

Improving the Quality of Courier Services During a Pandemic with Theory of Inventive Problem Solving

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Abstract. *The increase in transactions through e-commerce due to changes in consumer buying behavior during the COVID-19 pandemic affected the demand for logistics services for the delivery of goods. The quality of logistics services can affect customer satisfaction and loyalty, and logistics service companies must provide added value to the services provided. This is what underlies the making of this research to be able to provide innovation proposals and improve service quality to courier service providers to support government programs to improve the quality of national logistics services. The method used in this research is Logistic Service Quality (LSQ), which analyzes problems in courier services. Theory of Inventive Problem Solving (TRIZ) is used to solve problems in the object of research and provide suggestions for improvement.*

Keywords: *courier service, LSQ, TRIZ, customer satisfaction*

I. INTRODUCTION

E-commerce transactions during the pandemic increased by 26%, with daily transactions also increasing from an average of 3.1 million to 4.8 million and the percentage of new consumers rising to 51% (Koesno, 2020). Changes in consumer buying behavior from buying in physical stores to buying at online stores influence the demand for logistics services, especially the courier business. The availability of logistics services within a company is an advantage that can create customer satisfaction and loyalty (Saura et al., 2008). In addition,

logistics is an essential factor that can contribute to cost savings and service improvement through outsourcing activities to companies (Zacharia et al., 2011). The need for logistics services is not just a physical need but has increased the demand for added value for the services provided (Hal et al., 2018). The growth of national logistics in Indonesia is influenced by economic growth. According to data released by the Central Statistics Agency, Indonesia's economic growth in the second quarter of 2020 reached 5.32%. Meanwhile, the transportation and warehousing business sector experienced a growth contraction of 30.84% from the production side. Although national logistics growth is growing positively, the main problems that create inefficiency in the logistics process in Indonesia and are still unresolved are high costs and low service quality (Markus Hartono, Amelia Santoso, Mika Benita Tanugraha, Dita Natalia Prayogo, 2018). This has caused the government to reduce logistics costs from 23.5% to 17% (Agatha Olivia Victoria, 2020).

In 2018 Indonesia was ranked 46th out of 160 countries based on data from The World Bank regarding the Logistic Performance Index (LPI) survey, which is based on six assessment dimensions, namely process efficiency, quality of logistics infrastructure, price competitiveness, competence, and quality of logistics services, tracking capability and timeliness in the delivery of goods (The World Bank, 2019). This shows an increase in the quality of national logistics services from previous years. However,

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Indonesia's position based on the results of the LPI survey compared to other countries in Southeast Asia such as Singapore, Thailand, Vietnam, and Malaysia is still lagging. Therefore, improving the quality of logistics services in Indonesia is still necessary, especially during the pandemic when the demand for logistics services increases.

Therefore, this study will analyze problems related to the Quality of logistics services, namely couriers, which are widely used by the Indonesian people, especially in the Banyumas regency, based on several aspects of the assessment or dimensions used as a model as measured by the Logistics Service Quality instrument (LSQ). The five LSQ dimensions used in this study are Timeliness, Accuracy of order, Quality of information, Quality of contact personnel, and Order discrepancy handling (Sze et al., 2012).

After analyzing the problem from the assessment dimension, the Theory of Inventive Problem Solving (TRIZ) method is used to solve problems and arrange improvements to logistics services by compiling an inventive principal matrix. TRIZ is a method that can solve problems in the logistics service industry. TRIZ is an abbreviation of Theory of Inventive Problem Solving, a problem-solving method introduced by E. Genrich Altshuller. TRIZ analyzes problems through a unique contradiction perspective and provides a powerful tool for separating contradictions without the need to compromise; TRIZ can be used to solve service problems that have inherent contradictions (Zhang et al., 2005). The difference between this research and previous research is that the research object is more than one courier service and the combination of the LSQ and TRIZ methods that have never been carried out on more than one courier service.

II. RESEARCH METHOD

This study begins with determining the dimensions of the Logistic Service Quality (LSQ) used in making the questionnaire. There are five dimensions of the LSQ used in this study, as shown in Figure 1. After that, the questionnaire

was made with a Linkert scale of 1-5, starting from "strongly disagree" to "strongly agree." Determination of the number of samples in this study using purposive sampling. The purposive sampling technique, also called assessment sampling, is a deliberate choice of a participant because of the participant's qualities (Etikan, 2016). It is a non-randomized technique that does not require an underlying theory or several participants. Simply put, the researcher decides what needs to be known and sets out to find people who can and are willing to provide information based on knowledge or experience (Bernard, 2002).

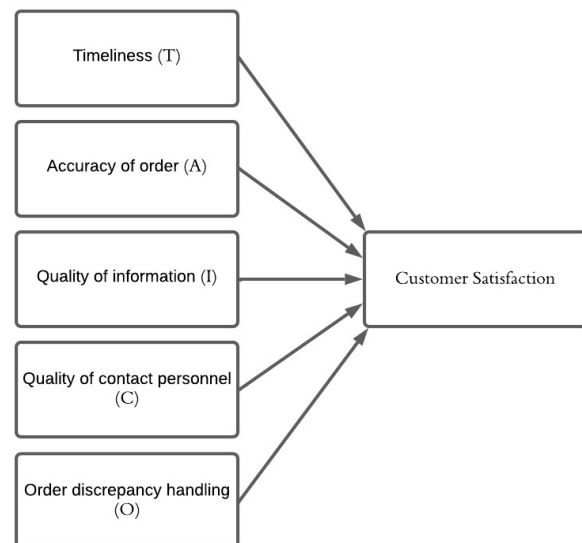


Figure 1. LSQ Dimension

The questionnaire distributed consisted of twenty-two attribute questions consisting of five LSQ dimensions. The number of respondents in this study was 210, while the object of this study consisted of four courier services, namely JNE, J&T, Pos Indonesia, and SiCepat.

Logistic Service Quality (LSQ)

Service quality is the level or degree of service excellence expected by customers and control over these advantages (Hati & Juliati, 2019). The quality of logistics services is a service advantage that customers can feel or tangible so that the quality of service is decided by the company and must receive feedback from

Tabel 1. Question Attribute

Question Attribute	Description
T1	On time delivery
T2	Packing setup speed
T3	Delivery time speed
T4	Agent service speed
A1	Delivery address accuracy
A2	Accuracy of terms and conditions
A3	Receipt accuracy
A4	Tracking accuracy
I1	Easy access to service information
I2	Information accuracy
I3	Information clarity
I4	Clarity of terms and conditions of service
I5	Package search
I6	Use of information technology such as website applications, etc.
I7	Confidentiality of sender information
C1	Clear procedure
C2	Simple procedure
C3	Provision of alternative recipients
C4	Provision of alternative senders
O1	Decent compensation
O2	Readiness to process complaints
O3	Complaint settlement

customers by customer requests and expectations. Measurement of customer service quality based on logistics service quality (LSQ) consists of five dimensions as follows: 1) Timeliness, 2) Accuracy of orders, 3) Quality of information, 4) Quality of contact personnel, 5) Order discrepancy handling.

Service quality will affect customer satisfaction, which is a situation where customers feel happy or disappointed when receiving services and comparing performance and expectations for the performance of these services (P Kotler, 2003), especially during the COVID-19 pandemic, the need for logistics services increases, and consumers want to increase their demand for logistics services. Get safe and hygienic delivery services. The key to getting customer loyalty is to provide excellent or high-quality service. Customer loyalty is generally supported by customer satisfaction with a product or service. This is also the basis for

developing logistics service quality (LSQ), which is a combination of service quality and customer satisfaction in the logistics sector (Japariato, 2018). In addition, LSQ is also considered the most effective for assessing the quality of logistics services and has a significant effect on customer satisfaction and loyalty (Hati & Juliati, 2019), (Mentzer et al., 2001).

Theory of Inventive Problem Solving (TRIZ)

TRIZ pronounced as "treez" is a Russian acronym for "Teoriya Resheniya Izobreatatelskikh Zadatch". In English, it stands for "Theory of Inventive Problem Solving" (Yeoh Teong San, Yeoh Tay Jin, 2016). TRIZ is a philosophy, a process, and a series of tools based primarily on the concept of resolving contradiction.

Zhang et al. formulated 40 inventive principles sound in service management and operation. Service development is differentiated from physical product development because of

the unique characteristics of service products, such as customer participation, simultaneity, heterogeneity, intangibility, perishability, etc. This determines that the resolution of problems in service operations requires a tighter coupling between marketing and operations aspects (Zhang et al., 2003).

Problem-solving using TRIZ in the service industry has been carried out before, such as repairing the Outpatient Hospital Installation (Sari & Harmawan, 2013), airline image improvement (Jeeradist et al., 2016), improvement of service quality on mobile dining car and mobile phone (Chen et al., 2020; Chang et al., 2010). Previous research that has applied TRIZ to solve problems in the service industry has proven that TRIZ is good to be used to increase customer satisfaction

III. RESULT AND DISCUSSION

Gap Analysis

The first step in data processing in this research is to calculate the level of the gap value between the average reality value perceived by consumers when using courier services minus the average expected value of each question attribute. The following is the Gap Value of the four courier services as objects in this study:

The highest Gap Value at Pos Indonesia that will be the focus of improvement is the question with attribute numbers I3 (Information clarity), C3 (Provision of alternative recipients), C4 (Provision of alternative senders), and O2 (Readiness to process complaints). For two question attributes with positive values, consumers who use Pos Indonesia courier services are satisfied with the question attributes A1 (Delivery address accuracy) and A3 (Receipt accuracy).

The highest Gap Value at J&T that will be the focus of improvement is the question with attribute numbers T3 (Delivery time speed), O1 (Decent compensation), and O3 (Complaint settlement). There is one question attribute that has made consumers feel satisfied, namely A3 (Receipt accuracy).

The highest Gap Value at JNE that will be the focus of improvement is the question with

attribute numbers T3 (Delivery time speed), O1 (Decent compensation), O2 (Readiness to process complaints) and O3 (Complaint settlement).

The highest Gap Value at JNE that will be the focus of improvement is the question with attribute numbers T1 (On time delivery), C1 (Clear procedure), C2 (Simple procedure), and O3 (Complaint settlement).

Functional Analysis

Function Analysis is the analysis performed on two or more components in terms of their interactions with each other. Functional analysis in this research can be seen in Figure 6.

From the Function Analysis Figure, it can be seen that logistics and couriers are not strong enough to serve the sender or recipient so that it affects customer satisfaction.

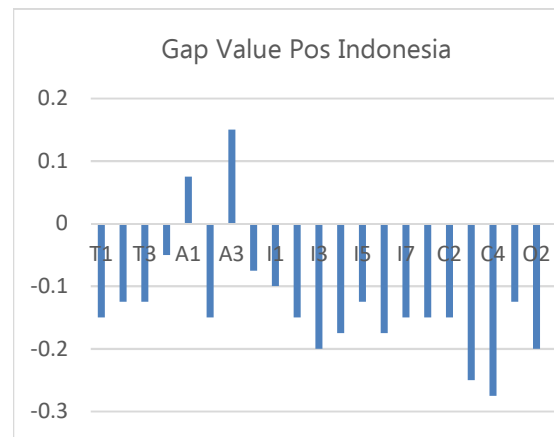


Figure 2. Gap Value Pos Indonesia

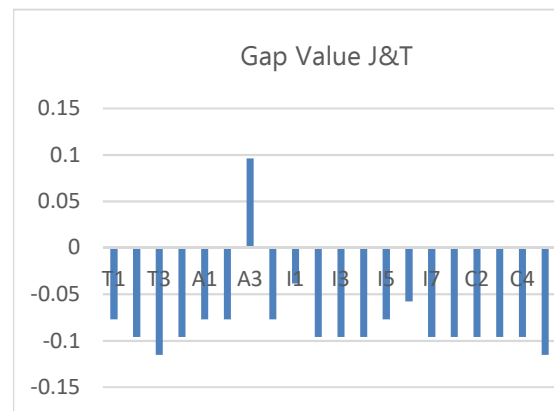


Figure 3. Gap Value J&T

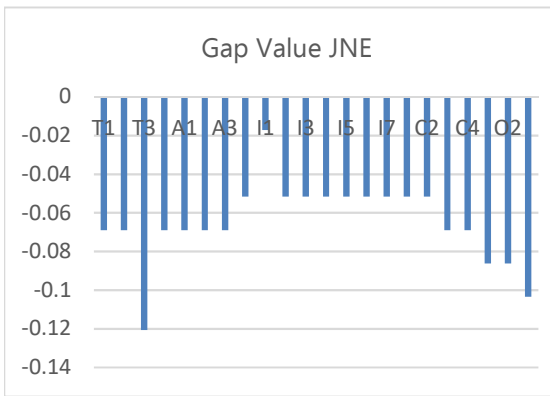


Figure 4. Gap Value JNE

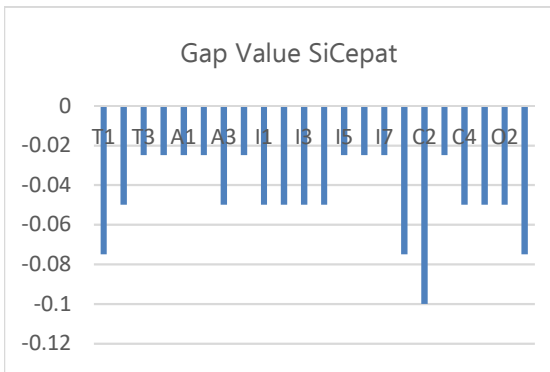


Figure 5. Gap Value SiCepat

Cause and effect analysis

1. The Information Quality (I) dimension is influenced by problem-solving skills, product knowledge, and special attention to customers (Xu & Cao, 2009)
2. The dimensions of Personnel Contact (C) are influenced by the quality of information, the quality of contact between logistics personnel and customers, and personal qualities, including knowledge, empathy, and problem-solving abilities.
3. The Order Discrepancy Handling (O) dimension is influenced by: delivery accuracy and the condition and quality of the package received (Mentzer et al., 2001).
4. The Timeliness dimension (T) is influenced by time availability (Saura et al., 2008).

Contradiction

There is a contradiction between timeliness and availability of time. If the promptness and speed of delivery are increased, the customer will be satisfied, but the available time is limited.

Improvement

Improvements that can be made with 40 inventive principles in each courier service are as follows.

Pos Indonesia

I3 Clarity of information, an be improved with inventive principles:

- a. Problem-solving skills: mechanical vibration (18) recruits specialized and skilled employees in problem-solving.
- b. Knowledge of the product: universality (6)/self-service (25): available media where the customer has understood the advantages and benefits of PT Pos Indonesia before delivery.
- c. Special attention to customers: local quality (3) differentiates loyal customers from regular customers. If loyal customers have been registered, increase the quality of the special attention.
- d. Mechanical vibration (18), there is intensive communication with customers, especially loyal customers.

C3 Provision of alternative recipients and C4 Provision of alternative senders

To improve information quality, personal contact quality, and personal quality:

- a. Principle Another dimension (17) is two-way communication rather than one-way communication. At the organizational level, change the "delivery information flow."
- b. Principle Asymmetry (4)/preliminary action, namely optimizing available information channels including social media, image media, and so on. So that the customer has understood in advance what needs to be prepared before sending the package.

O2 Readiness to process complaints (suggestions for improvement are the same as JNE and J&T for O dimension improvement (order discrepancy handling)

SiCepat

T1 on-time delivery,

Based on the table of contradictions, the suggested inventive principle:

- a. Taking out (2) simplifies the service process and eliminates time-consuming processes.
- b. Parameter changes (35) periodically re-energize employees both in logistics and couriers.
- c. Local Quality (3) utilizes couriers from the regions to better understand the terrain and faster delivery process.
- d. Self-service (25) customers prepare their packages to make the process more immediate.

C1 Clear procedure and C2 Simple procedure:

- a. Taking out (2) eliminating unnecessary processes
- b. Local Quality (3) Hire local people to gain knowledge of local customer culture
- c. Dynamization (5) continuous process improvement

O3 Complaint settlement:

Universality (6): Ability and broad understanding of employees handling complaints.

JNE

T3 delivery time speed

Based on the table of contradictions, the suggested inventive principle:

- a. Local quality (3) each region has a customized standard to speed up the delivery process.
- b. Periodic action (19) manages optimal delivery batches both cost and delivery speed
- c. Parameter changes (35) change the focus area of package distribution.

O1 Proper compensation, O2 Readiness to process complaints and O3 Complaint resolution:

- a. Compensation, complaints, and complaints occur because orders are inaccurate, and charges are nasty. Therefore, the solution is related to the Clarity of information and handling of orders.
- b. Clarity of information: discarding and recovering (34)/periodic action (19), periodically re-energizing continuous improvement initiatives from employees so that the ability to convey information increases.
- c. Feedback (23), giving the customer the freedom to ask questions about their rights.

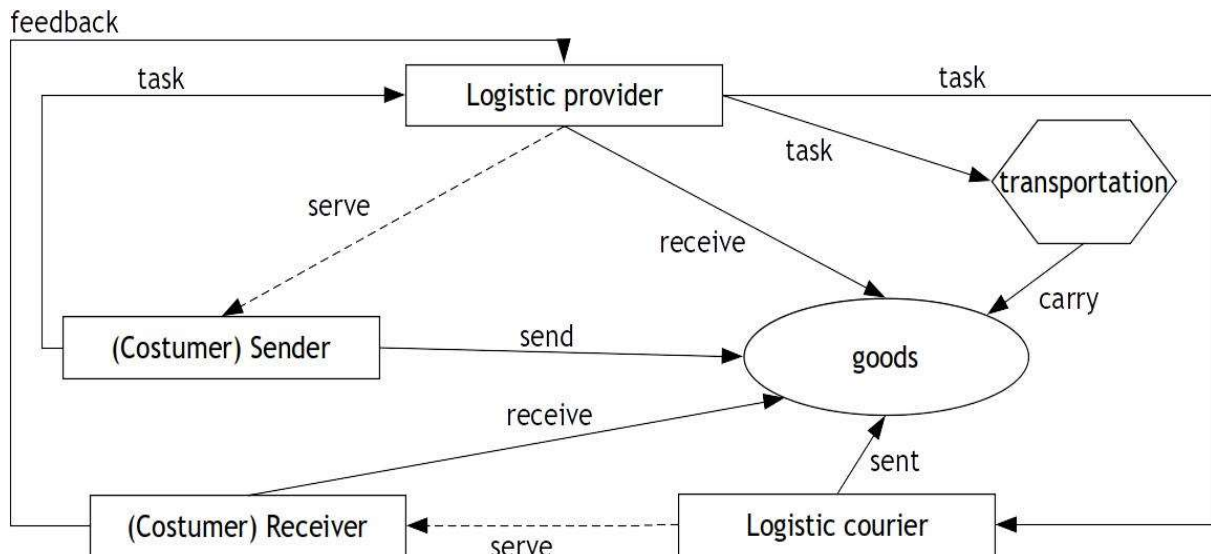


Figure 6. Functional Analysis

Tabel 2. Contradiction Matrix

		Improving Parameter	
		On time delivery (T1) / Reability (27)	Delivery time speed (T3)/ Speed (9)
Worsening Parameter	Duration of action of moving object (15)	Taking out (2), Parameter changes (35), Local Quality (3), Self Service (25)	Local Quality (3), Periodic action (19), Parameter changes (35), Merging (5)

- d. Handling: beforehand cushioning (11)/intermediary (24)/preliminary anti action (9), ensuring that before shipping, packages are installed with impact-resistant packaging (wooden boxes, bubble wrap, etc.)
- e. Self-service (25) customers understand about what service should be obtained.

J&T

Based on the table of contradictions, the suggested inventive principle:

- O1 Proper compensation, O2 Readiness to process complaints and O3 Complaint resolution:
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 - c. Feedback (23), giving the customer the freedom to ask questions about their rights.
 - d. Handling: beforehand cushioning (11)/intermediary (24)/preliminary anti action (9), ensuring that before shipping, packages are installed with impact-resistant packaging (wooden boxes, bubble wrap, etc.)
 - e. Self-service (25) customers understand about what service should be obtained.

IV. CONCLUSION

This research was conducted on four courier services to assess customer satisfaction based on Logistic Service Quality (LSQ) dimensions. The results of this study were obtained from the perspective of courier service users consisting of 210 respondents by comparing the gap between expectations and the reality felt by customers when using courier services. From the results of the gap calculation, it is found that the attribute with the most significant negative value will be repaired.

Based on service improvements carried out using the TRIZ method based on 40 inventive principles, a proposed solution for each LSQ attribute must be improved for each courier service for four courier services, namely:

1. Pos Indonesia with a focus on improvement in the LSQ dimensions, namely I3 (Clarity of information), C3 (Provision of alternative recipients) and (C4 Provision of alternative senders), O2 (Readiness to process complaints) proposed improvements based on 40 inventive principles are parameter numbers 18,6,25,3,18.
2. SiCepat has four focus improvements, namely T1 (On-time delivery), C1 (clear procedure), and C2 (simple procedure), and O3 (complaint settlement), with proposed improvements based on 40 inventive principles, namely parameter numbers 2,35,3,25,5,6.
3. JNE has four dimensions of improvement, namely T3 (delivery time speed), O1 (Proper compensation), O2 (Readiness to process complaints), and O3 (Complaint settlement) with proposed improvements based on 40 inventive principles, namely with parameter number 3,19,35,34,19,23,11,24,9,25.
4. J&T has three dimensions of improvement, namely O1 (Proper compensation), O2 (Readiness to process complaints), and O3 (Complaint settlement), with proposed improvements based on 40 inventive principles, namely with parameter numbers 34,19,23,11,24,9, 25.

REFERENCES

- Agatha Olivia Victoria. (2020). Langkah Baru Pemerintah untuk Pangkas Biaya Logistik jadi 17% Artikel ini telah tayang di Katadata.co.id dengan judul "Langkah Baru Pemerintah untuk Pangkas Biaya Logistik jadi 17%", <https://katadata.co.id/agustiyanti/berita/5f6c6e14548b3/langkah-baru-pe>, <https://katadata.co.id/agustiyanti/berita/5f6c6e14548b3/langkah-baru-pemerintah-untuk-pangkas->

- biaya-logistik-jadi-17
- Chang, Y. L., Lai, S. C., & Wang, C. N. (2010). Enhancing repair service quality of mobile phones by the TRIZ method. *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, 6421 LNAI(PART 1), 468–481. https://doi.org/10.1007/978-3-642-16693-8_48
- Chen, T., Huang, Y., Hou, K., Weng, M., & Xu, N. (2020). Using Kano and TRIZ to Investigate Service Quality with Mobile Dining Car in Taiwan. November.
- Etikan, I. (2016). Comparison of Convenience Sampling and Purposive Sampling. *American Journal of Theoretical and Applied Statistics*, 5(1), 1. <https://doi.org/10.11648/j.ajtas.20160501.11>
- H. Russell Bernard. (2002). *Research Methods in Anthropology: Qualitative and Quantitative Approaches* (3rd ed.). Walnut Creek, CA: Alta Mira Press.
- Hal, W., Jdm, J., Sept, V. I. N., Penyedia, P., Jasa, L., Jdm, J., & Sept, V. I. N. (2018). Widiadibrata Hal . 87-97. I(02), 87–97.
- Hati, S. W., & Juliati, A. (2019). Analisis Pengaruh Logistics Service Quality Terhadap Kepuasan Dan Loyalitas Pelanggan Pada Perusahaan Logistik Jalur Nugraha Ekakurir (Jne). *JURNAL AKUNTANSI, EKONOMI Dan MANAJEMEN BISNIS*, 7(2), 240–249. <https://doi.org/10.30871/jaemb.v7i2.1592>
- Japariato, E. (2018). Pengaruh Logistics Service Quality terhadap Customer Retention dengan Customer Satisfaction sebagai Variabel Intervening pada Industri Ekspedisi Laut Di Surabaya. *Jurnal Manajemen Pemasaran*, 12(1), 8. <https://doi.org/10.9744/pemasaran.12.1.25>
- Jeeradist, T., Thawesaengkulthai, N., & Sangsuwan, T. (2016). Using TRIZ to enhance passengers' perceptions of an airline's image through service quality and safety. *Journal of Air Transport Management*, 53, 131–139. <https://doi.org/10.1016/j.jairtraman.2016.02.011>
- Koesno, D. A. S. (2020). <https://tirto.id/jumlah-pelanggan-e-commerce-tercatat-meningkat-383-selama-pandemi-f1eP>.
- Markus Hartono, Amelia Santoso, Mika Benita Tanugraha, Dita Natalia Prayogo, A. H. K. (2018). Kansei Engineering, Kano, & TRIZ for Logistics Service Excellence. *Graha Ilmu*.
- Mentzer, J. T., Flint, D. J., & Hult, G. T. M. (2001). Logistics service quality as a segment-customized process. *Journal of Marketing*, 65(4), 82–104. <https://doi.org/10.1509/jmkg.65.4.82.18390>
- P Kotler. (2003). *Marketing management 11th edition*. Prentice Hall.
- Sari, D. P., & Harmawan, A. (2013). Usulan Perbaikan Kualitas Pelayanan Pada Instalasi Rawat Jalan Dengan Metode Servqual Dan Triz (Studi Kasus Di Rs Muhammadiyah Roemani). *J@Ti Undip: Jurnal Teknik Industri*, 7(2), 95–104. <https://doi.org/10.12777/jati.7.2.95-104>
- Saura, I. G., Molina, M. E. R., & Francés, D. S. (2008). Logistic service quality and technology: A comparison between supplier–retailer and retailer–consumer relationships. *International Review of Retail, Distribution and Consumer Research*, 18(5), 495–510. <https://doi.org/10.1080/09593960802573385>
- Sze, J., Ho, Y., Ong, D., Teik, L., Tiffany, F., Kok, L. F., & Teh, T. Y. (2012). Logistic Service Quality among Courier Services in Malaysia. *International Conference on Economics, Business Innovation*, 38, 113–117.
- The World Bank. (2019). *The World Bank Global Ranking* 2018. <https://lpi.worldbank.org/international/global>
- Xu, J., & Cao, Z. (2009). Logistics Service Quality Analysis Based on Gray Correlation Method. *International Journal of Business and Management*, 3(1), 27–28. <https://doi.org/10.5539/ijbm.v3n1p58>
- Yeoh Teong San, Yeoh Tay Jin, S. C. L. (2016). TRIZ Systematic Innovation in Manufacturing. *Firstfruits Sdn. Bhd., Malaysia*.
- Zacharia, Z. G., Sanders, N. R., & Nix, N. W. (2011). The emerging role of the third-party logistics provider (3PL) as an orchestrator. *Journal of Business Logistics*, 32(1), 40–54. <https://doi.org/10.1111/j.2158-1592.2011.01004.x>
- Zhang, J., Chai, K.-H., & Tan, K.-C. (2003). 40 Inventive Principles with Applications in Service Operations Management. *The TRIZ Journal*, 1–16.
- Zhang, J., Chai, K. H., & Tan, K. C. (2005). Applying TRIZ to Service Conceptual Design: An Exploratory Study. *Creativity and Innovation Management*, 14(1), 34–42. <https://doi.org/10.1111/j.1467-8691.2005.00323.x>