLP moderation has an outer loading value of 1.153 and an AVE value of 1. These values

Table 16. Recapitulation of the validity value after re-estimation

Variable	Indicator	Outer loading	AVE	Evidence
Quality of staff service	S1	0.721	0.548	Valid
	S2	0.742		Valid
	S3	0.741		Valid
	S4	0.757		Valid
Quality of service operations	PL1	0.785	0.547	Valid
	PL2	0.741		Valid
	PL3	0.629		Valid
	PL4	0.778		Valid
	PL5	0.755		Valid
Quality of technical service	IP1	0.763	0.598	Valid
	IP2	0.837		Valid
	IP3	0.762		Valid
	SL1	0.754		Valid
	SL2	0.747		Valid
Customer satisfaction	KP1	0.858	0.695	Valid
	KP2	0.787		Valid
	KP3	0.853		Valid
Customer loyalty	LP1	0.799	0.698	Valid
	LP2	0.861		Valid
	LP3	0.883		Valid
	LP4	0.795		Valid
Customer trust	T1	0.866	0.754	Valid
	T2	0.869		Valid
	T3	0.870		Valid
Customer commitment	N1	0.854	0.662	Valid
	N2	0.865		Valid
	A1	0.801		Valid
	A2	0.726		Valid
Var mod	KP x LP	1.153	1.000	Valid

indicate that the outer loading and AVE values of each indicator in each variable are valid. The construct indicator is valid if the outer loading indicator value is > 0.6 and the AVE value for each variable is > 0.5 (Hair et al., 2011). After testing each indicator and variable's validity, the reliability test is carried out on each indicator and variable. The following is a table recapitulation of calculating the reliability of each variable and its indicators.

Table 17 shows that each variable in Cronbach's alpha and the reliable composite value has a reliable value, which means that the indicator has a consistency value even though it is carried out on different subjects and places. Each variable is reliable if the value of Cronbach alpha and composite reliability has a value of > 0.7 (Hair et al., 2020).

4.5.4. Discriminant variable

Discriminant validity is a latent variable distinguished from other latent variables, which assumes that an item must have a higher correlation among others than correlating with other items from other constructs that theoretically cannot be associated (Zait & Berteu, 2011). (Fornell & Larcker, 1981) argued that discriminant validity is determined if the latent variable calculates more

Table 17. Reliability results on variables after re-estimation

Variable	Cronbach's Alpha	Composite Reliability	Evidence
Customer commitment (C)	0.829	0.886	Reliable
Quality of technical service (IPSL)	0.832	0.881	Reliable
Customer satisfaction (KP)	0.780	0.872	Reliable
Customer loyalty (LP)	0.855	0.902	Reliable
Quality of operational service (PL)	0,792	0.857	Reliable
Quality of staff service (S)	0.732	0.829	Reliable
Customer trust (T)	0.837	0.902	Reliable
Var.mod	1.000	1.000	Reliable

variance in the construct indicators of a variable than is distributed to other constructs in the same model. Evaluation of discriminant validity can be carried out in two ways (Voorhees et al., 2016). The first is by analyzing cross-loading, namely by looking at the loading factor on each construct indicator. The determining variable must be higher with the condition that the cut-off value for each construct indicator is a loading factor > 0.7 (Joseph F Hair et al., 2016). The second is analyzing the discriminant validity using the Fornell-larker method. It is done by comparing the square root of the AVE value and the correlation of its latent constructs. Each construct's AVE value's square root must have a higher value than its correlation with other latent variable constructs (Joseph F Hair et al., 2016). The following table is a calculation of the cross-loading discriminant validity test and Fornell Larcker.

Table 18 is a table of the recapitulation results of cross-loading values. All construct indicators in a variable have only one correlation in one construct variable (Hair et al., 2011). The cross-loading value for each indicator construct is reliable if it has a value of > 0.7 (Joseph F Hair et al., 2016). The indicator PL3 has a value of 0.629 so that the value is less than 0.7. Hence, to assess the problem, an analysis is carried out through the Fornell-Larcker criteria to test whether the indicator is still suitable for use. The following is a table of Fornell Larcker results recapitulation.

Table 19 shows that the AVE value's square root is greater than the other constructs' highest correlation. The discriminant analysis results can have no problem as each variable construct has the highest correlation value than other constructs. For example, the PL3 indicator has a low external loading value. Still, the quality of operational service (PL) variable is 0.740, while the other channels have a value not equal to 0.740 or higher than the value of 0.740. Therefore, the PL3 indicator can be used or said to be feasible.

4.5.5. Structural Model Analysis (Inner Model)

The structural model is used as a step to describe one or more dependency relationships on the hypothesized model construct (Janadari et al., 2016). The purpose of conducting structural model analysis is to predict layer data from the output using input data and make predictions to explain the variance of endogenous latent variables. The primary variable construct must have a high R2 value (Joe F Hair et al., 2014). Inner model analysis or structural model includes an analysis of the R-square path coefficient carried out in stages (2016). Joe F Hair et al. (2014) said that the highest R2 value depends on the research conducted. In consumer behavior research, an R2 value of 0.2 is considered high, while in the research of success study, the R2 value of 0.75 is deemed high. In marketing research, values are considered weak if < 0.50 , and 0.50–0.75 is considered moderate and > 0.75 is considered high. According to Joseph F Hair et al. (2016), the path coefficient value is said to have a strong relationship if it has a value close to +1 while a value close to –1 has a weak

Table 18. Results of the cross-loading

Cross-Loading							
	C	IPSL	KP	PL	S	T	Var.mod
S1	0.284	0.457	0.495	0.335	0.721	0.410	-0.241
S2	0.397	0.469	0.787	0.470	0.742	0.428	-0.159
S3	0.148	0.558	0.533	0.319	0.741	0.277	-0.200
S4	0.316	0.817	0.533	0.422	0.757	0.475	-0.195
PL1	0.150	0.540	0.543	0.785	0.543	0.318	-0.149
PL2	0.202	0.526	0.412	0.741	0.478	0.313	-0.062
PL3	0.211	0.459	0.340	0.629	0.498	0.226	-0.113
PL4	0.148	0.558	0.533	0.778	0.741	0.277	-0.200
PL5	0.292	0.675	0.542	0.755	0.607	0.434	-0.159
IP1	0.172	0.763	0.512	0.359	0.632	0.349	-0.140
IP2	0.320	0.837	0.540	0.426	0.758	0.476	-0.187
IP3	0.293	0.762	0.568	0.447	0.565	0.430	-0.089
SL1	0.241	0.754	0.491	0.409	0.504	0.363	-0.080
SL2	0.361	0.747	0.555	0.490	0.516	0.467	-0.048
KP1	0.328	0.689	0.858	0.555	0.685	0.518	-0.291
KP2	0.397	0.469	0.787	0.470	0.742	0.428	-0.159
KP3	0.331	0.566	0.853	0.533	0.619	0.455	-0.230
LP1	0.366	0.564	0.668	0.799	0.546	0.537	-0.090
LP2	0.459	0.511	0.551	0.861	0.461	0.602	-0.036
LP3	0.515	0.407	0.472	0.883	0.406	0.692	0.075
LP4	0.548	0.374	0.394	0.795	0.375	0.684	0.143
T1	0.662	0.398	0.408	0.679	0.398	0.866	0.115
T2	0.613	0.459	0.492	0.651	0.479	0.869	0.017
T3	0.592	0.565	0.569	0.631	0.541	0.870	-0.079
N1	0.854	0.339	0.370	0.509	0.392	0.613	0.109
N2	0.865	0.270	0.299	0.446	0.269	0.562	0.108
A1	0.801	0.361	0.447	0.507	0.398	0.658	0.084
A2	0.726	0.183	0.222	0.351	0.215	0.476	0.160
Var.mod	0.137	-0.139	-0.273	0.028	1.000	0.023	1.000

relationship. Janadari et al. (2016) believe that there are three assessment criteria for the path coefficient. Firstly, the path coefficient value < 0.15 is considered weak, the second path coefficient value is considered moderate if it has a value between 0.15–0.45, and the third value > 0.45 is considered strong. The level of the construct indicator weight significance can be assessed using a bootstrap. The paths that do not have a significant relationship have the opposite direction to those hypothesized. In contrast, the paths that have a considerable value will lead in the direction that has been hypothesized, thus supporting the proposed causal correlation (Joe F Hair et al., 2017). The following is the recapitulation of the R2 and the path coefficient calculation.

Table 20 shows that the R-square value of the customer satisfaction variable (KP) is 0.682. This value explains that the Kansei customer satisfaction (KP) variable can be defined by 68%, and the remaining 32% is the contribution of other variables that are not discussed in this study. The R-square value of customer loyalty (KP) is 0.644. This value explains that the Kansei Customer Loyalty (LP) variable can be defined by 64%, and the remaining 36% is the contribution of other

Table 19. Results of fornell larcker recapitulation

Variable	C	IPSL	KP	LP	PL	S	T	Var. mod
Customer commitment (C)	0.813							
Quality of technical service (IPSL)	0.364	0.773						
Customer satisfaction (KP)	0.423	0.692	0.834					
Customer loyalty (LP)	0.566	0.555	0.624	0.836				
Quality of operational service (PL)	0.270	0.752	0.652	0.464	0.740			
Quality of staff service (S)	0.403	0.769	0.820	0.535	0.741	0.780		
Customer trust (T)	0.718	0.544	0.561	0.754	0.431	0.542	0.868	
Var.mod	0.137	-0.139	-0.27	0.028	-0.189	-0.262	0.023	1.000

Table 20. R-square value

Endogenous variables	R Square
Customer satisfaction (KP)	0.682
Customer Loyalty (LP)	0.644

variables that are not discussed in this study. Joe F Hair et al. (2014) said that the R2 value of 0.2 is considered high in consumer behavior research. The R2 in the table above has a value of > 0.2, meaning that the endogenous latent variables' variance has a high R-value. In addition to evaluating the structural model with R-square, another step that can be taken is to use the path coefficient. The following is a recapitulation of the path coefficient results:

Table 21 shows that there are two related variables with a strong relationship, which is > 0.45. The variables are the relationship between quality of staff service (S) and customer satisfaction (KP), whose path coefficient is 0.720, and the relationship between customer trust (T) and customer loyalty (LP) because it has a value of 0.539. Besides, there is a moderate relationship, namely between the quality of technical service (IPAL) and customer satisfaction (KP) variable, whose value is 0.16, and the relationship between the customer satisfaction (KP) and customer loyalty (LP) variable, whose value is 0.362. The remaining are six variants (Joseph F Hair et al., 2016) of variables. The relationship is said to be weak as the value of the relationship variable is < 0.15. They are the relationship between customer commitment (C) and customer loyalty (LP) with a value of 0.027, the relationship between the quality of technical service variable (IPSL) and customer loyalty (LP) with a value of 0.089, quality of operational service (PL) with customer satisfaction (KP) with a value of -0.031, the relationship between quality of operational service (PL) and customer loyalty (LP) with a value of 0.061, the relationship between quality of staff service (S) and customer loyalty (LP) with a value of -0.157, and the relationship between moderation variables and customer loyalty (LP) with a value of 0.081.

Table 21. Recapitulation of the path coefficient results

Path Coefficient		
Variable	KP	LP
Customer commitment (C)		0.027
Quality of technical service (IPSL)	0.162	0.089
Customer satisfaction (KP)		0.362
Customer loyalty (LP)		
Quality of operational service (PL)	−0.031	0.061
Quality of staff service (S)	0.720	−0.157
Customer trust (T)		0.539
Var. mod		0.081

Furthermore, the significant path coefficients analysis is performed by looking at the standard error with bootstrap.

Table 22 is the bootstrap analysis result of the relationship between the two variables. The two variables are said to have a significant relationship if they have a P-value of < 0.05. The inner model coefficient is significant if the t-value is > 1.96 (Wong, 2013). From the table above, it is known that four relationship variables have a considerable value. The relationship between technical service quality (IPSL) and customer satisfaction (KP) is considerably strong, with a statistical value of 2.327 and a P-value of 0.020, respectively. It also shows that customer satisfaction (KP) and customer loyalty (LP) have a significant relationship (statistical value of 4.286 and a P-value of 0.000). Moreover, a significant relationship was found between quality of staff service (S) and customer satisfaction (KP) with a statistical t-value of 10.010 and a P-value of 0.000. Finally, the relationship between customer trust (T) and customer loyalty (LP) is considerably strong (statistical t value of 7.975 and P-value of 0.000).

Table 22. Results of path coefficients between latent variables

Variable	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T-Statistics	P-Values	Evidence
C -> LP	0.027	0,032	0.055	0.497	0.619	Not significant
IPSL -> KP	0.162	0.159	0.070	2.327	0.020	Significant
IPSL -> LP	0.089	0.096	0.077	1.164	0.245	Not significant
KP -> LP	0.362	0.358	0.085	4.286	0.000	Significant
PL -> KP	−0.031	−0.028	0.068	0.463	0.643	Not significant
PL -> LP	0.061	0.055	0.078	0.776	0.438	Not significant
S -> KP	0.720	0.723	0.072	10.010	0.000	Significant
S -> LP	−0.157	−0.158	0.106	1.480	0.140	Not significant
T -> LP	0.539	0.538	0.068	7.975	0.000	Significant
Var.mod	0.081	0.081	0.049	1.650	0.100	Not significant

Table 23. Hypothesis testing

Logistics Services Hypotheses on Humanitarian Logistics

	Hypothesis	T-statistics	P-value	Evidence
H1:	The quality of staff service of logistics service providers during the COVID-19 pandemic has a significant effect on customer satisfaction (KP).	10.010	0.000	Significant
H2:	The quality of operational service (PL) of logistics service providers during the COVID-19 pandemic has a significant effect on customer satisfaction (KP).	0.776	0.438	Not significant
H3:	The quality of technical service (IPSL) of logistics service providers during the COVID-19 pandemic has a significant effect on customer satisfaction (KP).	2.327	0.020	Significant
H4:	The quality of staff service (S) of logistics service providers during the COVID-19 pandemic has a significant effect on customer loyalty (LP).	1.480	0.140	Not significant
H5:	The quality of operational service (PL) of logistics service providers during the COVID-19 pandemic has a significant effect on customer loyalty (LP).	0.776	0.438	Not significant
H6:	The quality of technical service (IPSL) of logistics service providers during the COVID-19 pandemic has a significant effect on customer loyalty (LP).	1.164	0.245	Not significant
H7:	Customer satisfaction (KP) during the COVID-19 pandemic will significantly affect customer loyalty (LP).	4.286	0.000	Significant

(Continued)

Table 23. (Continued)

Logistics Services Hypotheses on Humanitarian Logistics				
	Hypothesis	T-statistics	P-value	Evidence
H8:	Customer trust (KP) significantly moderates the relationship between customer satisfaction (KP) and customer loyalty of logistics service providers during the COVID-19 (LP) pandemic.	1.650	0.100	Not significant
H9:	Customer trust (T) significantly affects customer loyalty (LP) during the COVID-19 pandemic.	7.975	0.000	Significant
H10:	Customer commitment (C) to logistics service providers during the COVID-19 pandemic will significantly affect customer loyalty (LP).	0.497	0.619	Not significant

Results of hypothesis testing

Hypothesis testing is conducted to test the effect of exogenous variables on endogenous variables. Hair et al. (2016) said that testing the relationship between the two variables is significant if the t-statistic value > t-table. This study uses a significance level of 5% and t-table 1.96. Table 23 is a table of hypothesis testing recapitulation.

The recapitulation of hypothesis testing results which has a direct effect on the relationship between the two variables will be explained as follows:

H1: The quality of staff service (S) during the COVID-19 pandemic has a significant effect on customer satisfaction (KP).

Based on the results of the H1 t-statistic value of 10.010 > 1.96 and P-value of 0.000 < 0.05, it can be concluded that the quality of staff service during the COVID-19 pandemic has a significant effect on customer satisfaction. It means that the increasing quality of staff service will increase customer satisfaction.

H2: The quality of operational service (PL) during the COVID-19 pandemic has a significant effect on customer satisfaction (KP)

Based on the results of the H2 t-statistic value of 0.776 < 1.96 and P-value of 0.0438 > 0.05, it can be concluded that the quality of operational service during the COVID-19 pandemic has no significant effect on customer satisfaction. It means that the increasing quality of operational service will not affect customer satisfaction to logistics service providers.

H3: The quality of technical service (IPSL) during the COVID-19 pandemic has a significant effect on customer satisfaction (KP)

Based on the results of the H3 t-statistic value of $2.327 > 1.96$ and P-value of $0.020 < 0.05$, it can be concluded that the quality of technical service during the COVID-19 pandemic has a significant effect on customer satisfaction. It means that the increasing quality of technical service will increase customer satisfaction.

H4: The quality of staff service (S) during the COVID-19 pandemic has a significant effect on customer loyalty (LP)

Based on the results of the H4 t-statistic value of $1.480 < 1.96$ and P-value of $0.140 > 0.05$, it can be concluded that the quality staff service during the COVID-19 pandemic has no significant effect on customer loyalty. It means that the increasing quality of staff service will not affect customer loyalty to logistics service providers.

H5: The quality of operational service (PL) during the COVID-19 pandemic has a significant effect on customer loyalty (LP)

Based on the results of the H5 t-statistic value of $0.776 < 1.96$ and P-value of $0.438 > 0.05$, it can be concluded that the quality of operational service during the COVID-19 pandemic has no significant effect on customer loyalty. It means that the increasing quality of operational service will not affect customer loyalty to logistics service providers.

H6: The quality of technical service (IPSL) during the COVID-19 pandemic has a significant effect on customer loyalty (LP)

Based on the results of the H6 t-statistic value of $1.164 < 1.96$ and P-value of $0.245 > 0.05$, it can be concluded that the quality of technical service during the COVID-19 pandemic has no significant effect on customer loyalty. It means that the increasing quality of operational service will not affect customer loyalty to logistics service providers.

H7: Customer satisfaction (KP) significantly affects customer loyalty (LP) during the COVID-19 pandemic.

Based on the results of the H7 t-statistic value of $4.286 > 1.96$ and P-value of $0.000 < 0.05$, it can be concluded that customer satisfaction during the COVID-19 pandemic has a significant effect on customer loyalty. It means that increasing customer satisfaction will increase customer loyalty to logistics service providers.

H8: Customer trust (T) moderates the relationship between customer satisfaction (KP) and customer loyalty (LP)

Based on the results of the H8 t-statistic value of $1.650 < 1.96$ and P-value $0.100 > 0.05$, it can be concluded that the consumer trust moderating variable between customer satisfaction and customer loyalty has no significant effect on customer loyalty. It means that the consumer trust moderating variable weakens the relationship between customer satisfaction and customer loyalty.

H9: Customer trust (T) significantly affects customer loyalty (LP) during the COVID-19 pandemic.

Based on the results of the H9 t-statistic value of $7.975 > 1.96$ and P-value $0.000 < 0.05$, it can be concluded that the customer trust variable has a significant effect on customer loyalty. It means that the greater the consumer trust, the more consumer loyalty to logistics service providers during the COVID-19 pandemic will increase.

H10: Customer Commitment (C) has a significant effect on customer loyalty (LP) during the COVID-19 pandemic.

Based on the results of the H10 t-statistic value of $0.497 < 1.96$ and P-value of $0.619 > 0.05$, it can be concluded that customer commitment has no significant effect on customer loyalty during the COVID-19 pandemic. It means that increasing customer commitment will not affect customer loyalty to logistics service providers during the COVID-19 pandemic.

4.6. Managerial and theoretical implications

This section consists of the results analysis and implications management after researching the logistics service quality during the COVID-19 pandemic. The implications management aims to make a theoretical contribution to the logistics service practices for logistics service providers, especially in Indonesia. This study provides recommendations for improving the logistics service quality for logistics service providers, which are the indicators for each variable with the highest loading factor value. Several things were proposed to logistics service providers during the COVID-19 pandemic to appropriately-recruit qualified staff and experts in their fields. Kepha et al. (2014) said that the recruitment process must be carried out objectively; companies must develop and strictly follow company specifications during the recruitment process. It is necessary to gather much information relating to prospective employees regarding their suitability for work (Gerhart et al., 1996). In order to improve the logistics service quality, delivery timeliness must be paid attention to so that customers can receive the goods according to a predetermined schedule. Masudin (2013) has previously researched the relationship between location facilities and service levels using a stochastic and deterministic approach. This research can be used as a reference for determining the fastest route so that goods arrive at the customer's hands faster.

Logistics service providers need to improve information systems so that the goods tracking system can be accessed by customers quickly and precisely. Therefore, the presence of goods can be monitored by companies and customers. Loebbecke and Powell (1998) and Shamsuzzoha and Helo (2011) stated that the logistics economic impact increases over time. The efficiency and transparency of logistics service providers to customers are considered very important for customers. Therefore the information exchange of "logistics information", which is managed effectively and efficiently by service providers along the logistics chain, is deemed very important.

During the COVID-19 pandemic, logistics service providers must pay attention to the COVID protocol. It starts from employees who must implement the COVID protocol to product distribution systems that must implement the COVID-19 protocol even eliminate customer concerns so that the spread of the COVID-19 virus does not contaminate them. World Health Organization (2020) provides suggestions and steps to prevent the spread of the COVID-19 virus. The suggestions include requiring to wear masks for employees and gloves while working to avoid contaminating items touched directly, providing handwashing stations at several points in the company environment, rapid checking and swab tests for employees to reduce the possibility of spreading COVID-19.

5. Conclusion

In this research, it can be proven that the Kansei engineering method can describe the wishes of consumers so that it can identify consumers' expectations for the logistics services quality during the COVID-19 pandemic. There are three quality variables in this study, i.e., quality of staff service, quality of operational service, and quality of technical service. The results show that the quality of operational service has a significant effect on customer satisfaction. Therefore, improving the quality of operational service is necessary. The first operational service quality is a well-coordinated logistics process from upstream to downstream. Secondly, logistics processes must apply the COVID-19 protocol. The third operational service quality is delivering on time to customers. Then, it is essential to consider the capacity adjustment of delivery to prevent damage when goods arrive in the consumers' hands. Finally, logistics service providers must have high responsiveness to customer requests.

The quality of staff service variable has a significant effect on customer satisfaction. If logistics service providers improve the quality of staff service, customer satisfaction will also increase. Meanwhile, the quality of staff service variable has a significant effect on customer satisfaction. It means that if logistics service providers improve employee service quality, customer satisfaction will also increase. The quality of staff service variable indicators to improve are that employees must pay attention to customers, service provider staff must have expertise in their fields, the employer is easily accessible to customers, and the worker adheres to the COVID-19 protocol. The customer satisfaction variable has a significant effect on customer loyalty. It means that logistics service providers need to improve customers' getting the best service by logistics service providers, services provided are following the price paid by customers, and services obtained by customers make them satisfied so that logistics service providers get loyalty from customers. The customer commitment variable has a significant effect on customer loyalty. It means that the logistics service provider company must improve relationships with customers. Logistics service providers feel responsible for strengthening relationships with customers, and logistics service providers try to build an emotional bond with customers. Logistics service providers must try to make customers have positive feelings towards logistics service providers. Judging from the variable relationship between customer satisfaction and customer loyalty to logistics service providers during the COVID-19 pandemic, it has no significant effect. It means that in this case, customer trust does not need to be considered to get customer loyalty.

In this study, of course, there are still many shortcomings that need to be improved in the future. This study's respondents provide logistics services in Indonesia, so that these findings do not necessarily represent customer feelings towards logistics service providers in other countries. Therefore, it is necessary to do further research on Kansei engineering and add additional variables that may influence customer satisfaction and loyalty during the current COVID-19 pandemic. Further analysis can be carried out on the structure and network of facilities that will affect supply chain activities starting from warehousing, making faster and more efficient delivery location decisions to increase customer satisfaction and loyalty to logistics service providers during the COVID-19 pandemic.

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