

Optimizing Goods Claims Processing Time in Logistics Operations Through Website-Based Applications with the DMAIC Approach

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ABSTRACT

PT XYZ is an e-commerce company which offers an electronic buying and selling platform for a wide variety of products from many sellers to buyers. As an industry engaged in the commercial sector, logistics has a vital role in shipping goods from upstream to downstream to meet consumer desires. However, conditions in the field are not always in accordance with the plans. Lost or damaged goods during delivery or at the Warehouse are a frequent problem. PT XYZ, through its XYZ Logistics team, implements a claims system for replacing items lost or damaged during the operational process. Currently, the claim submission system is done manually via email. This manual claim system creates many problems due to the lack of proper coordination between stakeholders. Therefore, this study proposed a solution with a lean six sigma approach using the DMAIC (Define, Measure, Analyze, Improve and Control) method. The solution offered to improve PT XYZ's claim system is to design an automated claim system using a website-based application. After implementing a website-based application to automate the XYZ logistics claim process, it was proved that the company was able to reduce lead time by up to 60% from initial conditions, up to 33% of stakeholder workload, and improve data security and real-time supervision.

1. INTRODUCTION

The Covid 19 pandemic does not always negatively impact human life but also creates new innovations in the industrial world. Increasingly developing technology also supports the development of various industrial worlds. One of the industries that have progressed since the pandemic was the digital trade industry, better known as e-commerce, whose economic growth has increased to 33.2% since 2020 (Kominfo, 2021). It is also indirectly supported by the policies the government requires all activities to be carried out from home so that people's consumptive behavior to shop in the digital industry also increases. Furthermore, the growth of the e-commerce industry cannot run well without the logistics accompanying it. Logistics has a vital role in this industry because the key to customer satisfaction depends on the quality of the goods and delivery from the seller to the consumer (Restuputri, Indriani, & Masudin, 2021).

PT XYZ is one of the influential e-commerce industry companies in Indonesia. As one of the big industries, PT XYZ continues to develop its industry from a commercial and logistical standpoint. From the logistical side of PT XYZ, besides collaborating with outside third-party logistics (3PL) companies, this company has its own fleet and logistics system known as XYZ Logistics. XYZ Logistics has also developed into a 3PL company that supports the XYZ marketplace and expands its operations to other companies. XYZ Logistics is responsible for picking up the goods at the seller's location, sending them to the hub, sorting, or logistics facilities of PT XYZ until the final delivery to the buyer by courier using either 2-wheeled, 3-wheeled or large-sized 4-wheeled vehicles. Figure 1 illustrates the process of the journey of goods from the e-commerce industry.

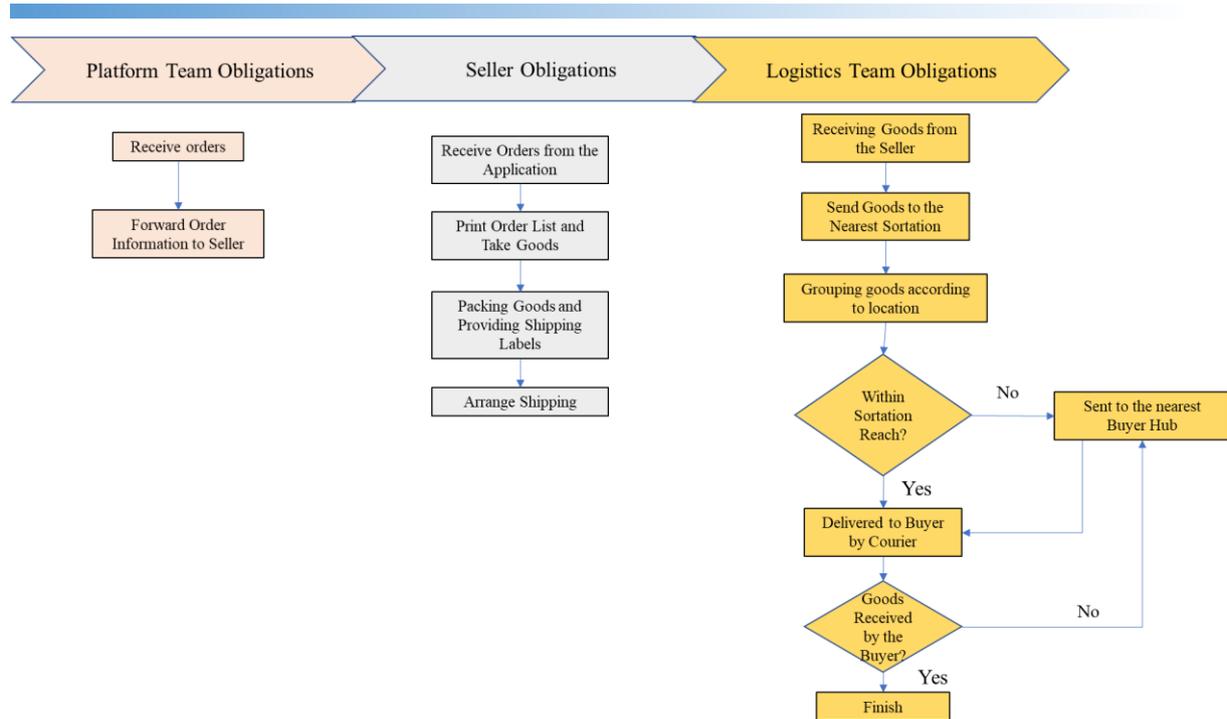


Figure 1. Goods Flow at PT XYZ

In its business operations, logistics is one of the crucial keys to achieving company goals: meeting consumer needs (Rohman & Abdul, 2021). However, the actual conditions in the field are not always as planned. The existence of lost or damaged goods during operations has a great chance of happening. Therefore, it is necessary to have a handler so that this problem does not significantly affect the satisfaction of sellers and buyers and does not harm all parties. To overcome this problem, PT XYZ implements a claim system, where lost or damaged goods during the operational process will be replaced. Currently, XYZ Logistics has a claim submission system that is done manually via email. However, the claim process that has been carried out so far is still ineffective because, in practice, the claim process takes 5-7 days to complete the claim process. There is also a problem with the lack of information and communication among the team. Moreover, the financial reporting is sometimes less structured, the reports are incomplete, and sometimes the filing process is not in accordance with the provisions made.

This problem creates a waste of time and administration which will cause losses to the company. Waste is all work activities that do not provide added value throughout the flow of a process that converts inputs into outputs (Gaspersz & Fontana, 2011). One of the methods used to analyze and minimize waste is the lean six sigma approach, which eliminates waste from activities that do not create added value while continuously improving quality. Based on the problems above, research will be carried out to identify, analyze, improve, and monitor waste that is carried out in the claim process for PT XYZ's logistics operations using the lean six sigma logistics approach DMAIC (Define, Measure, Analyze, Improve and Control), to increase productivity and quality from logistics company XYZ.

2. LITERATURE REVIEW

E-commerce

In Indonesia, e-commerce became known around the 1990s when the first commercial internet provider company was established in Indonesia. Since then, this industry has continued to grow and has even become a trend since the Covid-19 pandemic until now. The term e-commerce means electronic commerce or internet-based commercial transactions, commonly known as buying and selling goods or services through an internet platform or marketplace. According to (Pradha, 2018), this industry is experiencing increasing growth because it makes it easy for customers to buy a variety of products and direct delivery to the customer's location, making it easier and more efficient for their time. Apart from that, the development of new features that support this industry, such as the cash on

delivery (COD) feature, which makes it easy for customers to pay, is also why this industry is very competitive.

The retail industry is a sector with the largest and fastest growth compared to other industries. The e-commerce industry is also inseparable from logistics, a significant change in the supply-demand market due to the e-commerce wave. The impact caused by the existence of e-commerce logistics that demands convenient and timely delivery has changed the traditional delivery method with various logistics service providers who can meet their demands.

Lean Six Sigma

The term lean describes a method or tool for identifying and eliminating waste through continuous improvement to increase speed and simplify the flow of a process. Six Sigma is a management methodology that seeks to understand and eliminate the negative impacts of various variations in a process. Logistics is an activity that manages the flow of materials, information and finance from the point of origin to the end point of consumers. It can be concluded that lean six sigma logistics is a science related to eliminating waste with the concept of reducing variation and speeding up the supply chain flow.

The concept of Lean Six Sigma itself is closely related to waste from various stages of the supply chain process. In general, there are seven types of logistics waste: wasted inventory, transportation, wasted space and facilities, wasted time, wasted packaging, wasted administration and wasted knowledge (Pradana, Chaeron, & Khanan, 2018). These types of waste can occur throughout the supply chain flow, especially logistics. The methods commonly used in handling waste on the lean six sigma concept include the following.

- a. DMAIC (Define, Measure, Analyze, Improve, Control) is usually used to develop an existing product or activity to increase customer satisfaction.
- b. DMADV (Define, Measure, Analyze, Design, Verify) is usually used to design or redesign a manufacturing process.
- c. PDCA (Plan, Do, Check Action) is an approach used by a company to improve the quality of a process, service, or product.

3. METHOD

One method commonly used for waste management in lean six sigma is DMAIC or a problem-solving approach with 5 phases: Define, Measure, Analyze, Improve and Control (Mijajlevski, 2013). In addition, in the application of lean six sigma, many techniques or tools can be used at each stage of the method. Several techniques or tools commonly used include project charters, flow charts, SIPOC diagrams, Voice of Customers, Brainstorming, Work Breakdown Structures, Control Charts, Pareto diagrams, histograms, Check sheets, Fishbone diagrams, 5Whys, FMEA, Cause and Effect Matrix, Action Plans and Control Plans and many more that can be developed and used as needed (Qimacros, 2023).

a. Define

The define phase can be done by defining existing problems, defining goals or goals, processes and consumer desires based on a predetermined "problem statement" (Hartoyo, Yudhistira, Chandra, & Chie, 2013). The specified problem statement must define a level of severity either in terms of the percentage of times an error occurs, the impact the problem has on a specific business or region. Furthermore, the goals that are defined must be measurable, and there must be a clear timeframe so that the project can be carried out successfully. In general, the essence of a project that will be carried out is the desire of consumers, both external and internal, for the company. So that in this phase, communication and coordination with consumers is an important requirement that must be carried out.

b. Measure

The measurement phase aims to measure the actual performance of the problem definition's results. The data used at this measurement stage must be detailed, accurate and correct because at this stage it influences the decisions at the next step. The common objects of measurement are cost, time and quality.

c. Analyze

This phase aims to identify the root cause of the problem. Cause-effect relationship diagram is one way to analyze how one or more independent variables affect the dependent variable (Lestari & Purwatmini, 2021). In this phase, further identification is also related to consumer dissatisfaction with the services provided.

d. Improve

This phase aims to fix the root causes that have been obtained in the previous stage by finding and implementing the solutions that have been generated.

e. Control

Control is the phase of taking action to control the results of the improvement. The actions must ensure that the process is continuously monitored with key measurement variables maintained at certain limits. At this stage, a new Standard of Operational Procedure needs to be established, workers must be given training for updates, and clear new process performance measurements must be implemented.

4. RESULTS AND DISCUSSION

The research focuses on claiming lost or damaged goods during the operational process sent by XYZ Logistics Indonesia. Data processing in this study uses the DMAIC approach applied in Lean Six Sigma Logistics. From the current DMAIC phases, this research will only apply the Define, Analyze, Improve and Control stages in accordance with problem conditions, data and company policies.

a. Define

The initial condition of the claim process at PT XYZ is the XYZ Logistics team submits claims for items damaged or lost in this operational process manually via electronic mail. In practice, the claim process takes 5-7 days for the claim process to be completed because when the email is sent, other relevant stakeholders pay little attention to notifications from the email sent, so the time for processing the claim data itself is also delayed. This waste of time and administration in the claim process will undoubtedly have an impact on the satisfaction of sellers and buyers in the XYZ company. In addition, from a financial point of view, detailed reporting of submitted claim data is less structured and the reports are incomplete. There is no clear SOP regarding reporting formats and deadlines for filing which result in missing or unrecorded financial reporting, hindering and slowing the processing time for claims.

Therefore, researchers aim to optimize the process of submitting claims for this logistical operational claim by improving it in terms of administration and applicable SOPs with DMAIC analysis and finding the most appropriate solution to be implemented by PT XYZ. The following table compares the problems and objectives of the research to be conducted. The expectations for the claim filing process from reporting to completion are shown in the following table of objective conditions. The data is determined based on the flow of the claim submission process and each stakeholder's responsibilities, which wastes a lot of time based on field conditions.

Table 1. Definition of Improvement Goals

Parameters	Existing Conditions	Objective Conditions
Claim processing lead time	It takes 5 – 7 days from the time the claim is submitted until the process is complete.	Lead time is reduced by up to 60%, that is, the claim process from delivery to completion takes a maximum of 2x24 hours.

Parameters	Existing Conditions	Objective Conditions
Working Duration	It takes 3 hours per stakeholder on average to process the claim	1 hour per stakeholder on average to process the claim
Administration	Reporting is incomplete and done manually using email	100% complete reporting using an automated system
Data Validation	There is no clear and valid SOP for the claim process	There is a clear and valid SOP for the claim process
Payment Success	Unrecorded and unpaid payment data is still found	100% of claim payments are successful because they are recorded automatically.

b. Analyze

At this stage, an analysis of the root causes will be carried out using fishbone diagram tools. Making a fishbone diagram in this phase goes through several stages, including defining the problem, determining the category of the cause of the problem, describing the cause into several sub-categories, conducting an analysis using a cause-effect question and defining the root cause to determine the corrective steps to be taken (ASQ, 2023). Figure 2 illustrates a fishbone diagram of the waste problems in the claim process for lost and damaged goods during logistics operations carried out by XYZ logistics.

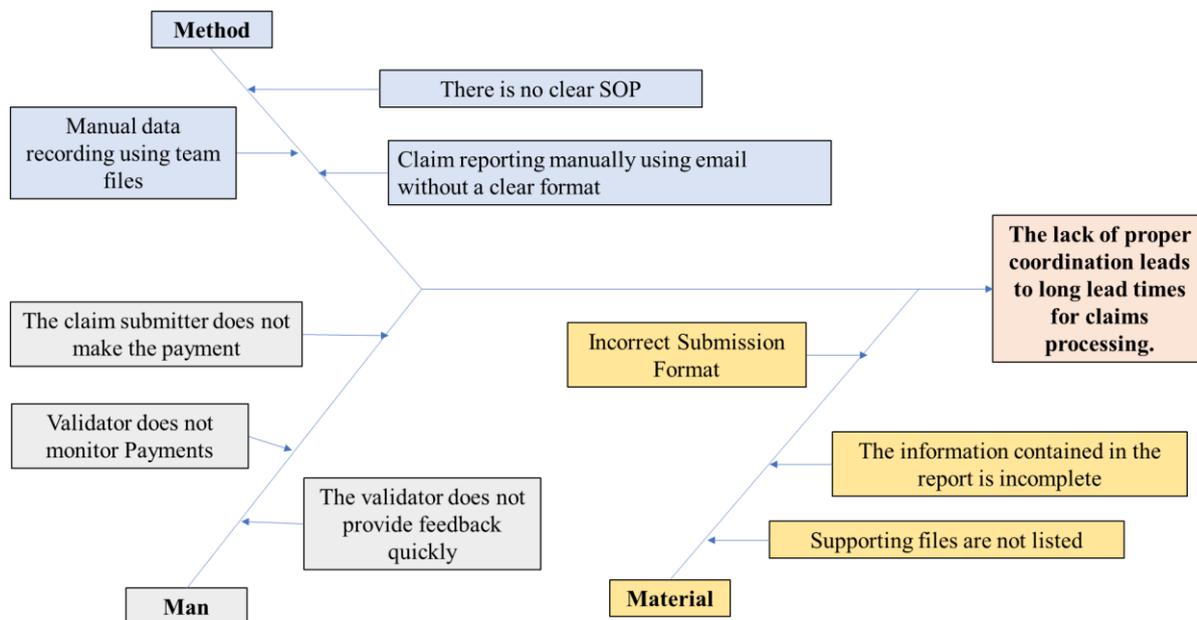


Figure 2. Fishbone Diagram of Root Cause Analysis

Based on the figure above, there are three things that need to be underlined. First, the Manpower category raises issues such as the lack of responsiveness from the validator team, which results in delays in feedback and late or even non-payment of claims. Second, from the Material category, it is found that there are faulty submission forms which do not equip with complete information and event reports. Lastly, from the Method category, the existing condition claim submission process does not have a clear SOP, and the recap process is still manual; hence it takes a long time. Additionally, the reporting format is inconsistent between one team and another. After conducting a deeper analysis and discussion with the XYZ logistics team, it was found that the root cause of this problem is related to the lack of structured coordination for the claim process. This results in the possibility of failure in the claim payment process, incomplete financial reporting, and the most impactful are related to delays in feedback given by related stakeholders, which causes the long lead time of this claim process. Therefore, an improvement is needed to make coordination between stakeholders more structured and in real-time.

c. **Improve**

Based on the definition of the problem and the analysis, the previous claim process needs improvement to be more structured and coordinated with valid SOPs and applications that can be monitored in real-time and easily used by all lines of business and related stakeholders. Consequently, this study proposes a solution in the form of designing a website-based application that is used to facilitate the process of reporting claims, preparing financial reports and payments, and providing feedback between stakeholders, which is equipped with real-time notifications to all stakeholders.

a. Application Development Stages

- 1) Preparation. In this stage, what needs to be prepared is the Product Requirement Document (PRD) and Business Requirement Document (BRD), which explain the proposed update design and detailed information on the new product to be launched.
- 2) Implementation. In this stage, the team collaborates with relevant stakeholders to make applications according to the SOP and the team's requirements. The process requires several meetings so that the application made is in accordance with the objective conditions and the flow of submitting claims following predetermined SOPs.
- 3) Testing. The test is carried out by the user or application users to verify the process flow of using the application, and to check whether there are data errors or discrepancies with other stakeholders' requirements.
- 4) Launching. After the application is declared appropriate and ready to use, an official launch is carried out involving all stakeholders. After the launch, the logistics claim process was carried out using this website-based application.

b. Application User View

The following Figure 3 illustrates the user view of a website-based application designed based on the information data requirement of the claims process.

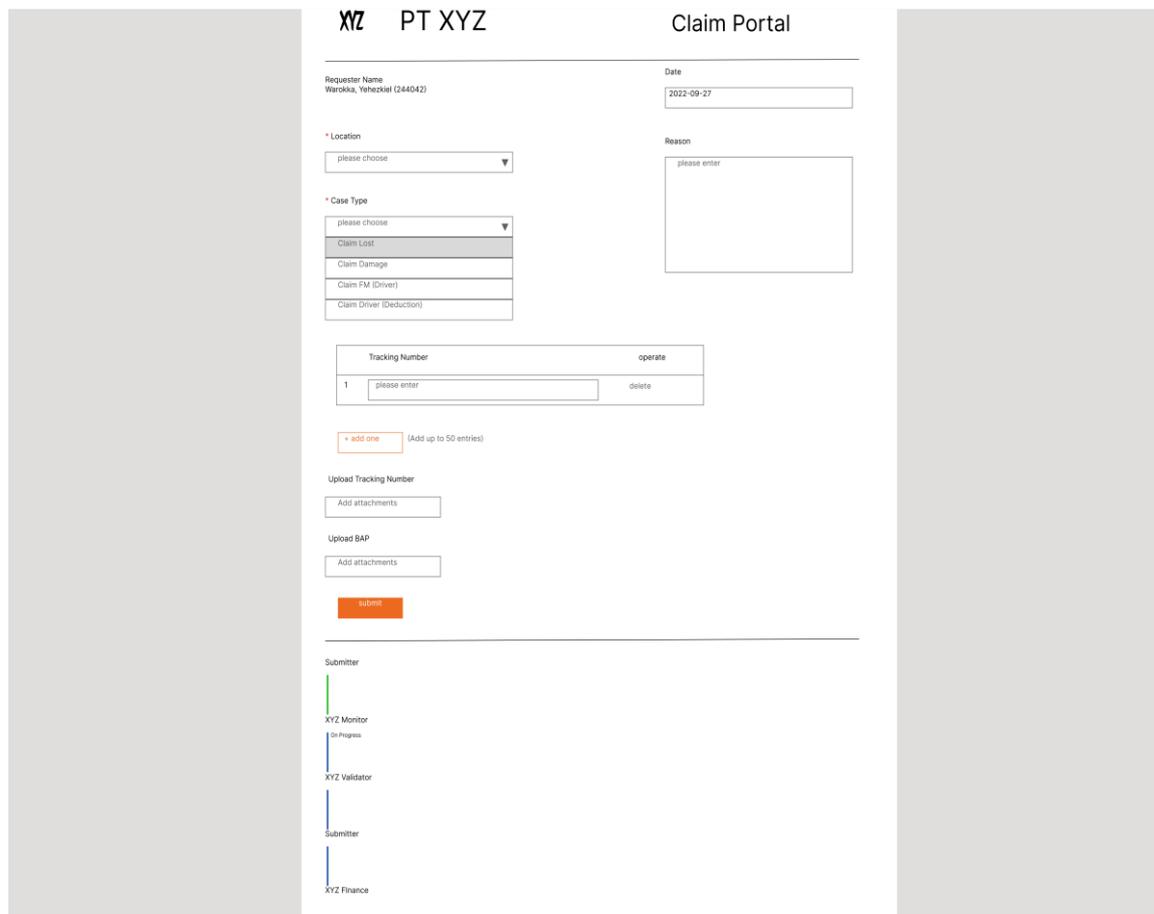


Fig. 3. Application View

c. Stakeholder

The stakeholders involved and their roles in this application are as follows.

Table 2. XYZ Logistics Claim Process Stakeholders

Stakeholder	Role
Submitter	Plays a role in reporting claims, is a representative of each part of the logistics operation, namely first mile, last mile and middle mile (sorting or hub)
MPLog	Designing, making claims submission flow and overseeing the course of the claim system.
Fleet/Vendor	Validating the data of workers who get the claim
Finance	Validating payment data and make automatic payment of workers' salaries.

d. Application Usage Guide

Guidelines for using the application for submitters or users who will report claims can be seen in Figure 5.

- a. In the requestor name section, the Submitter data will automatically be filled in;
- b. In section number 1, the Submitter is asked to choose the location name for the company's logistics facility;
- c. In section 2, the Submitter is asked to choose the type of case that will be claimed;
- d. In section 3, the Submitter fills in the date of the damaged or lost item to be claimed.
- e. In section 4, the Submitter fills in the reasons or describes the case in more detail;
- f. Section 5 contains data tracking number of lost or damaged goods. Submitter can enter data one by one;
- g. If there is a lot to claim, the Submitter can send it in the form of a file with the following format as described in Figure 4.

	A	B	C	D	E
1	ID LOP	Driver Name	Driver Type	Deduction Tracking Number	Nominal
2	12345	budi	FM	LX-1234-6758	1000
3	12345	budi	FM	LX-1234-6759	1000
4	12345	budi	FM	LX-1234-6760	1000
5	12345	budi	FM	LX-1234-6761	1000
6	12345	budi	FM	LX-1234-6762	1000
7	12345	budi	FM	LX-1234-6763	1000
8	12345	budi	FM	LX-1234-6764	1000
9	12345	budi	FM	LX-1234-6765	1000
10	12345	budi	FM	LX-1234-6766	1000

Figure 4. Bulk Reporting Excel Format

- h. In section 6, the submitter can add files supporting the claim in the form of Minutes of Examination.
- i. Section 8 is the stage of monitoring, validation and final payment. Submitters and other stakeholders can see the progress of the claims submitted and can provide notifications to the relevant stakeholders if there is no response within the specified lead time range.

The screenshot shows the 'XYZ PT XYZ Claim Portal' interface. It includes a header with the company name and logo. Below the header, there is a form for submitting a claim. The form contains several sections:

- Requester Information:** 'Requester Name' (Warokka, Yehezkiel (244042)) and 'Date' (2022-09-27).
- Location:** A dropdown menu labeled '* Location' with the text 'please choose'.
- Case Type:** A dropdown menu labeled '* Case Type' with options: 'Claim Lost', 'Claim Damage', 'Claim FM (Driver)', and 'Claim Driver (Deduction)'.
- Reason:** A text input field labeled 'Reason' with the text 'please enter'.
- Tracking Number:** A text input field with '1' and 'please enter', and buttons for 'operate' and 'delete'.
- Upload Tracking Number:** A section with 'Add attachments' and 'Upload BAP' buttons.
- Submit:** A red 'submit' button.
- Progress Bar:** A vertical progress bar on the left side of the form, showing the status of the claim process: 'Submitter', 'XYZ Monitor (On Progress)', 'XYZ Validator', and 'XYZ Finance'.

 Eight yellow callout boxes with numbers 1 through 8 are placed around the form to highlight specific elements:

- 1: Location dropdown
- 2: Case Type dropdown
- 3: Date input
- 4: Reason input
- 5: Tracking Number input and buttons
- 6: Upload Tracking Number and Upload BAP buttons
- 7: Submit button
- 8: Progress bar

Figure 5. Application Usage Guide

d. Control

This phase is to ensure that the improvement process goes according to purpose and is carried out continuously. Therefore, an SOP was made and became one of the references for controlling this claim process. The Monitor team also directly supervised the claim process, both from the reporting format and duration to the final process. Evaluation is carried out if it does not comply with the established standards. Table 3 compares the existing condition of the claim process within the first month since the automation system was launched.

Table 3. Comparison of Existing Conditions and After Improvement

Parameter	Before Application	After Application	Impact
Claim processing lead time	5-7 days	2 days	Reduced lead time to 60%
Working duration	15 hours/week	5 hours/week	Reducing up to 33% workload and more efficient stakeholder work force
Reporting	100% manually recorded	100% recorded by system	Increase data security and reduce the potential for data loss or incomplete

e. Result Discussion

PT XYZ has encountered a serious issue in the claims process that has negatively impacted seller and buyer satisfaction. The Lean Six Sigma Logistics approach with the DMAIC method is utilized to address this problem, focusing on the Define, Analyze, Improve, and Control phases. The Define phase establishes the root issues and company objectives based on field observations and the logistics business process flow. The results of the Define phase reveal that the claims process is being

conducted manually via email, resulting in delays and administrative problems. Key issues include a lack of attention to email notifications, delays in claims data processing, unstructured financial reporting, a lack of Standard Operating Procedures (SOPs), and financial report loss.

Analysis using a Fishbone Diagram tool reveals the primary root problems, namely, a lack of coordination in the claims process, leading to the potential for claims payment failures, incomplete financial reporting, and most notably, delays in stakeholder feedback, extending the claims process lead time. In the Improve phase, alternative solutions are explored, and in this study, the chosen solution is to design a web-based application that streamlines the claims process, financial reporting, payments, and real-time feedback to all stakeholders as the proposed improvement solution.

The Control phase involves creating Standard Operating Procedures (SOPs) that provide detailed guidelines for controlling the claims process. These SOPs include objectives, scope, stakeholder roles, the claims process flowchart, and other important explanations. After the implementation of the proposed solution, the results show a significant improvement, including a reduction in lead time by up to 60%, a 33% reduction in stakeholder workload, and an enhancement in data security and real-time monitoring. Therefore, the DMAIC approach has aided PT XYZ Logistics in identifying, analyzing, and improving issues within the claims process, resulting in significant enhancements in the efficiency and quality of their e-commerce claims process. The web-based solution and implemented SOPs have had a significant positive impact on the company.

5. CONCLUSION

PT XYZ implements a claim system, with the existing condition of the claim process that the company implements, still uses a manual method via email. However, there are many problems found in the claim process implemented by the company, one of which is the long claim process which affects seller satisfaction. Therefore, in this study, researchers analyzed this problem with a lean six sigma logistics approach using the DMAIC method, which focuses on the Define, Analyze, Improve and Control phases. In the Define phase, researchers define PT XYZ's problems, and the goals desired by the company based on field observations and analysis of the company's logistics process flow. Furthermore, in the Analyze Phase, the researcher conducted a study using fishbone diagrams and brainstorming with relevant stakeholders to determine the roots of the problems experienced by PT XYZ.

Furthermore, in the Improve phase, the researcher examines more deeply the opportunities for improvements that can be made, determines solutions and implements solutions designed by researchers. At this stage, the proposed solution is to create a claim automation system using a website-based application to simplify the claim process in data processing and reporting and to shorten time because it can be monitored in real-time. In the last phase of control, to ensure the claim automation process runs continuously, there is a standardized SOP and a guide to the claim process, and there is also a monitoring team that oversees it directly. After implementing a website-based application to automate the XYZ logistics claim process, it can reduce lead time by up to 60% from initial conditions, 33% of stakeholder workload, and improve data security and real-time supervision.

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