THE OPTIMIZATION OF THE SALES ORDER DELIVERY PROCESS: A CASE STUDY OF A TELECOMMUNICATION COMPANY

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ABSTRACT

This research paper aimed to improve the lead time of the sales ordering process and minimize the delivery lead time to distributors. The study employed the DMAIC (Define, Measure, Analyze, Improve, and Control) model as a process improvement methodology. Through observations, interviews, and the application of various improvement tools and techniques, the root causes of delays in the sales ordering and delivery processes were identified. The study used a swim-lane process map to reveal connections among different processes and a fishbone diagram to determine the root causes of the issue, allowing for validation of current process execution. The proposed improvement plan includes several measures such as modifications to the order placement process, real-time payment integration, automated order verification and release, and the adoption of a decentralized distribution strategy. These changes are expected to streamline processes, reduce lead time, and ultimately improve customer satisfaction and overall business performance.

Keywords*: DMAIC, Process, Fishbone Diagram, Improvement Plan*

บทคัดย่อ

งานวิจัยนี้มีวัตถุประสงค์เพื่อปรับปรุงระยะเวลาในกระบวนการสั่งซื้อสินค้าและการจัดส่งสินค้าถึงผู้จัดจำหน่าย การศึกษานี้ใช้แบบจำลอง DMAIC เป็นวิธีการปรับปรุงกระบวนการ สาเหตุหลักของความล่าช้าในกระบวนการสั่งซื้อและการส่งสินค้าถูกระบุผ่านการสังเกต การสัมภาษณ์ และการใช้เครื่องมือและเทคนิคในการปรับปรุง การใช้แผนที่กระบวนการ swim-lane มีจุดมุ่งหมายเพื่อแสดงความสัมพันธ์ระหว่างกระบวนการ ในขณะที่ใช้แผนภูมิก้างปลาเพื่อหาสาเหตุหลักของปัญหาและตรวจสอบการดำเนินการของกระบวนการปัจจุบัน แผนการปรับปรุงที่เสนอมีมาตรการหลายอย่าง รวมถึงการปรับเปลี่ยนกระบวนการสั่งซื้อสินค้า การชำระเงินแบบทันที การตรวจสอบและปล่อยสินค้าโดยอัตโนมัติ และการนำเสนอกลยุทธกระจายสินค้าแบบกระจายอำนาจ ซึ่งคาดว่าการเปลี่ยนแปลงเหล่านี้จะช่วยปรับกระบวนการให้ดีขึ้น ลดระยะเวลา เพิ่มความพึงพอใจของลูกค้าและประสิทธิภาพธุรกิจโดยรวม

คำสำคัญ: DMAIC กระบวนการ แผนภูมิก้างปลา แผนการปรับปรุง

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INTRODUCTION

The pervasive role of communication in our daily lives underscores the essential nature of telecommunication services, which encompass both voice and data functionalities. Among these services, the efficient delivery of recharge cards to customers is a critical business imperative, ensuring uninterrupted communication. This study focuses on optimizing the sales order delivery process for Galaxy Telecom (GT), a prominent telecommunications entity in Myanmar. GT provides data and voice services nationwide and sells recharge PINs to distributors in both physical cards and E-PINs. To prevent fraud, GT requires advance payment via banks. The sales order process for physical recharge cards involves five parties and three systems, and it's monitored in two parts. Process (a) aims to be completed within 240 minutes, but 40% of orders exceed this timeline. Process (b) targets a delivery lead time of 1 to 2 days, but 10% of distributors (customers) receive orders after 3 days.

The objectives of this research were as follows:
1. Optimize the lead time of the Sales Ordering Process.
2. Reduce the delivery lead time to Distributors.

This research covers only the processes from customer orders for recharge cards to warehouse handover of the delivery order to the courier, and the delivery lead time to the southern regions of Myanmar, where road restrictions and distances to destinations can be problematic. Once the causes of process delays have been identified, the proposed model will be implemented over a 3-month period between June and August 2023, with a project assessment to follow in September.

REVIEW OF RELATED LITERATURE

Enterprise Resource Planning

Enterprise Resource Planning (ERP) is a comprehensive software application used by organizations to efficiently manage a wide range of business operations, including inventory management, financial management, procurement, human resource administration, and customer relationship management. These intricate and integrated ERP system software packages are employed by successful businesses worldwide (Koch, 1996). The term "ERP" was coined by Gartner in 1990, representing a modern iteration of material requirements planning (MRP) systems (Nazemi, Saeed, & Amidi, 2012). ERP's primary objective is to unify various functions and departments within an organization, facilitating seamless information flow and communication across the enterprise. Implementing an ERP system enables businesses to streamline operations, reduce costs, increase productivity, improve decision-making capabilities, and gain a competitive advantage in the market.

Lean Concepts

The theories of Lean and Six Sigma are both recognized methods of business improvement. Both Lean and Six Sigma have gained popularity and are widely accepted in the industry, as stated by Nonthaleerak and Hendry (2006). Lean focuses on eliminating non-value steps of the process, while Six Sigma applies statistical methods to minimize variations. Goldsby and Martichenko (2005) assert that Lean concepts offer two-fold benefits: the removal of waste and an increase in the speed and flow of goods or services, in which the author found most relevant to the research

objectives. Furthermore, Lean theory identifies excess inventory, transportation waste, space and facility waste, packaging waste, lead time waste, administrative waste, and knowledge waste as the most common forms of waste.

Six Sigma

Six Sigma is a widely accepted methodology for improving business processes that results in superior performance and enhanced profitability. As per Goldsby and Martichenko (2005), Six Sigma is a problem-solving methodology that utilizes process control tools such as the DMAIC (Define, Measure, Analyze, Improve, and Control) approach. DMAIC model follows a systematic approach to address the challenges faced by different organizations, aiming to understand and enhance the processes.

DMAIC Model

DMAIC is a data-driven quality strategy used to improve processes, as described by Borror (2009). It consists of five phases: Define, Measure, Analyze, Improve, and Control.

Define: The DEFINE phase serves as the initial stage of improvement, where the project's purpose and scope are clarified (Wiesenfelder, 2011). Tools such as flow charts and process maps are utilized to comprehensively characterize the process to be enhanced, recognizing clientele requirements and internal challenges (Berardinelli, 2012). A Project Charter is created, providing an overview of the process and outlining customer needs. The completion of this phase leads to a better understanding of project necessity and problem causality, serving as the basis for the subsequent MEASURE phase (Arumugam, 2012).

Measure: In the MEASURE phase, data is collected and analyzed to describe the problem and current process performance (McDonough, 2011). This phase aims to gather a comprehensive amount of information about the current process and identify potential causes of the problem. It involves data collection, analysis, system validation, root cause identification, and measurement. Initial hypotheses regarding the causes of the issue are generated, and direct activity measurement is crucial for data gathering (Arumugam, 2012). The data collected in this phase sets the stage for the subsequent ANALYZE phase (The Juran Institute, 2002).

Analyze: The ANALYZE phase, as the third step of the DMAIC model, focuses on pinpointing potential root causes and verifying them through data analysis (Wiesenfelder, 2011). Data-driven evaluation of process performance is essential to establish a baseline for process performance (Bertolaccini, Viti, & Terzi, 2015). Various tools, including brainstorming and cause-and-effect diagrams, are employed to analyze the data and identify cause-and-effect relationships (Rever, 2004). The insights gained from this phase inform the IMPROVE phase, where alterations to enhance process performance are formulated.

Improve: During the IMPROVE phase, potential solutions are identified and assessed, leading to process refinement (Berardinelli, 2012). Ideas for addressing issues are developed, and the most promising ones undergo limited-scale testing. This phase focuses on monitoring and assessing process performance, ensuring that improvements are sustained, and addressing any negative effects. A timeline comparing the previous and current states of the process is used to demonstrate improvements, ultimately leading to the CONTROL phase (Rever, 2004).

Control: The CONTROL phase ensures the sustainability of improvements achieved in previous phases (Rever, 2004). It involves standardizing improvements, documenting the new process, establishing performance oversight frameworks, and summarizing the work done (Vendrame Takao, Woldt, & da Silva, 2017). Ongoing monitoring is crucial to maintaining improved outcomes (Niemeijer et al., 2013). The DMAIC framework is used to define process issues, measure current performance, analyze root causes, confirm improvements, and implement changes for sustainability (Vendrame Takao et al., 2017).

Flow Chart (Swim Lane Process Map)

Flowcharts, as graphical representations of processes, offer a versatile and adaptable tool for process analysis, communication, documentation, and planning. They aid in identifying problematic areas and facilitating corrective actions (Shrigyan, 2017). Flowcharts visually represent workflows and contribute to value chain mapping and analysis (Schonberger & Knod, 1996).

Cause and Effect Diagram (Fishbone Diagram)

The cause and effect diagram, also known as a fishbone or Ishikawa diagram, is a structured visual tool used to identify and organize potential factors or root causes contributing to a problem's occurrence (Tague, 2005). Its fishbone-like structure includes branches representing categories like people, process, equipment, materials, environment, and management, with each branch further breaking down into sub-causes. By visually mapping out these causes and sub-causes, the fishbone diagram offers a comprehensive overview of factors influencing a problem. This tool aims to pinpoint the underlying cause and establish preventive measures to prevent recurring issues. It aids in brainstorming sessions where participants identify and prioritize root causes, based on collected data, to engage in problem-solving effectively. The fishbone diagram serves as a valuable tool for understanding, analyzing, and addressing problems within various contexts, including the sales ordering and delivery process.

Brainstorming

Brainstorming is a widely employed problem-solving technique, beneficial for rapidly generating a multitude of ideas to address issues or identify potential causes of problems. Often used in conjunction with cause-and-effect diagrams, brainstorming encourages collective idea generation, leading to enhanced problem-solving solutions (Sheldon, 2004). The process involves rounds of idea contributions by group members, fostering creativity and innovation. All generated ideas are recorded for subsequent analysis, helping identify problem areas, opportunities for improvement, and action plan development. However, successful brainstorming sessions require a shared understanding of the problem's significance, emphasizing its importance throughout the process. Brainstorming is a valuable technique for generating solutions and insights within diverse problem-solving contexts, including the sales ordering and delivery process.

Overall, these phases and tools are essential components of Lean Six Sigma, contributing to a systematic and data-driven approach for process improvement.

RESEARCH METHODOLOGY

The main objective of this research is to investigate the issue of extended lead times for delivering sales orders at Galaxy Telecom Company. The aim is to enhance the efficiency of their Sales

Ordering Process and reduce the time it takes to deliver orders to Distributors (Customers). The researcher introduces the methods and approaches used to pinpoint and address the underlying causes of this problem. This section will utilize the DMAIC model, which played a pivotal role in the methodology used to streamline the sales order delivery process.

Defining the problem by Process Map (swim lane)

This phase involves defining and describing the problems under investigation, with data collection encompassing two main types. The first type involves detailed observations of the physical recharge card ordering process, including the involvement of five parties and three systems. The second type focuses on processes, procedures, and lead times in the sales order delivery process from the 3PL warehouse to distributors, considering factors like 3PL procedures, courier operations, transportation methods, and road conditions. Interviews with relevant personnel identified specific delays occurring in processes like bank payments, invoice validation, and SAP order release during peak hours. Additionally, interviews with the 3PL Warehouse team and couriers revealed factors causing delays in cargo movement, order transmission, and cargo collection. Process Map in Figure1 and 2 illustrate the precise points of delay in these processes.

Figure 1: Identifying Delay Transitions in the Sales Ordering Process

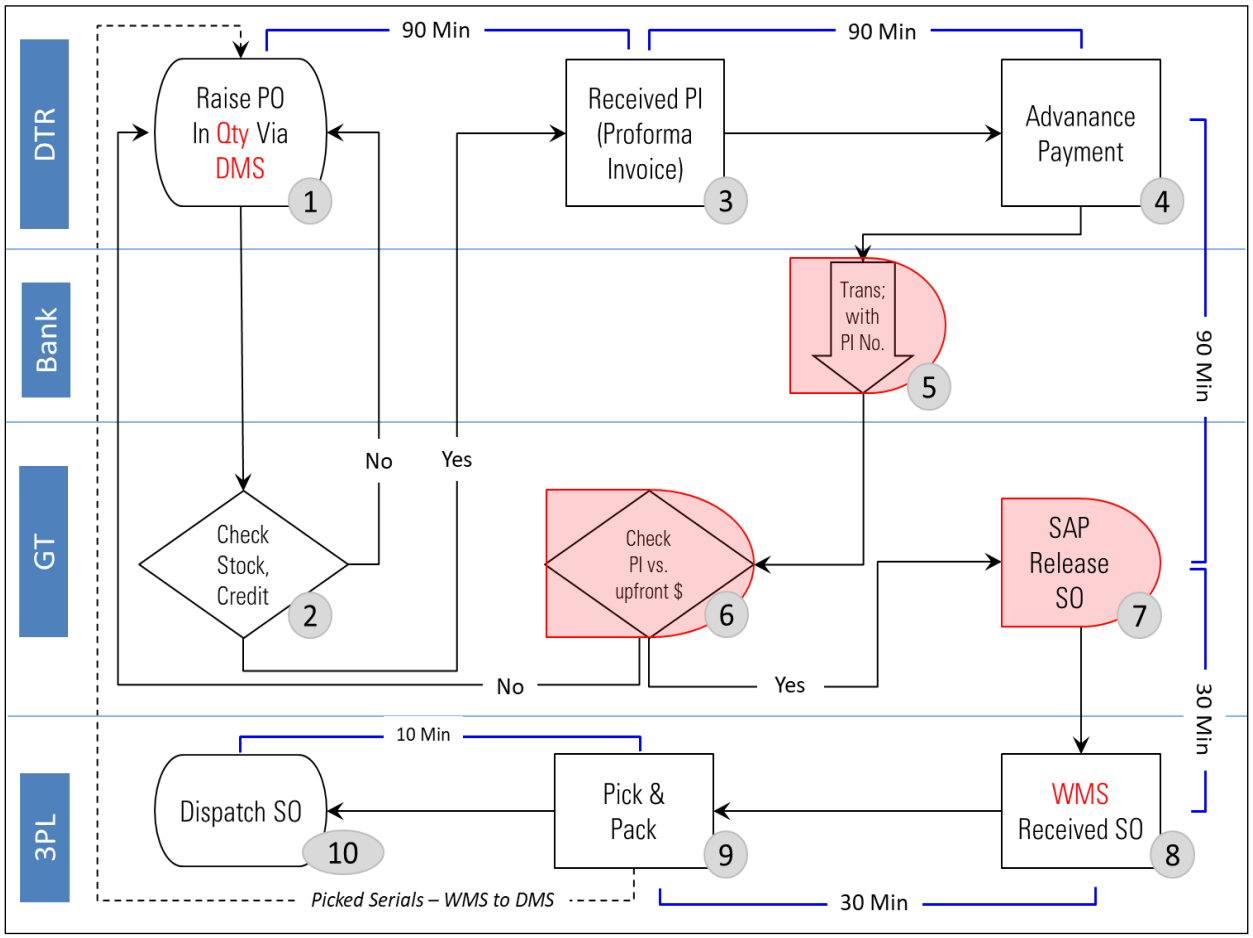
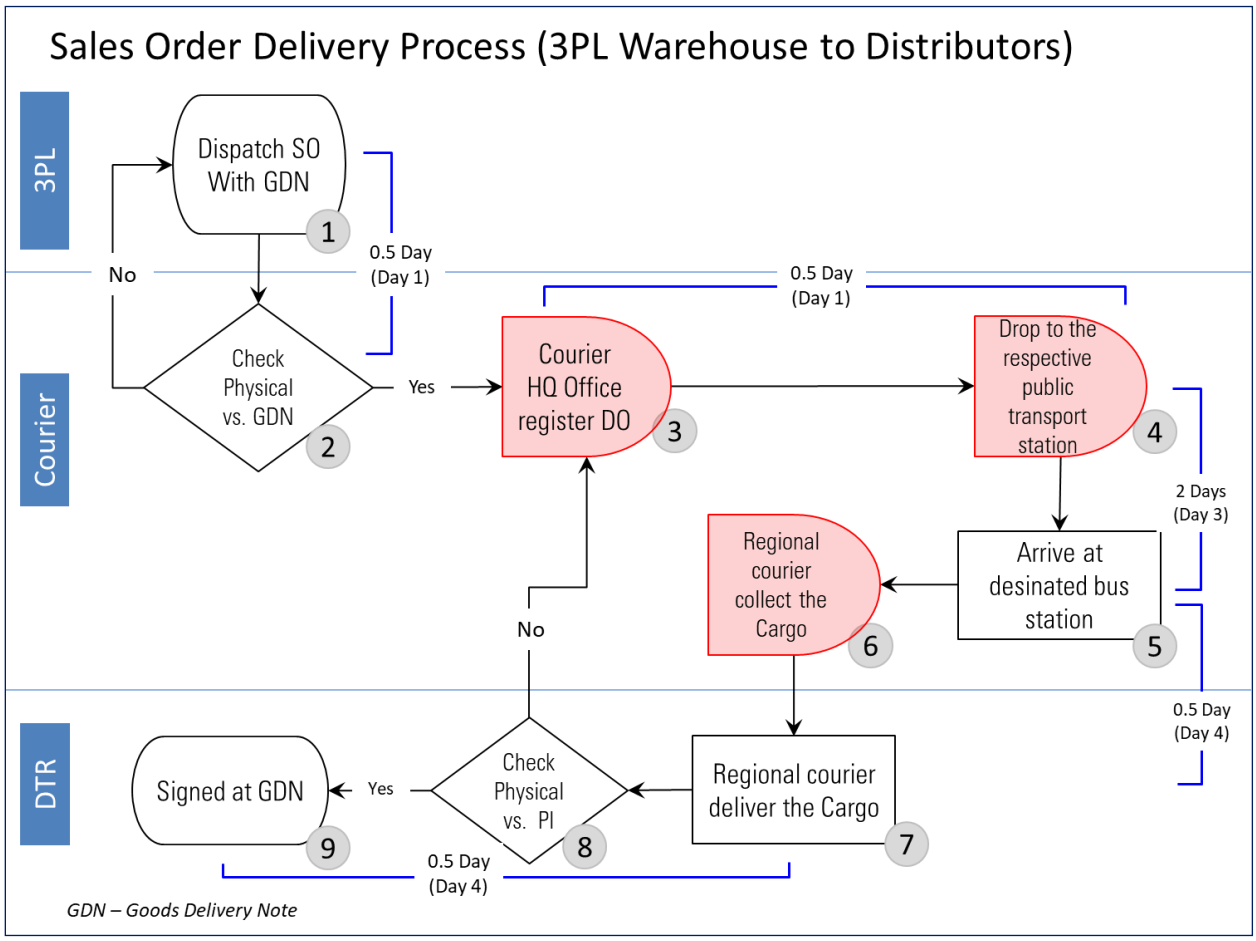


Figure 2: Sales Order Delivery Process



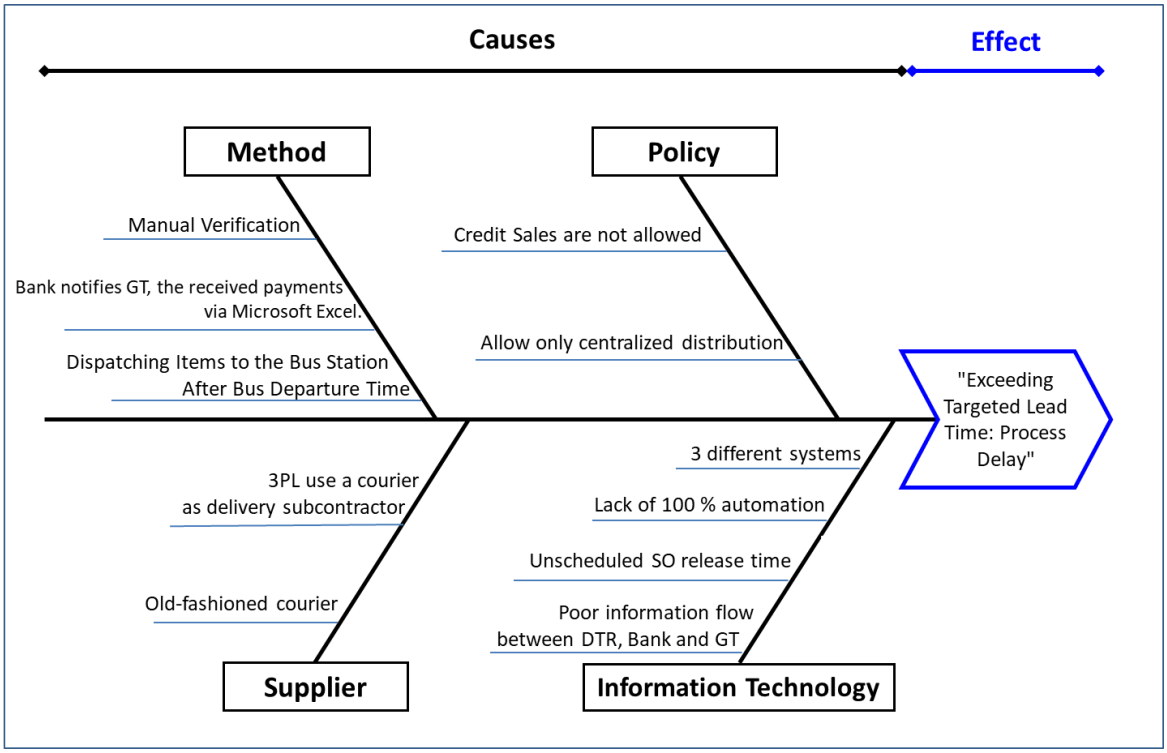
Cause and Effect Diagram

In the Analyze Phase of this research, the primary goal was to identify and analyze the underlying causes of delays in processing and delivering sales orders to the southern Myanmar region. This analysis drew upon measurement data collected by the researcher and feedback from employees. To delve deeper into the issue, a brainstorming session involving cross-functional personnel from Sales, IT, Finance, and Supply Chain departments was conducted. This collaborative effort aimed to assess every aspect of the sales ordering and delivery processes, resulting in the identification and categorization of potential causes for extended lead times. Subsequently, a cause-and-effect diagram, illustrated in Figure 3, was developed to pinpoint the primary causes of these delays, with a focus on four key categories: Policy, Method, Technology, and Supplier. Through ongoing analysis and branching, this process aimed to uncover all root causes contributing to excessive lead times.

PRESENTATION AND CRITICAL DISCUSSION OF RESULTS

The improve phase aims to propose improvements to the sales ordering and delivery process of a telecommunications company, Galaxy Telecom. The "Improve" phase of the study focuses on developing effective methods and plans by modifying systems, policies, and addressing the root causes identified in the earlier "Analyze" phase.

Figure 3: Cause and Effect Diagram of Sales Ordering and Delivery Process



This paper presents an action plan that encompasses four key factors and variables (Method, Policy, Supplier, and Technology) contributing to in-store delivery delays. The implementation of these improvements required strong commitment from GT's management and involved brainstorming sessions with internal stakeholders and suppliers to identify optimal solutions. The paper concludes with recommendations of improvement, outlined in Figure 4 and 5.

Sustaining Improvements and Continuous Incremental Enhancement: To ensure the long-term success and revenue growth of Galaxy Telecom, it is crucial to sustain the improvements achieved through the improvement action plan. The author emphasizes the importance of implementing continuous incremental improvements in both the sales ordering process and delivery process, especially in remote areas. By maintaining control over and continuously enhancing the performance of these processes, Galaxy Telecom can enhance its competitive position and overall business performance.

Proposed Lead Time Improvement

The proposed plans reveal a significant reduction in processing lead time from 340 minutes to 170 minutes for the sales ordering process and from 4 days to 2 days for delivery to the southern Myanmar DTR.

Sales Ordering Process: Upon implementing the improvement action plan, the time required in the sales ordering process can be reduced from 340 minutes to 170 minutes, starting from the point of DTR placing an order to 3PL dispatching the order to the courier. This optimization of processing lead time is expected to have a positive impact on customer satisfaction.

Figure 4: Proposed Process Flow for Sales Ordering Improvement

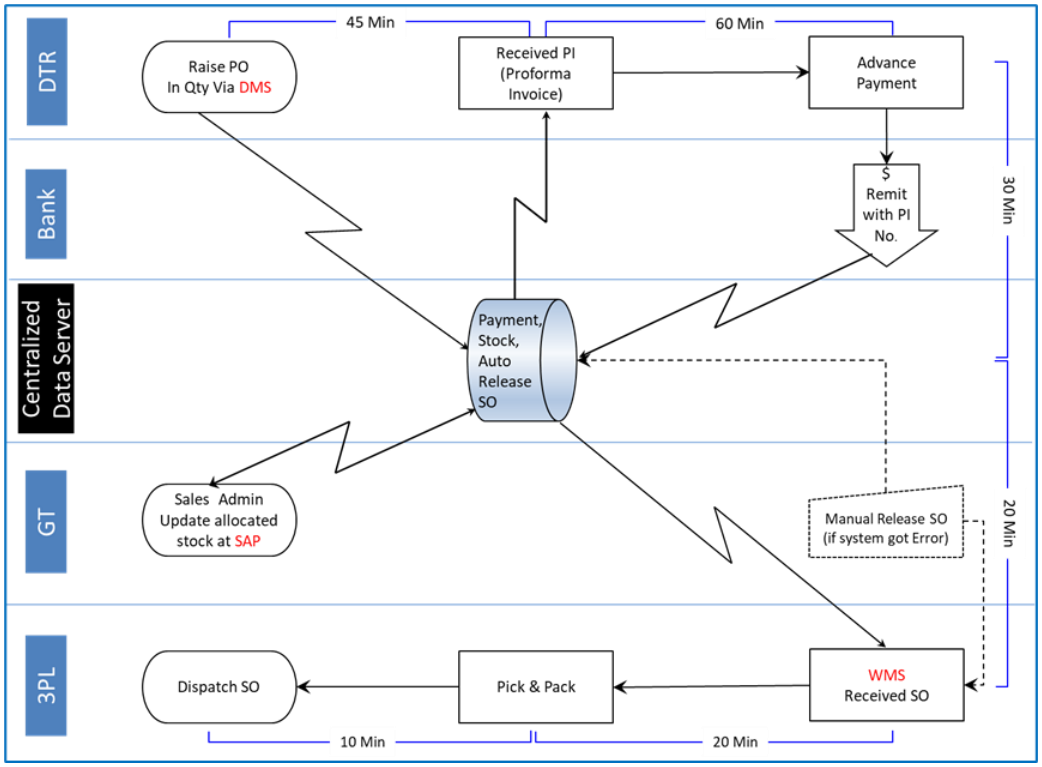
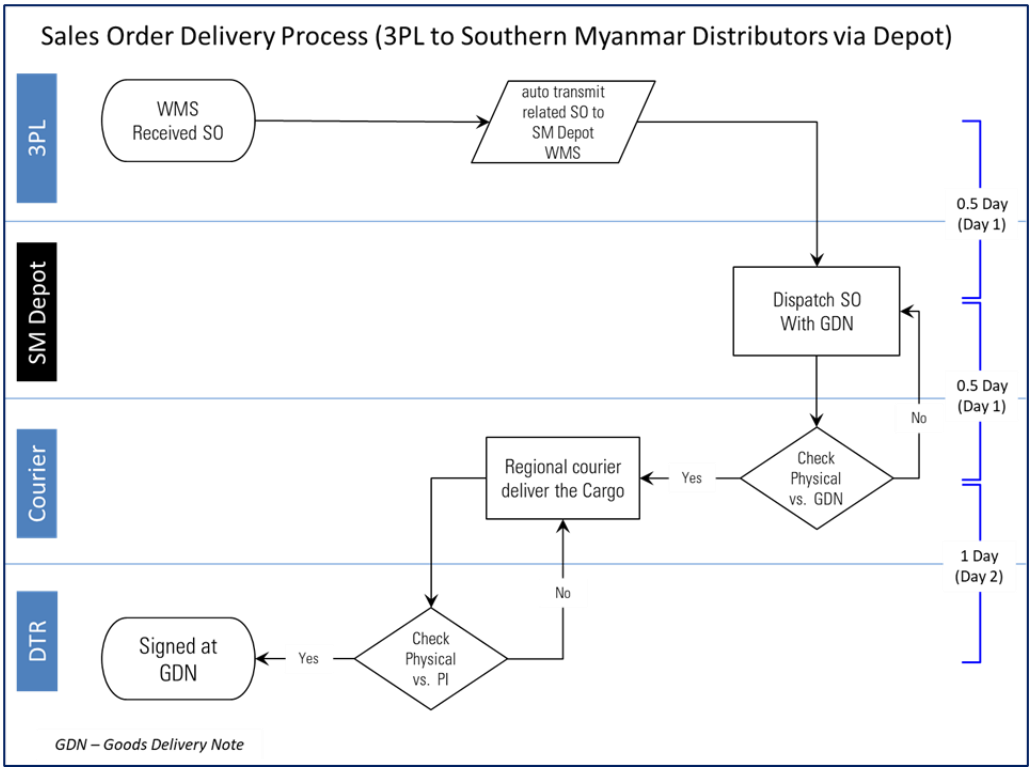


Figure 5: Proposed Process Flow for Sales Order Delivery Improvement



Sales Ordering Process: Upon implementing the improvement action plan, the time required in the sales ordering process can be reduced from 340 minutes to 170 minutes, starting from the point of DTR placing an order to 3PL dispatching the order to the courier. This optimization of processing lead time is expected to have a positive impact on customer satisfaction. Table 1 presents a comparison of lead times for each step of the "Current" sales ordering process with the expected times after the "Proposed" improvement plan is implemented.

Table 1: Comparison of Lead Times for Each Step of the Sales Ordering Process

Sr.	Activities (Process)	Actioned by (Process owner)	Lead time - Current (Minute)	Lead time - Proposed (Minute)	Remark Proposed
1	Raise Purchase Order in DMS	DTR	30	30	
2	Check DTR's stock balance, payment	GT - Sales Admin	30	0	Check via phone
3	Received Proforma Invoice from GT	DTR	30	15	
4	Arrange payment via Bank as per PI	DTR	30	30	
5	Transfer cash and sent list to GT	Bank	60	30	live notification
6	Check PI vs payment amount	GT - Sales Admin	30	20	Auto Generate
7	Release DTR order as SO in SAP	GT - Finance	60		
8	WMS received SO	3PL	30	15	
9	Pick & Pack	3PL	30	20	
10	Dispatch SO to Courier	3PL	10	10	
Total Lead Time (Minute)			**340**	**170**	

Delivery Process to Southern Myanmar DTR: Similarly, the proposed improvement plan can significantly reduce the lead time from 4 days to 2 days for delivery to the southern Myanmar DTR. This reduction further contributes to improving customer satisfaction. Table 2 outlines the estimated times for each step of the "Current" delivery process and the expected times after implementing the "Proposed" improvement plan.

Sustaining Improvements and Continuous Incremental Enhancement: To ensure the long-term success and revenue growth of Galaxy Telecom, it is crucial to sustain the improvements achieved through the improvement action plan. The author emphasizes the importance of implementing continuous incremental improvements in both the sales ordering process and delivery process, especially in remote areas. By maintaining control over and continuously enhancing the performance of these processes, Galaxy Telecom can enhance its competitive position and overall business performance.

Control and Maintain the Improve State

The Control phase, which is the final phase of the DMAIC model, focuses on establishing sustainable improvements. The Control phase incorporates methods that not only maintain the system improvements but also ensure their longevity. In order to secure long-term success and

revenue growth for Galaxy Telecom, the sales ordering and sales order delivery process underwent improvements. The author emphasizes the importance of implementing continuous incremental improvements in both the sales ordering process and delivery process, including remote areas. By maintaining control over and continuously enhancing the performance of these processes, Galaxy Telecom can enhance its competitive position and overall business performance.

Table 2: Comparison of Lead Times for Each Step of the Sales Order Delivery Process

Sr.	Activities (Process)	Actioned by (Process owner)	Lead time - Current (Day)	Lead time - Proposed (Day)	Day Proposed	Remark
1	Dispatch SO with GDN	Regional 3PL	0.5	0.5	Day 1	Real Time
2	Received, check Physical vs. GDN and Pack	Regional Courier				
3	Move the dispatched cargo to HQ and register as DO	Courier	0.5	~		
4	Sent to the respective public transport station	Courier				
5	Bus Departure	Public Transport	2	~		
6	Arrive at designated bus station	Bus Station				
7	Collect the Cargo from Bus Station	Regional Courier	0.5	~		
8	Regional office check and sort the cargo for delivery routing	Regional Courier		0.5		
9	Deliver the SO	Regional Courier		0.5	Day 2	Arrive next day to other SM cities
10	Check received good, DO and PI	DTR	0.5	0.5		
11	Signed at GDN	DTR				
Total Lead Time (Day)			**4**	**2**		

To ensure the improvement action plan maintains the improved state and provides direction for future improvement, control measures needed to be implemented. As part of these control measures, the researcher proposed revising the current Key Performance Indicators (KPIs) of related departments and the Service Level Agreement of the third-party logistics (3PL) provider. This would ensure sustained improvement efforts and enable monitoring of operations across all areas of the sales order delivery process. The recommended KPIs would align with the overall company KPIs, allowing all departmental KPIs to be achieved and directing all departments towards the company's core objectives.

Table 3 outlines the proposed key performance indicators (KPIs) for the relevant departments, while Table 4 suggests service level agreements (SLAs) for third-party logistics (3PL). Additionally, the author recommended several activities for Galaxy Telecom to maintain long-term success and growth. These activities include monthly reviews of the modified process compared to the actual flow, monthly sales order delivery performance reviews, quarterly continual improvement meetings with related departments and the 3PL provider, as well as quarterly audits and monthly inventory checks at the depot.

Table 3: Proposed KPI for the Related Departments

Department	KPI	Definition (Current)	Definition (Proposed)	Proposed Measure
SAP Support Team	On time SO Release	80% of DTR's sales order before cut-off time (3PM) are released	98% of DTR's sales orders are released within same day	number of released SO / number of total SO (daily basis)
	On time SO Release	Bug / Error are fixed within 8 working hours	Bug / Error are fixed within 3 working hours	Error start time vs. Fixed Time (Refer to Error Log)
Sales Admin	Accurate Stock	~	99.5% of allocated stock for DTR are uploaded in SAP at 5 PM	number of uploaded transitions / Total Active DTR (Monthly)
	Accurate Stock	~	Accurate uploading product Code and quantity (< 4 Customer Complaints)	number of customer complaint of raising SO in DMS (Monthly)

Table 4: Proposed SLA for 3PL

Department	KPI	Definition (Current)	Definition (Proposed)	Proposed Measure
3PL	Sufficient Stock	~	2-week standby stock replenishment to depot	Weekly Average SM Region sales quantity vs. inventory balance of SM Depot (Bimonthly)
	Accurate Delivery	Actuate Dispatch - 98 % of SO	dispatch error - less than 1%	Dispatch Error SO Qty/ Dispatch SO Quantity (Monthly)
		Actuate Delivery - 98% of SO	99 % Accurate Delivery	Wrong Delivery SO / Total Delivery SO (Monthly)

CONCLUSIONS AND RECOMMENDATIONS

The research paper concentrates on enhancing the sales order delivery process at Galaxy Telecom to boost customer satisfaction, employing the DMAIC model as a process improvement framework. It investigates several key issues, including significant delays in order processing, data congestion during peak hours, and notable delivery delays to remote regions. The "Define Phase" explores the physical recharge card ordering and delivery processes, identifying specific delays in payment transitions, invoice validation, and manual order releases. The "Measure Phase" assesses lead time performance, revealing extended processing and delivery times. The "Analyze Phase" identifies factors contributing to delays through brainstorming and cause-and-effect analysis.

Finally, the "Improve and Control" phases propose actionable recommendations to reduce lead times and enhance customer satisfaction.

In conclusion, the research underscores the importance of optimizing the sales order delivery process to improve customer satisfaction and generate new sales orders. The DMAIC model and various improvement tools were effectively employed to identify root causes and develop a practical improvement plan. The proposed modifications aim to streamline processes, reduce lead times, and enhance overall operational efficiency. Sustaining these improvements through control measures and continuous improvement efforts is crucial for long-term success.

The managerial implications of the findings highlight the need for Galaxy Telecom and similar organizations to prioritize the implementation of the proposed improvement plan, collaborate with stakeholders, and establish control measures. Managers should focus on revising KPIs and SLAs, conducting regular evaluations, and maintaining a commitment to continuous improvement to ensure the effectiveness of optimized processes and support business growth.

However, it's important to acknowledge limitations in this research, such as the industry-specific focus on telecommunications and the potential need for customization in different organizational contexts. Additionally, potential barriers and challenges during the implementation of the improvement plan have not been addressed. Future research should explore these aspects and consider the broader applicability of the proposed strategies across various industries and organizational settings.

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