

IMPROVING DELIVERY SERVICE QUALITY OF LOCAL LOGISTIC SERVICE PROVIDER (LSP) COMPANY USING THE SIX SIGMA DMAIC METHODOLOGY

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Abstract

This study focuses on improving the delivery service quality and operational performance of PT Jaya Connect Transportindo (PT JCT), a local logistics provider specializing in last-mile delivery for telecommunications equipment. Currently, PT JCT is facing several challenges, including a 9% defect rate and a sigma level of 3.38, resulting in a 91% service level performance. This performance falls short of the company's goal to achieve a 4% defect rate and a 95% service level, which is the benchmark set by its top competitors. Key issues affecting PT JCT's performance include a lack of operational staff, heavy reliance on a small number of partners, outdated tracking methods, and the absence of a system to evaluate partner performance. To address these challenges, this study applies the Six Sigma DMAIC methodology—Define, Measure, Analyze, Improve, and Control. Using tools such as the Fishbone Diagram, Statistical Process Control, and Process Capability Analysis, the research identifies the root causes of delivery issues, grouped into five categories: Man, Material, Method, Measurement, and Machine. The study proposes several practical solutions: adding more operational staff, expanding the network of delivery partners, introducing a real-time GPS tracking system, implementing a performance evaluation system for partners with clear KPIs, and ensuring vehicle reliability through regular inspections. These improvements are accompanied by a structured implementation plan to ensure their successful execution and long-term sustainability. By adopting these solutions, PT JCT can significantly reduce its defect rate, improve service quality, and achieve its performance targets. This research highlights how logistics companies can use Six Sigma tools to overcome operational challenges, enhance customer satisfaction, and maintain a competitive edge in a demanding market.

Keywords: *Six Sigma, DMAIC, logistics service quality, process improvement, operational performance.*

1. INTRODUCTION

The global logistics industry is evolving rapidly, driven by technological advancements and increasing demands for high-quality, efficient service delivery. In Indonesia, the logistics sector is a significant contributor to economic growth, valued at approximately IDR 873 trillion or approximately 23% of GDP in 2023, and expected to grow further due to increased e-commerce activities and ongoing infrastructure improvements (PwC, 2023). Despite this growth, logistics costs in Indonesia remain high, largely due to the country's challenging geography and connectivity issues across its many islands. The market comprises various types of logistics service providers (LSPs), including local, international, and multinational companies, each navigating their unique operational hurdles (Wibowo, 2016).

Quality in logistics is essential for customer satisfaction and competitiveness, impacting factors such as delivery timeliness, product integrity, and customer communication. Quality-related issues, particularly around delivery accuracy and damage prevention, are common challenges in the Indonesian logistics sector, where inconsistent infrastructure contributes to a high degree of service variability (Ślusarczyk et al., 2020 and Antony J, 2006). These challenges emphasize the need for advanced logistics solutions that can ensure high-quality service across Indonesia's complex logistics landscape.

The Fourth Industrial Revolution, or Industry 4.0, introduces powerful new technologies that are reshaping logistics by integrating real-time data analytics, Internet of Things (IoT) sensors, and automation into operations. These Industry 4.0 technologies enable logistics companies to monitor product quality more precisely and to prevent damage during transit by employing predictive maintenance and automated quality checks (Barreto et al., 2017). The advent of Logistics 4.0 — the application of Industry 4.0 in logistics — has

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made it possible to achieve higher standards of service quality, with real-time tracking and transparency enhancing customer trust and satisfaction (Barreto et al., 2017). PT Jaya Connect Transportindo (PT JCT), a logistics service provider focused on B2B last-mile delivery, faces unique quality challenges. Operating with traditional logistics methods, PT JCT encounters issues such as delayed deliveries, damaged goods, and limited tracking capabilities, which collectively affect customer satisfaction and weaken its competitive standing. These quality issues underscore the need for PT JCT to adopt more advanced, data-driven approaches to monitor and control delivery quality, particularly as its customer base grows and expectations for service excellence rise(Maulana & Wahyuni, 2021).

A viable path to addressing these quality challenges is transforming from conventional logistics operations to a smart logistics model, as demonstrated by companies like Waresix, a tech-driven Indonesian logistics provider. Waresix has successfully utilized digital tools, including IoT-based tracking systems and automated workflows, to improve its service quality. These enhancements have enabled Waresix to minimize delivery damage and delays, thereby improving customer satisfaction and operational resilience(Wibowo, 2016). For PT JCT, adopting similar smart logistics practices and applying a Six Sigma DMAIC (Define, Measure, Analyze, Improve, Control) approach could allow systematic quality improvements by identifying root causes of defects and implementing effective quality controls(Mandal, 2012).

Over the past two years, PT JCT has faced increasing challenges as the logistics service provider for PT Indotelco Jaya (PT ITJ), one of Indonesia's leading telecommunications companies. PT ITJ implemented a key performance indicator (KPI)-based rating system to evaluate its logistics vendors on a quarterly basis. This ranking determines the value of allocated projects, not just the number of delivery orders. For example, a vendor in the second rank may receive 12 delivery orders to high-value locations such as Sumatra, generating more revenue compared to a vendor in the third rank, who may receive 20 lower-value delivery orders to West Java based on PT ITJ's rate, and usually based on the company's internal data, deliveries to certain locations such as Sumatra and Kalimantan have larger margins than deliveries within Java. This system underlines the importance of maintaining a high rating, as this directly impacts the revenue potential of each vendor.

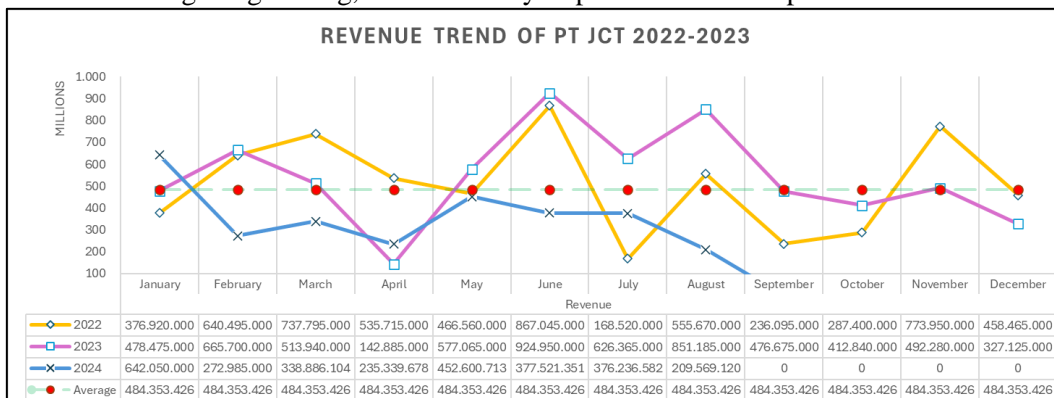


Figure I.2 Revenue Trend of PT JCT 2022-2024

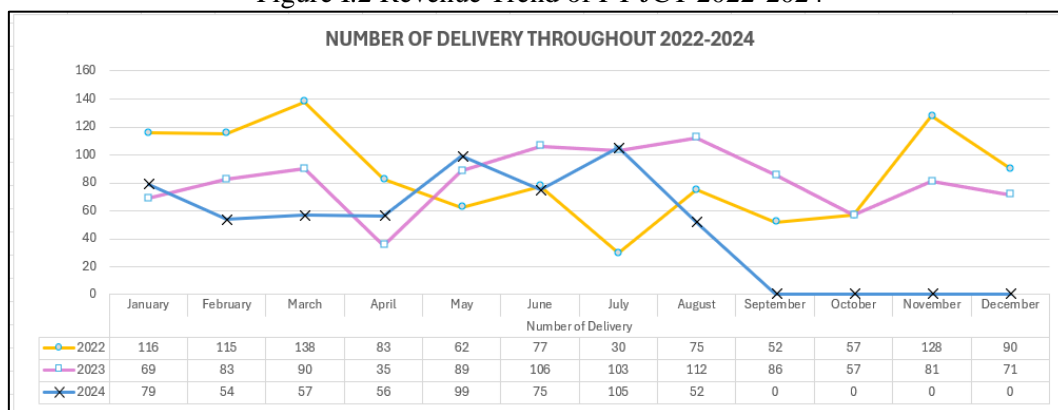


Figure I.3 Number of Delivery throughout 2022-2024

The alleged business issues faced by PT JCT are reflected in the revenue trends from 2022 to 2024 that shown on Figure 1.2 above. While there was a significant spike in revenue in 2023, 2024 showed signs of decline and instability, which was attributed to an increase in complaints from PT ITJ. According to Mr Aziz,

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President Director of PT JCT, these complaints mainly stemmed from inconsistencies in the quality of deliveries, which affected PT JCT's performance rating. Throughout 2023-2024, PT JCT handled 1,559 delivery orders, of which 128 were defective. The complaints included delivery delays, reporting delays, and operational readiness issues called 'support', which reflects PT JCT's ability to accept assignments promptly. These deficiencies highlighted gaps in service quality and operational efficiency.

As a result, PT JCT's ranking in PT ITJ's vendor evaluation system was affected, leading to the allocation of lower-rated work despite maintaining or even increasing the number of assignments. This decline in performance jeopardises PT JCT's revenue and its position as a vendor for PT ITJ. If these issues persist, PT JCT risks further erosion of trust, a decline in revenue, and potentially removal from PT ITJ's vendor list. To address this, PT JCT should prioritise improving service consistency, addressing quality control issues, and improving readiness to differentiate itself in an increasingly competitive logistics market.

2. IMPLEMENTATION METHOD

The research design for this study is developed to address the quality challenges faced by PT Jaya Connect Transportindo (PT JCT) in its delivery services. By employing a structured approach, the study aims to identify root causes of service defects and provide actionable solutions to improve operational performance and customer satisfaction. This research adopts the Six Sigma DMAIC (Define, Measure, Analyze, Improve, Control) methodology as its core framework, combining qualitative and quantitative methods for comprehensive analysis.

The research begins with the identification of specific quality issues in PT JCT's delivery services, such as delays, damaged goods, and limited tracking capabilities. These challenges have significantly impacted customer satisfaction and the company's competitive positioning. To ensure alignment with organizational needs, a stakeholder analysis is conducted, focusing on key actors, including management, partners, and customers. This analysis provides a deeper understanding of their perspectives and expectations, forming the foundation for the research objectives. A literature review is conducted to establish the theoretical framework of the study. Key concepts from Six Sigma, quality management, and process improvement are explored to identify best practices and methodologies applicable to PT JCT's context. These insights guide the selection of tools and techniques used throughout the research process.

The study employs a mixed-method approach for data collection. Qualitative data is gathered through in-depth interviews with stakeholders, including the Director and Operations Manager, to gain insights into operational dynamics and quality challenges. Quantitative data is collected from PT JCT's internal records for 2023, providing a factual basis for identifying defect patterns and their impact on performance. Statistical tools, such as control charts and Process Capability Analysis (PCA), are used to assess and quantify process performance. The research design is structured around the DMAIC methodology. The Define phase focuses on outlining the project's scope, objectives, and milestones through the development of a Project Charter.

In the Measure phase, the current performance of PT JCT's delivery processes is evaluated. Statistical tools, including control charts and PCA, are employed to establish baseline metrics and assess process stability. These measurements provide a clear understanding of where performance gaps exist. The Analyze phase delves into identifying the root causes of defects using tools such as the Ishikawa diagram and the 5 Whys technique. The analysis focuses on various contributing factors, including human errors, partner performance, and system inefficiencies, to pinpoint areas that require improvement.

The Improve phase involves developing and proposing improvement strategies based on the analysis findings. These solutions aim to address the identified root causes and are designed to enhance operational efficiency, reduce defects, and align with customer expectations. Proposed improvements are detailed in a structured implementation plan. Finally, the Control phase ensures the sustainability of improvements. Control mechanisms, such as updated control charts, regular quality audits, and ongoing training programs, are implemented to monitor processes and prevent defects from recurring. These measures aim to maintain the gains achieved and embed the improvements into PT JCT's operational practices.

The expected outcomes of this research include a significant reduction in defect rates, improved service reliability, enhanced customer satisfaction, and strengthened competitive positioning for PT JCT. By systematically applying the DMAIC methodology, this research provides a comprehensive roadmap for PT JCT to address its quality challenges and ensure long-term success in the competitive logistics industry.

3. RESULTS AND DISCUSSION

Analyze

The "Analyze" phase focuses on identifying the core problem(s) that consistently impact the operational effectiveness of PT JCT. The company observed recurring defects, including issues related to SLA (Service Level Agreement) adherence, reporting accuracy, and support quality, which disrupt overall performance. To address this, the researcher will utilize the Fishbone Diagram method. This tool is highly effective in identifying root cause(s) by visually categorizing potential factors contributing to the defects and their relationships.

The Fishbone Diagram allows for a systematic exploration of issues that influence PT JCT's operations. By breaking down potential causes into logical categories, such as processes, personnel, systems, and tools, it provides a structured approach to pinpoint specific areas needing improvement. For PT JCT, this method is particularly useful for addressing complex issues like SLA breaches, inaccurate reporting, and suboptimal support, which often involve multiple interconnected factors.

To further enhance the analysis, the 5M Framework (Man, Machine Method, Material, Measurement) is integrated into the Fishbone Diagram. This approach enables the identification of causes such as human errors, inefficiencies in tools and equipment, insufficient resources, or flawed processes. By systematically categorizing and analyzing these causes, PT JCT can develop targeted improvement actions to address the root problems effectively and improve operational performance. Figure IV.5 illustrating the root cause analysis using fishbone diagram for PT JCT's defects.

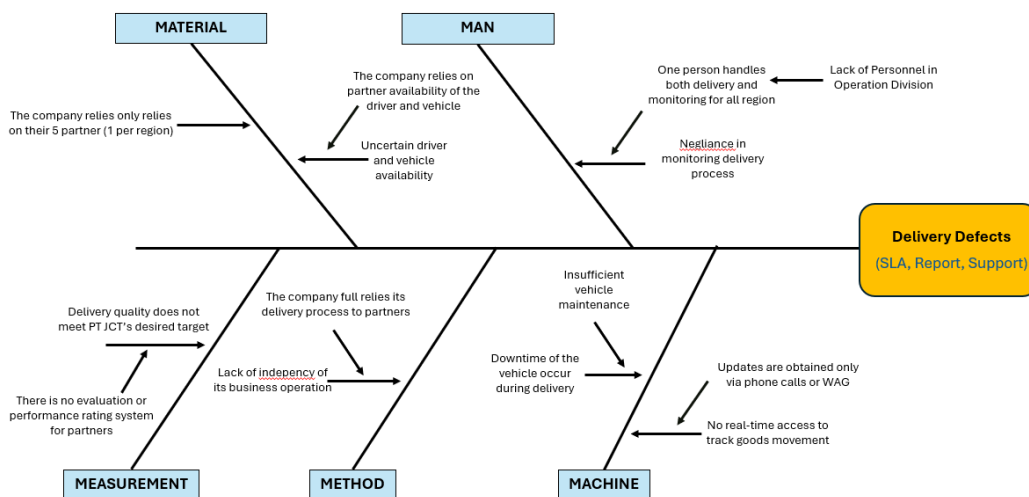


Figure 1 Fishbone Diagram of Delivery Defect

Based on Figure 1, it can be seen the result of the RCA using the fishbone diagram that has been carried out by the Researcher. After discussing the results obtained with the Operations Manager and CEO of PT JCT, the factors are considered to be sufficient to describe the actual occurrence in business practices and it will be the benchmark for Researcher to propose several improvement solutions on the next phase. The following is a further explanation of the Cause of each category:

- **MAN**

This category focuses on causes related to manpower issues, including:

1. **Lack of Personnel in Operation Division**, In actual conditions, the operations manager works alone by carrying out job descriptions assignments, communication and monitoring to all regions consisting of 5 different vendors depending on the destination of the DO. This results in the possibility of negligence from the operations manager in terms of reporting. Because in practice, getting updates on the position of goods from partners is sometimes rather difficult for various reasons, for example, for example there is a shipment of goods from JKT-SBY, when the operations manager has been asked to update the status of the goods by the customer, the driver cannot be contacted because he is driving. This situation makes the operations manager have to focus on getting information related to this shipment. Meanwhile, on that day there were several other DOs that needed status updates as well but were being delayed because of this one driver. Finally causing delays in providing status updates to customers.

- **MATERIAL**

This category focuses on caused that related to any input either raw material or component used to produce goods or services, including:

1. The company relies on partner vehicle availability, because in running its business, PT JCT does not own vehicle assets and only relies on partners, where these partners are usually pool managers and their resources is based on freelance driver, whose the number of driver availability is uncertain. This can result in delays in delivery (SLA) due to the waiting time for vehicle availability and also result in terms of support for delivery requests from customers can at any time not be maximised due to rejecting assignments (Request Order).
2. The company only relies on their 5 partner (1 partner per region), The company relies exclusively on five partners, with one partner assigned per region. If a partner encounters issues, it directly leads to delivery defects in that region due to the lack of alternative providers. This reliance may cause partners to feel secure in their position and feel no need to make any improvement , as PT JCT's demand depends heavily on them.

- **MACHINE**

This category focuses on caused that related to the tools, equipment and technology that used in the process, including:

1. Updates are obtained only via phone calls or WAG, This method of retrieving delivery status is still fairly conventional and has a fairly high potential for human error such as HP runs out of battery, runs out of quota. In addition to factors related to communication devices, this method also has a lack of reliability value. As one example of a real incident that has been experienced in one of the shipments to the East Java area. when the operations manager asked about the position of the goods the day after the goods were picked up, the partner for the Java island region said that the car had left and the estimate arrived at its destination within 2 days. However, two days later it was found that the goods had not arrived and were still positioned in Semarang. After further investigation, it turned out that there was non-transparent information provided by the partner where in fact, the car was still waiting for a full load in the pool for 2 days and the goods were only dispatched on that day and as a result the goods arrived at their destination a day past the lead time. This method resulted in PT JCT not having real-time access to the movement of goods which has the potential for failure to fulfil SLA.
2. Insufficient vehicle maintenance, this cause may lead to the downtime of the vehicle occur during the delivery process.

- **METHOD**

This category focuses on caused that related to the processes, procedures, and workflows employed, including:

1. The company full relies its delivery process to partners, this cause leading to lack of independency of its business operation, which means if they can get more independent, it will be more easier to control the overall process and quality delivered to customer.

- **MEASUREMENT**

This category focuses on caused that related to how performance, processes, or outcomes are tracked, monitored and evaluated, including:

1. There is no evaluation or performance rating system (KPI) for partners, PT JCT does not have an evaluation or performance rating system (KPIs) in place for its partners. Without a proper framework like KPIs, it's hard to track how well the partners are doing or hold them accountable for delivery quality. This often leads to inconsistent performance, making it difficult to spot issues or encourage improvements. In the end, this lack of oversight results in delivery quality falling short of what PT JCT aims to achieve.

Improve

The fourth phase is about proposing several improvement solutions to anticipate identified root caused from prior analysis and achieve the desired objective. Beside the list of solutions suggested by researcher to PT JCT CEO, this phase also explains the implementation design—consists of procedures and time schedule to realize those improvements effectively and efficiently.

1. Alternative Solutions

There are 3 type of defects that occur based on PT IJT or customer’s KPI i.e., SLA, Reporting and Support. The “Improve” phase will propose improvement solutions for the root caused from the previous phase. The rootcauses of the problem determined are:

- Lack of Personnel
- The company resources limited by current partners resources
- Updates are obtained only via phone calls or WAG
- Insufficient partners vehicle condition
- The company relies only on their 5 partner (1 per region)
- There is no evaluation or performance rating system for partners

Each of these root cause will be anticipated by implementing several improvement solutions that are suitable with the current dynamics of PT JCT. Table IV.4 Below is the table describing outline of the proposed solution for each core problem:

Table 1 Proposed Improvement Solutions

Problem	Root Cause	Category	Type of Defect	Solution
Defected Delivery (SLA, Report, Support)	Lack of Personnel in Operation Division	Man	Report	Assign additional staff
	The company resources limited by current partners resources	Material	SLA, Report, Support	Expand partnership beyond 5 partners current existing
	The company relies only on their 5 partner (1 per region)			
	The company full relies its delivery process to partners	Method	SLA, Report, Support	Gradually reduce dependency on partners
	There is no evaluation or performance rating system for partners	Measurement		Develop and implement a partner evaluation system with clear KPIs to monitor performance
	Insufficient partners vehicle condition	Machine	SLA	Ensure delivery reliability
	Updates are obtained only via phone call or WAG		Report	Implement a simple tracking system that utilize cellphone GPS

Furthermore, the researcher will give an explanation about the solution to address the root cause that each solution might have a few way of action that can be taken, also the reasoning to choose the chosen solutions to proposed based on table IV.4 which structured by category of cause as follows:

a. MAN

Purpose Solution (1) : Assign additional staff in Operation Division

To ease the operational burden, PT JCT can assign more staff to assist with communication, monitoring, and reporting. With additional personnel, responsibilities can be divided, ensuring timely and accurate updates for all deliveries. This would not only reduce delays but also improve overall service quality by minimizing errors caused by overwhelming workloads.

b. MATERIAL

Purpose Solution (2) : Expand partnerships beyond 5 current partner existing

To address resource limitations, PT JCT should form additional partnerships or subcontract with other vendors to broaden their alternative. This would provide flexibility and ensure sufficient vehicle availability to meet customer demand, even during peak periods or in cases of partner resource shortages. Increasing the number of partners or adding backup vendors in each region also would reduce dependency on individual partners and mitigate risks caused by underperformance.

c. METHOD

Purpose Solution (3) : Gradually reduce dependency on Partners

PT JCT could consider internalizing some key delivery processes, such as hiring its own drivers or leasing vehicles to build an internal delivery team. While this requires an initial investment, it will give the company more control over its operations and improve service quality. In addition, reducing reliance on external partners ensures that PT JCT can respond more flexibly to customer demand and maintain consistent delivery performance, even in times of disruption.

d. MEASUREMENT

Purpose Solution (4) : Develop and Implement a Partner’s evaluation system with clear KPIs to monitor their performance

Researcher recommend PT JCT to build a structured framework to monitor and evaluate its partners’ performance using measurable Key Performance Indicators (KPIs). These KPIs could include critical metrics such as delivery timeliness, reporting accuracy, and vehicle readiness or other aspect that considered as an important factor. By consistently tracking these metrics, PT JCT can better assess partner effectiveness and identify areas for improvement.

In addition, To strengthen the evaluation system, PT JCT should incorporate a reward and punishment mechanism based on KPI outcomes. This mechanism help encourage the accountability and motivation among partners to compete to give the best performance and mitigate poor performance. But for the record, the reward and punishment needed to be favorable and fair for partners.

e. MACHINE

- Purpose Solution (5) : Ensure delivery reliability

To mitigate the downtime may occur during delivery process, PT JCT could set the minimum vehicle condition standard and validate the conditions with routine conduct direct assessment of the vehicle for partners vehicle condition. This purposed solution also could elaborate within the reward mechanism for a partner that achieve excellent that can gain a light maintenance from PT JCT for example an free brake maintenance including changing brake pads and brake fluid.

- Purpose Solution (6) : Implement a simple tracking system that utilize phones GPS

By adopting a real-time tracking system, PT JCT can gain direct visibility into the movement of goods without relying on manual updates. This solution would eliminate miscommunication, improve transparency, and allow the operation division to monitor deliveries efficiently. Real-time tracking ensures that any delays or issues can be identified and addressed proactively, reducing the risk of SLA defect.

2. Implentation Design

Along with the alternative solutions that soon to be proposed to the company, researcher will also develop implementation plan to know when and how it will take place. These improvements will dimmish the root cause and hopefully help PT JCT to achieve their goal. In designing the implementation, it will be elaborated on this following table:

Table 2 Proposed Solutions Summary and Procedures

Root Cause	Proposed Solution	Explanation	Procedures
Lack of Personnel in Operation Division	Assign additional staff (1)	Add more staff for Operation Division	1. Define workload distribution 2. Determine the number of employees needed and criteria 3. Proceed Recruitment
The company resources limited by current partners resources	Expand partnership beyond 5 partners current existing (2)	Increase the number of Partners to collaborate within the company operation	1. Set clear criteria for future partner (such as cost, number of unit, number of fleet avail, etc) 2. Exploration of Partner for all region 3. Contact and negotiate within the terms and condition with potential partners
The company relies only on their 5 partner (1 per region)			

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The company full relies its delivery process to Partners	Gradually reduce dependency on partners (3)	Reduce operational risk and delay caused by dependency on partners	<ol style="list-style-type: none"> 1. Conduct feasibility studies for the investment of asset and employed self own driver 2. Specific Cost Allocation for the investment
There is no evaluation or performance rating system for partners	Develop and implement a partner evaluation system with clear KPIs to monitor performance (4)	A metrics to measure partner performance as an objective evaluation tools	<ol style="list-style-type: none"> 1. Set the group of KPI that reflect company's goal and discuss the reward and punishment 2. Socialize the KPIs that have been developed to current and future partners 3. Implement Evaluation system 4. Take appropriate action (Reward & Punishment)
Insufficient partners vehicle condition	Ensure delivery reliability (5)	Reduce chance of delivery delay caused by downtime of vehicle that resulting delay delivery by determine the minimum vehicle condition allow to operate with company and regular inspection from PT JCT to partners vehicle	<ol style="list-style-type: none"> 1. Set a vehicle reability standards allowed to operate with PT JCT 2. Regular inspection to the vehicle of Partner
Updates are obtained only via phone call or WAG	Implement a simple tracking system that utilize cellphone GPS (6)	Ensure real-time visibiof delivery status	<ol style="list-style-type: none"> 1. Find and choose easy-to-use tracking application 2. Socialize and Train partners and employee on the new system 3. Monitor and review the implementation effectivenessm to address issue for reporting process

Those procedures from Table IV.5 were then assigned into the following timeline:

Table 4 Timeline for Proposed Solutions Procedures

Solution Implementation Activity	Activity Timeline																			
	2025												2026							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Proposed Solution (1)																				
1. Define Workload Distribution																				
2. Determine the number employees needed and criteria																				
3. Proceed recruitment																				
Proposed Solution (2)																				
1. Set Clear criteria for future partner																				
2. Exploration and gathering data of potential future partner																				
3. Contact and Negotiate																				
Proposed Solution (3)																				
1. Conduct feasibility study of the investment on asset and other relevant factor																				
2. Specific cost allocation for the investment																				
Proposed Solution (4)																				
1. Set a group of KPIs that reflect company performance goal																				
2. Socialize and trial of KPIs utilization to Partners																				
3. The Implementation of Evaluation system																				
4. Take appropriate action (Reward&Punishment)																				
Proposed Solution (5)																				
1. Set a vehicle reliability standards allowed to operate with PT.JCT																				
2. Socialize and trial of Vehicle condition assessment																				
3. Regular Inspection of partner vehicle																				
Proposed Solution (6)																				
1. Find and choose easy-to-use location tracking app existing																				
2. Socialize and train partners regarding the app utilization																				
3. Monitor and review the implementation																				

Control

To ensure the improvements from the proposed solutions are implemented effectively and deliver sustainable results, a clear monitoring and supervision system will be established. The responsibility for overseeing the entire process will fall under the CEO and the Operation Manager. These two roles are essential in ensuring that all activities run smoothly, that progress is tracked, and that the intended outcomes are achieved. The Operation Manager will play a central role in overseeing day-to-day operations. This includes ensuring that each proposed solution is implemented according to plan, tracking results, and addressing any challenges that may arise along the way. To keep everything on track, regular updates will be compiled and reported to the CEO, who will provide strategic direction and support where needed.

To monitor the results of these improvements, control charts will be used. Control charts are a simple but effective tool to observe trends and variations over time. In this case, they will track critical metrics, such as the number of defects in the delivery process, delays, partner performance issues, or failures in vehicle conditions and tracking systems. By analyzing these charts, the team will be able to see whether the processes are performing within acceptable limits or if there are areas where performance is slipping. The control charts will have clearly defined Upper Control Limits (UCL) and Lower Control Limits (LCL) based on past performance. If results begin to exceed these limits, immediate action will be taken. For example, if defects in deliveries increase or tracking system issues occur, corrective measures will be implemented right away—such as revisiting partner agreements, providing additional training, or fine-tuning processes.

In addition to using control charts, regular review mechanisms will ensure ongoing oversight:

1. Weekly Progress Reports: The Operation Manager will track and document implementation progress, highlighting successes, challenges, and next steps.
2. Monthly Review Meetings: The CEO and Operation Manager will meet to discuss the performance of each solution and address any issues requiring immediate attention.
3. Quarterly Audits: Every three months, a thorough evaluation will be conducted to measure the performance of the implemented improvements, ensure they remain effective, and identify opportunities for further refinement.

4. CONCLUSION

This chapter contains findings to answer each research question raised in chapter I, with the following explanation:

1.How is PT JCT current service performance?

PT JCT's current performance is relatively average compared to industry standards. The company's sigma level stands at 3.38, with a service level performance of 91%, which means that about 9% of its shipments are defective. However, as PT JCT competes with other vendors whose performance is rigorously evaluated by customers, maintaining its rating is crucial. To remain competitive, the company has set a target to reduce annual defects to 4%, which aligns with a service level performance of 96%. The current benchmark

of its main competitor is with a service level performance of 95%. To close the current and desired performance gap of 5%, a Process Capability Analysis (PCA) was conducted. The results show that with the current process, PT JCT has not been able to meet the desired target. This underscores the need for significant improvements to achieve company performance targets.

2. What are the factors causing defects in the delivery of goods at PT JCT?

Root cause(s) analysed by Ishikawa Diagram that integrated with 5M approach. The result consist of 5 identified "M" factors and 7 root causes; (1) MAN – Lack of Personnel in Operation Division; (2) MATERIAL – The company resources limited by current Partners resources and The company only have 5 partner (1 per region); (3) METHOD – The company full relies its delivery process to partners; (4) MEASUREMENT – There is no evaluation or performance rating system for partners; (5) MACHINE – Insufficient Partner's vehicle condition and Updates are obtained only via phone call or WhatsApp Group(WAG).

3. What recommendations or Improvements can PT JCT implement to reduce the defect of its service?

Appropriate solutions are proposed for improving the overall quality of PT JCT Delivery based on each identified root cause: (1) MAN – Assign additional staff in Operation Division; (2) MATERIAL – Expand partnership beyond 5 Partners current existing; (3) METHOD – Gradually reduce dependency on Partners in terms of delivery; (4) MEASUREMENT – Develop and implement a Partners evaluation system with a clear KPIs to monitor performance; (5) MACHINE – Ensure delivery reliability and Implement a simple tracking system that utilize cell phone GPS.

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