Addis Ababa University
Addis Ababa Institute of Technology
School of Mechanical and Industrial Engineering

Improving Spare Parts Inventory Management System to Enhance Customer Satisfaction in My Wish Enterprise PLC

A MASTER'S THESIS SUBMITTED TO SCHOOL OF MECHANICAL AND INDUSTRIAL ENGINEERING OF ADDIS ABABA UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR DEGREE OF MASTER OF SCIENCE IN INDUSTRIAL ENGINEERING

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Improving Spare Parts Inventory Management System to Enhance Customer Satisfaction in My Wish Enterprise PLC

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Approval Statement

This research proposal, titled “Improving Spare Parts Inventory Management System to Enhance Customer Satisfaction in My Wish Enterprise,” has been prepared and submitted to Addis Ababa University, School of Graduate Studies, for assessment under my supervision in accordance with the university's academic requirements.

APPROVED BY BOARD OF EXAMINERS

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Declaration

I, Eyerusalem Mulugeta, hereby declare that this thesis entitled "Improving Spare Parts Inventory Management System to Enhance Customer Satisfaction in My Wish Enterprise Plc." is my original work and has not been presented for a degree in any other university or institution. All sources of material used for this thesis have been duly acknowledged and referenced. This work is submitted in partial fulfillment of the requirements for the Master of Science degree in Mechanical and Industrial Engineering at Addis Ababa University, Addis Ababa Institute of Technology, School of Mechanical and Industrial Engineering. This thesis is the result of my own investigation and analysis. Any views expressed in this study are mine and do not necessarily represent the views of the institution.

Name: Eyerusalem Mulugeta

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Date: _________________________

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Abstract

The primary objective of this study was to assess and improve the spare parts inventory management system to enhance customer satisfaction at My Wish Enterprise Plc. The research addressed persistent challenges in aligning inventory performance with customer expectations, particularly in demand forecasting, stock level monitoring, supply chain coordination, and inventory accuracy. Inefficient inventory systems often result in service delays, stock-outs, and reduced customer satisfaction—issues observed within the company. A quantitative design employed a structured questionnaire, administered to 20 employees via purposive sampling for primary data collection. Data analysis utilized SPSS for descriptive statistics, correlation, and multiple linear regression techniques to examine relationships between variables. Complementary time series analysis of historical spare parts sales in STATA was also conducted to specifically assess the operational aspects and challenges of demand forecasting accuracy for these items. Findings from the employee survey revealed that all four inventory practices positively and statistically significantly affect customer satisfaction ($p<0.05$). The regression model demonstrated strong explanatory power, with an R^2 of 0.798, indicating that nearly 80% of the variation in customer satisfaction is explained by the four predictor variables. However, the ARIMA (0, 1, and 1) time series analysis on spare parts sales highlighted inherent challenges in forecasting intermittent demand, evidenced by a Mean Absolute Error (MAE) of 64,112.96 and a Root Mean Squared Error (RMSE) of 179,628.26. This indicated the model's struggle to accurately predict large, sporadic sales spikes, underscoring the operational complexity of achieving high forecasting accuracy for such items. The study concludes that continuous improvements in demand forecasting, supply chain coordination, and inventory accuracy are essential for achieving higher customer satisfaction. Recommendations include adopting more advanced and data-driven forecasting models specifically suited for intermittent demand (e.g., specialized time series and AI/ML approaches), enhancing real-time supply chain coordination, and investing in digital inventory tracking systems. These measures are expected to streamline inventory operations, boost service responsiveness, and meet customer expectations more effectively.

Keywords: Inventory Management, Customer Satisfaction, Demand Forecasting, Supply Chain Coordination, Inventory Accuracy, My Wish Enterprise, and Intermittent Demand Forecasting

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CHAPTER ONE

1. INTRODUCTION

Effective inventory management plays a crucial role in ensuring operational efficiency, cost reduction, and customer satisfaction in industries that depend on the timely availability of spare parts. Spare parts inventory management involves maintaining the right balance between stock availability and operational requirements to prevent disruptions in service and production (Kumar & Arora, 2021). Inadequate management of spare parts can result in frequent stockouts, excessive inventory holding costs, and diminished customer satisfaction. Over the years, advancements in inventory management systems and forecasting techniques have been pivotal in addressing these challenges. However, despite technological progress, many firms continue to struggle with inventory inaccuracies, leading to inefficiencies in service delivery and unmet customer expectations (Amosu et al., 2024).

My Wish Enterprise, a leading importer and distributor of construction, mining, and agricultural machinery in Ethiopia, faces persistent challenges in its spare parts inventory management system. Established in 2006, the company has grown significantly by offering a wide range of products, including heavy and light machinery, high-quality lubricants, and batteries. Although the organization has achieved remarkable growth, maintaining an optimal inventory system remains a critical concern. The current system's limitations, including inconsistent demand forecasting and inadequate supply chain coordination, often result in either stock outs or excess inventory, both of which negatively impact customer satisfaction.

Given the strategic importance of inventory management in enhancing operational efficiency and customer service, this study seeks to explore the challenges faced by My Wish Enterprise and propose actionable solutions. By employing a quantitative approach, the research was examining the extent to which inventory management practices influence customer satisfaction. Moreover, insights derived from this study were contributed to the growing body of knowledge on inventory management strategies in the Ethiopian context. Recent studies emphasize that integrating data-driven tools and modern inventory techniques can lead to significant improvements in both inventory accuracy and service levels (Ravichandran & Ahmed, 2022). Therefore, understanding the current gaps and implementing robust solutions was vital in driving operational excellence and improving customer loyalty at My Wish Enterprise.

1.1. Background of the Study

In today's dynamic and competitive business environment, the efficiency of spare parts inventory management is a critical factor influencing customer satisfaction, operational efficiency, and overall organizational success. Spare parts inventory management involves planning, procurement, and controlling spare parts to ensure they are available when needed while minimizing costs associated with overstocking or stock outs. Effective management in this domain is especially vital for enterprises that operate in industries where equipment reliability and uninterrupted operations are paramount, such as manufacturing, construction, and automotive sectors (Christopher, 2016).

Customer satisfaction is closely linked to the timely availability of spare parts, as delays in providing necessary parts can lead to extended equipment downtime, operational disruptions, and financial losses. Studies highlight that poor inventory management systems often result in challenges such as stock outs, obsolete inventory, and increased lead times, all of which contribute to customer dissatisfaction and reduced competitiveness (Chopra & Meindl, 2019). For instance, Li et al. (2021) emphasize that a lack of accurate demand forecasting and real-time inventory tracking leads to inefficiencies that ripple across the supply chain, affecting service delivery and customer trust.

At My Wish Enterprise, spare parts inventory directly impacts its ability to deliver quality services to its customers. Despite its significant role in maintaining customer satisfaction, My Wish Enterprise faces persistent challenges in its spare parts inventory management system, including inaccurate demand predictions, insufficient supply chain coordination, and high carrying costs. These challenges are not unique; similar issues are prevalent in many organizations operating in high-demand, equipment-intensive industries (Jaber & Goyal, 2018).

Technological advancements in inventory management, such as automated replenishment systems, data-driven demand forecasting, and integration of enterprise resource planning (ERP) systems, offer substantial opportunities to optimize spare parts management. Organizations adopting such strategies have reported significant reductions in operational costs and improvements in service delivery, thereby enhancing customer satisfaction and loyalty (Gunasekaran et al., 2017). For example, the integration of predictive analytics and digital supply chains has enabled firms to forecast demand accurately, prevent stockouts, and improve order fulfillment rates (Kamble et al., 2019).

However, the successful implementation of these strategies requires a comprehensive understanding of the current inventory management practices and the underlying issues affecting performance. My Wish Enterprise's efforts to improve its spare parts inventory system present a unique opportunity to address these challenges and establish a robust framework for achieving higher levels of customer satisfaction. This research, therefore, aims to assess the existing inventory management system at My Wish Enterprise, identify key gaps and inefficiencies, and propose evidence-based solutions to enhance inventory performance and customer satisfaction.

By bridging the gap between theoretical insights and practical applications, this study contributes to the growing body of knowledge on supply chain and inventory management. Additionally, it provides actionable recommendations for My Wish Enterprise to strengthen its spare parts management processes and align its operations with customer expectations in an increasingly competitive market.

1.2 Statement of the Problem

Spare parts inventory management is a critical aspect of operational efficiency in industries that rely on machinery and equipment for delivering products and services. Ineffective spare parts management can lead to frequent stock outs, excessive inventory carrying costs, and disruptions in service delivery, ultimately affecting customer satisfaction and organizational competitiveness (Li et al., 2021). My Wish Enterprise, a prominent organization in the machinery sales and service sector, faces persistent challenges in this domain, including inaccurate demand predictions, insufficient supply chain coordination, and high inventory holding costs. These issues have resulted in delays in fulfilling customer requirements, increased operational expenses, and diminished trust and loyalty among customers.

Inaccurate demand predictions lead to overstocking of less-demanded parts while critical parts are often unavailable when required. This mismatch exacerbates the financial burden on the company by increasing carrying costs for slow-moving items and causing revenue losses due to service disruptions. Insufficient coordination across the supply chain further hampers the timely procurement and delivery of spare parts, creating bottlenecks that extend lead times. Moreover, the high costs associated with maintaining a large inventory of spare parts significantly impact the company's financial health, limiting its ability to invest in other critical areas of operation. These challenges underscore the urgent need for a systematic approach to enhance the spare parts inventory management system at My Wish Enterprise.

Previous studies have explored the impact of inventory management on operational efficiency and customer satisfaction. Chopra and Meindl (2019) emphasized that organizations with streamlined inventory systems are better positioned to meet customer demands promptly, reducing downtime and improving service quality. Similarly, Kamble et al. (2019) highlighted the role of predictive analytics in optimizing inventory levels and minimizing waste. However, these studies primarily focus on the adoption of advanced technologies in large-scale enterprises, often neglecting the unique challenges faced by mid-sized companies such as My Wish Enterprise, which operate in resource-constrained environments. Furthermore, while significant progress has been made in understanding inventory management's impact on supply chain performance, there remains a gap in addressing the specific interplay between demand forecasting, supply chain coordination, and cost optimization in spare parts inventory systems.

In the context of My Wish Enterprise, the problem is particularly acute due to the lack of an integrated inventory management framework that aligns with the company's operational goals and customer needs. Despite efforts to improve inventory practices, critical gaps remain in leveraging data-driven solutions, enhancing supplier coordination, and managing inventory costs effectively. Addressing these issues requires a comprehensive investigation into the company's current inventory management practices and the development of tailored strategies to overcome these challenges.

The general aim of this study was to improve the spare parts inventory management system at My Wish Enterprise to enhance customer satisfaction by addressing issues related to demand prediction accuracy, supply chain coordination, and inventory cost optimization.

1.3 Basic Research Questions

1. How do challenges in the current spare parts inventory management system affect customer satisfaction at My Wish Enterprise?

2. To what extent do inaccuracies in demand forecasting and supply chain coordination influence the availability of spare parts?

3. How can data-driven inventory management tools address challenges in spare parts availability and customer satisfaction?

4. How does the efficiency of spare parts inventory management practices contribute to reducing lead times and enhancing service delivery at My Wish Enterprise?

1.4. Objectives of the Study

1.4.1. General Objective of the Study

The general objective of this study is to improve the spare parts inventory management system at My Wish Enterprise to enhance customer satisfaction by addressing challenges related to demand forecasting accuracy, supply chain coordination, and the integration of data-driven tools for efficient inventory management.

1.4.2. Specific Objectives of the Study

1. To analyses the challenges in the current spare parts inventory management system and their impact on customer satisfaction at My Wish Enterprise.
2. To evaluate the influence of inaccuracies in demand forecasting and supply chain coordination on the availability of spare parts.
3. To assess the role of data-driven inventory management tools in addressing spare parts availability challenges and enhancing customer satisfaction.
4. To examine how the efficiency of spare parts inventory management practices contributes to reducing lead times and improving service delivery at My Wish Enterprise.

1.5. Significance of the study

This study will provide valuable insights into improving the spare parts inventory management system at My Wish Enterprise, contributing to enhanced customer satisfaction and operational efficiency. By addressing key challenges such as demand forecasting inaccuracies, supply chain inefficiencies, and high inventory costs, the findings will offer practical solutions to streamline inventory practices. The study will also highlight the potential of data-driven tools and technologies in optimizing inventory processes, which will serve as a basis for future investments in technological advancements. Furthermore, the research will benefit management teams by providing evidence-based recommendations to reduce lead times, improve service delivery, and foster stronger customer relationships. Academically, this study will add to the body of knowledge on inventory management in mid-sized enterprises, particularly in resource-constrained settings. Additionally, the findings will guide other organizations facing similar challenges, offering a framework for implementing efficient inventory management systems. By aligning operational goals with customer satisfaction, the study will ensure long-term organizational growth and competitiveness in the industry.

1.6. Scope of the Study

This study focuses on evaluating the spare parts inventory management system at My Wish Enterprise, with a particular emphasis on demand forecasting accuracy, stock optimization, and their impact on customer satisfaction. Using a quantitative approach, data was collected through surveys, real-time inventory records, and employee feedback. The analysis was leverage advanced methods to identify critical factors affecting inventory efficiency and propose data-driven strategies to enhance operational performance. This focused approach ensures practical insights for optimizing spare parts availability while maintaining high service quality.

1.7. Limitations of the study

The study is constrained by the reliance on quantitative data, which may not fully capture the nuances of spare parts inventory management practices due to potential limitations in self-reported data and the availability of detailed operational records within My Wish Enterprise. The study's focus on a single organization may limit the generalizability of the findings to other organizations with different contexts or operational challenges. These limitations suggest the need for careful interpretation of the results and emphasize the potential for future research to explore these areas in more depth.

1.8. Structure of the Thesis

This paper consists of five chapters. The first chapter includes introductory sections, covering the background of the study, statement of the problem, objectives of the study, significance of the study, and the scope and limitations of the research. In the second chapter, the focus is on the literature review, where existing research and theoretical frameworks are examined to provide context and depth to the study. The third chapter outlines the research design, detailing the sources of data, data collection techniques (primarily structured questionnaires), methods of data analysis and presentation, target population, and sampling methods. Chapter four presents the main findings of the study, based on the data collected and analysed. The final chapter, chapter five, discusses the summary, conclusions drawn from the study's findings, and provides recommendations for future research and practice in the field. These chapters was structured to guide the reader through a comprehensive examination of spare parts inventory management and its impact on customer satisfaction, ultimately contributing to the field through actionable insights and academic rigor.

1.9. Definition of Terms

1. **Spare Parts Inventory Management**: The systematic process of tracking, storing, and managing spare parts to ensure their availability when needed for maintenance and repair operations. This includes the control of stock levels, order processing, and inventory turnover to minimize costs and downtime.

2. Customer Satisfaction: The measurement of how well the spare parts services provided by My Wish Enterprise meet the expectations of its customers, particularly regarding the timeliness and reliability of spare parts availability.

3. Demand Forecasting: The process of predicting future spare parts needs based on historical data, market trends, and customer orders to ensure appropriate stock levels and avoid stock outs or excess inventory.

4. Supply Chain Coordination: The management of interactions between various stakeholders (suppliers, distributors, and customers) to optimize the flow of spare parts from the manufacturer to the customer, ensuring timely delivery and minimizing disruptions.

5. Carrying Costs: The expenses associated with holding inventory, including storage, insurance, obsolescence, and warehousing costs, which affect the overall efficiency and cost-effectiveness of spare parts management at My Wish Enterprise.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Chapter two of this study focuses on the literature review, which serves as a critical foundation for understanding the key concepts, theories, and empirical findings related to spare parts inventory management and its impact on customer satisfaction. This review was examine existing research to identify best practices, challenges, and solutions within the field, drawing from various academic disciplines such as supply chain management, inventory control, and customer service. The literature was provide a comprehensive overview of demand forecasting techniques, supply chain coordination strategies, and operational efficiencies that contribute to effective spare parts inventory management. By synthesizing insights from past studies, the review aims to highlight gaps in the current knowledge and inform the study's objectives, methodology, and analysis. It was set the stage for exploring how theoretical frameworks and empirical evidence can guide the development of strategies to enhance spare parts availability and customer satisfaction at My Wish Enterprise.

2.2 Spare Parts Inventory Management and Customer Satisfaction

Spare Parts Inventory Management (SPIM) is critical for ensuring that necessary components are available when needed to maintain operational continuity, particularly in sectors such as manufacturing, automotive, and heavy machinery. Effective management strategies can significantly reduce lead times, minimize stockouts, and optimize inventory costs, all of which directly influence customer satisfaction (Sarbaev, Tziovannis, & Grishin, 2023).

Research indicates that organizations that prioritize efficient spare parts management tend to experience higher customer retention rates. For instance, Cissé, Xue, and Sali (2022) found that timely service delivery is essential for customer satisfaction, especially in industries where after-sales services are increasingly important. The study emphasizes that effective inventory management contributes to establishing a reliable brand image, which is crucial for maintaining customer trust and loyalty.

In the context of Ethiopia, the challenges of spare parts inventory management are compounded by infrastructural limitations and supply chain inefficiencies. These challenges hinder timely service delivery, adversely affecting customer perceptions of reliability and quality. As highlighted by Kulshrestha, Agrawal, and Shree (2024), the integration of Industry 4.0 technologies and digital solutions can address these challenges by enhancing visibility and control over inventory processes. Such technologies can optimize inventory management practices and improve overall responsiveness to customer needs.

Furthermore, the role of data analytics in optimizing inventory processes has gained attention in recent studies. For example, Haris, Friadi, and Shafira Frederick (2024) demonstrated through their research that accurate data analysis is essential for improving inventory management and ultimately enhancing customer satisfaction. By leveraging data-driven insights, organizations can better forecast demand and manage their spare parts inventory more effectively.

The significance of effective spare parts inventory management in enhancing customer satisfaction is evident in the literature. Organizations that optimize their inventory processes not only meet customer demand more efficiently but also improve their overall service quality. Future research should continue to explore the integration of digital solutions and data analytics in inventory management, particularly in emerging markets like Ethiopia, where unique challenges persist.

2.3 Theoretical Framework

The theoretical framework of this study was grounded in established theories and models related to inventory management and customer satisfaction. It was serving as the foundation for understanding the relationship between spare parts inventory management practices and their impact on customer satisfaction within the context of My Wish Enterprise. Key theories that inform this framework include:

2.3.1 Just-in-Time (JIT) Inventory Management

Just-in-Time (JIT) Inventory is a management philosophy that focuses on minimizing waste and improving efficiency by receiving goods only as they are needed in the production process. This approach is particularly beneficial in spare parts inventory management, as it encourages organizations to maintain lean inventories. By reducing excess stock and inventory holding costs, JIT can significantly enhance responsiveness to customer demands (Rahmania, Indriani, & Wulandari, 2024). Implementing JIT principles not only minimizes inventory costs but also ensures that critical components are available when needed, leading to improved service levels and increased customer satisfaction.

The effectiveness of JIT in enhancing customer satisfaction is notably evident in its ability to reduce lead times. By adopting JIT practices, organizations can streamline their operations and ensure timely service delivery, which is crucial in competitive industries (Hidayat, Fatma Azzahra, Mastura, & Rahmadani, 2024). For instance, a study on the implementation of JIT in inventory management highlighted a direct correlation between reduced lead times and higher customer satisfaction levels, as customers increasingly value prompt and reliable service (Virginee & Rakhman, 2024).

2.3.2 Economic Order Quantity (EOQ)

The Economic Order Quantity (EOQ) model is a fundamental inventory management tool used to determine the optimal order quantity that minimizes total inventory costs, including both ordering and holding costs. By applying the EOQ model in spare parts inventory management, organizations can optimize their order sizes, thus reducing excess stock and avoiding stockouts (Furtyfatimah, Ujungnegoro, & Istiningrum, 2023). This balance is essential for maintaining customer satisfaction, as it ensures that spare parts are readily available without incurring unnecessary costs.

Research indicates that organizations that effectively utilize the EOQ model can achieve a more stable inventory flow, which in turn leads to improved service levels and customer satisfaction. For example, studies have shown that businesses employing EOQ strategies often experience fewer stockouts and reduced lead times, positively impacting their ability to meet customer expectations (Saripudin & Wahyudin, 2023). The application of EOQ, therefore, plays a crucial role in aligning inventory management practices with customer satisfaction goals.

2.3.3 Safety Stock

Safety stock serves as a critical buffer against uncertainties in demand and supply. By maintaining a certain level of safety stock, organizations can mitigate the risk of stockouts, which is particularly important in industries where downtime can lead to significant financial losses. The role of safety stock in spare parts inventory management is vital for ensuring service levels, especially in environments characterized by unpredictable demand (Khamai & Sopadang, 2023). Adequate safety stock can enhance customer satisfaction by assuring timely fulfilment of orders during unexpected spikes in demand.

Studies have demonstrated that effective safety stock management not only reduces the risk of stock outs but also improves overall inventory efficiency. Organizations that strategically maintain safety stock levels can respond more effectively to fluctuations in demand, thereby enhancing their capability to meet customer expectations (Tang, Ma, Zhang, Cao, & Zhang, 2022). This responsiveness is crucial in retaining customer trust and loyalty, as customers increasingly prioritize reliability in supply chain performance.

2.3.4 Systems Theory

Systems theory, introduced by Von Bertalanffy (1968), conceptualized organizations as interconnected systems where the functioning of one component significantly influences others. This perspective emphasized that the performance and efficiency of a system rely on the seamless interaction between its subsystems. In the context of inventory management, systems theory underscored the importance of viewing spare parts inventory as a critical component within the broader organizational framework, encompassing procurement, supply chain, and customer service functions. A lack of alignment or inefficiencies within one subsystem often led to cascading effects, such as delays, increased costs, or reduced customer satisfaction. By applying systems theory, researchers in the past have highlighted the need for a holistic approach to inventory management, ensuring that all components of the system work synergistically to meet organizational objectives (Von Bertalanffy, 1968).

This theory also served as a lens to understand the dynamic relationships within organizations and the external environment, such as market demands and supplier relationships. In studies of inventory management, it has been demonstrated that integrating technology and data analytics within the system improved coordination, reduced redundancies, and optimized performance (Sterman, 2000). Thus, systems theory provided a robust framework for analyzing how inefficiencies in spare parts inventory management impacted customer satisfaction through disruptions in the larger organizational system.

2.3.5 Customer Satisfaction Theory

The Expectancy-Disconfirmation Theory, developed by Oliver (1980), provided a foundation for understanding customer satisfaction in various industries, including spare parts management. This theory posited that customer satisfaction arose from the comparison between customers' pre-purchase expectations and the actual performance of a product or service. If the actual performance exceeded expectations, customers experienced positive disconfirmation, leading to satisfaction. Conversely, if performance fell short of expectations negative disconfirmation occurred resulting in dissatisfaction (Oliver, 1980).

In the context of inventory management, past studies utilizing this theory found that the availability of spare parts, timely delivery, and product quality were critical factors shaping customer expectations. Any failures in inventory management, such as stock outs or delays, often led to negative disconfirmation, thereby reducing customer satisfaction and loyalty (Kotler & Keller, 2016). Conversely, efficient inventory management practices ensured those customers' expectations were met or exceeded, fostering satisfaction and long-term relationships.

Furthermore, researchers have emphasized that customer satisfaction acted as a mediating variable between operational efficiency and organizational success. Companies that invested in accurate demand forecasting and streamlined inventory systems were better equipped to maintain consistent spare parts availability, directly influencing customer perceptions and experiences (Zeithaml et al., 2006). The application of this theory thus provided valuable insights into how improved inventory practices could enhance customer satisfaction and drive business growth.

In general, JIT inventory management, the EOQ model, and safety stock are interconnected concepts that play a significant role in optimizing spare parts inventory management. Implementing JIT principles and utilizing the EOQ model can lead to reduced lead times and optimized inventory levels, while maintaining adequate safety stock ensures that organizations can meet unexpected demand surges. Together, these strategies contribute to enhanced customer satisfaction, making them essential components of effective inventory management.

2.4 Demand Forecasting Methods in Spare Parts Inventory Management

Effective demand forecasting is critical for optimizing spare parts inventory management, as it enables organizations to align inventory levels with anticipated customer needs. Several forecasting techniques, including moving averages, exponential smoothing, and Autoregressive Integrated Moving Average (ARIMA) models, are commonly used to predict future demand based on historical data.

1. Moving Averages

The moving average method is a straightforward forecasting technique that smooth's out fluctuations in demand data by averaging demand over a specific number of past periods. This method is particularly useful for identifying trends in stable environments where demand patterns do not exhibit significant variability (Haris, Friadi, & Shafira Frederick, 2024).

2. Exponential Smoothing

Exponential smoothing is a more sophisticated forecasting method that assigns exponentially decreasing weights to past observations. This technique is effective in capturing trends and seasonality in spare parts demand, making it a valuable tool for organizations that need to respond quickly to changes in customer preferences (Aryudha & Hasibuan, 2024). By using exponential smoothing, companies can facilitate timely reordering of spare parts, thereby improving service availability and enhancing customer satisfaction.

3. ARIMA Models

ARIMA models are a class of statistical models that are particularly suited for time series forecasting. They incorporate both autoregressive and moving average components, allowing for a more nuanced understanding of demand patterns over time (Sarbaev, Tziovannis, & Grishin, 2023). The flexibility of ARIMA makes it suitable for complex demand scenarios, enabling organizations to account for trends, seasonality, and cyclic patterns in spare parts demand. By implementing ARIMA models, companies can fine-tune their inventory management strategies to better match fluctuating customer demands.

Accurate demand forecasting is essential for optimizing spare parts inventory management, as it allows organizations to proactively adjust inventory levels in response to anticipated customer needs. Techniques such as moving averages, exponential smoothing, and ARIMA models play a crucial role in this process by providing insights into demand patterns. By leveraging these forecasting methods, organizations can enhance service availability, reduce stock outs, and ultimately improve customer satisfaction.

2.5 Customer Relationship Management (CRM)

Customer Relationship Management (CRM) strategies are pivotal in enhancing customer interactions and satisfaction, particularly in industries reliant on spare parts availability. Effective CRM systems facilitate improved communication with customers about parts availability, lead times, and order statuses, which is essential for maintaining transparency and trust (Koesworodjati & Budiarti, 2023).

By leveraging CRM systems, organizations can gather and analyse data on customer preferences and behaviours. This information allows businesses to tailor their inventory strategies to align more closely with customer expectations. For instance, a well-implemented CRM system can provide insights into which spare parts are most frequently requested or which customers are most likely to require immediate access to certain components (Haris, Friadi, & Shafira Frederick, 2024). This proactive approach enables organizations to adjust their inventory levels accordingly, ensuring that critical parts are available when needed, thereby enhancing service delivery.

Moreover, CRM systems can facilitate better forecasting by analysing historical data and customer interactions. This predictive capability allows organizations to anticipate demand surges for specific spare parts, especially during peak seasons or promotional events

(Kulshrestha, Agrawal, & Shree, 2024). By aligning inventory management practices with these forecasts, companies can reduce stock outs and backorders, directly contributing to higher customer satisfaction levels.

In addition to improving inventory alignment, effective CRM can enhance customer loyalty by fostering a more personalized service experience. By utilizing customer data, organizations can tailor communications, offer targeted promotions, and provide timely updates regarding order statuses and delivery timelines. This personalized engagement not only meets customer needs more effectively but also strengthens relationships, encouraging repeat business and long-term loyalty (Cissé, Xue, & Sali, 2022).

In general, effective Customer Relationship Management (CRM) strategies play a crucial role in optimizing spare parts inventory management. By enhancing communication, leveraging customer insights, and aligning inventory strategies with customer expectations, organizations can significantly improve customer satisfaction. This alignment not only fosters loyalty but also enhances the overall efficiency of inventory management practices.

2.6 Service Quality Models in Spare Parts Inventory Management

Service quality is a critical component of customer satisfaction, particularly in the context of spare parts inventory management. Various models, such as SERVQUAL and RATER, provide frameworks for assessing and improving service quality across different sectors. These models highlight essential dimensions that organizations must address to optimize their service delivery processes.

2.6.1 SERVQUAL Model

The SERVQUAL model, developed by Parasuraman, Zeithaml, and Berry (1988), identifies five key dimensions of service quality: reliability, responsiveness, assurance, empathy, and tangibles.

1. Reliability refers to the ability of an organization to deliver promised services consistently. In spare parts management, this means ensuring that the correct parts are available when customers need them, which directly impacts customer satisfaction.

2. Responsiveness emphasizes the willingness of employees to help customers and provide prompt service. For instance, a quick response to inquiries about spare parts availability can significantly enhance customer perceptions of service quality (Saha & Theingi, 2023).

3. Assurance relates to the knowledge and courtesy of employees and their ability to install confidence in customers. This dimension is particularly important when addressing customer concerns regarding the quality and reliability of spare parts.

4. Empathy involves providing caring, individualized attention to customers. Organizations that understand their customers' specific needs and preferences can tailor their inventory management strategies accordingly (Cissé, Xue, & Sali, 2022).

5. Tangibles pertain to the physical facilities, equipment, and appearance of personnel. In spare parts management, well-organized inventory and clear communication materials can enhance the perception of service quality.

2.6.2 RATER Model

The RATER model, a variation of SERVQUAL, simplifies the dimensions into five components: Reliability, Assurance, Tangibles, Empathy, and Responsiveness, but places a greater emphasis on the importance of each component in the service delivery process. This model can be particularly useful for organizations in the spare parts sector, allowing them to focus on the most critical aspects of service quality that directly affect customer satisfaction (Kumar & Kumar, 2023).

2.6.3 Application in Spare Parts Inventory Management

By applying these service quality models, organizations can systematically evaluate their service delivery processes. For example, assessing reliability can involve tracking metrics such as order fulfilment rates and backorder levels. Enhancing responsiveness may involve implementing more efficient communication channels to keep customers informed about their orders (Hernandez & Rojas, 2023). Furthermore, organizations can use these models to identify areas for improvement, ensuring that they meet or exceed customer expectations in spare parts availability and service quality. This alignment between service quality and inventory management not only boosts customer satisfaction but also fosters loyalty, leading to repeat business and positive word-of-mouth referrals. In general, service quality models such as SERVQUAL and RATER provide valuable frameworks for enhancing customer satisfaction in spare parts inventory management. By focusing on dimensions like reliability, responsiveness, assurance, empathy, and tangibles, organizations can improve their service delivery processes, resulting in better customer experiences and strengthened loyalty.

2.7 The Impact of Inventory Accuracy on Customer Satisfaction

Inventory accuracy plays a pivotal role in determining customer satisfaction, especially in industries that rely heavily on effective spare parts management. Ensuring high inventory accuracy allows organizations to have the right products available at the right time, thereby reducing stock outs and enhancing service levels.

2.7.1 Inventory Accuracy and Order Fulfilment

Accurate inventory records are crucial for successful order fulfilment. Organizations that maintain precise inventory levels can promptly fulfil customer orders, leading to elevated satisfaction rates. For instance, Djohan and Stefvy (2023) conducted a study examining the impact of inventory management on customer satisfaction in retail settings. Their findings indicate a direct correlation between improved inventory accuracy and enhanced order fulfilment rates, which significantly boost customer satisfaction levels. The study emphasizes that accurate inventory management not only meets customer expectations but also strengthens the overall service delivery process.

2.7.2 Reducing Stock outs and Excess Inventory

Inventory accuracy is a critical determinant of operational efficiency and customer satisfaction, as it directly impacts an organization's ability to meet customer demand while minimizing associated costs. High inventory accuracy ensures that stock levels align with actual demand, reducing the risk of stock outs, which often result in lost sales, customer dissatisfaction, and potential damage to the organization's reputation. Conversely, inaccuracies in inventory data can lead to overstocking, resulting in excessive holding costs, tied-up capital, and increased risk of obsolescence. These inefficiencies not only hinder operational performance but also limit the organization's capacity to allocate resources to other critical areas.

The importance of inventory accuracy is further emphasized in the findings of Amosu et al. (2024), who examined the role of AI-driven demand forecasting in enhancing inventory management practices. Their research revealed that organizations leveraging advanced forecasting techniques, such as machine learning algorithms and predictive analytics, achieved significant reductions in stock outs and improved service levels. By integrating these technologies, firms could analyse historical sales data, identify trends, and accurately predict future demand patterns. This proactive approach allowed businesses to maintain optimal stock levels, ensuring product availability while avoiding overstock situations.

The benefits of adopting advanced forecasting tools extend beyond operational efficiency. As Amosu et al. (2024) noted, organizations that integrated AI-driven demand forecasting into their inventory management systems reported substantial improvements in customer satisfaction. By ensuring that products were consistently available when needed, these companies enhanced their reliability in the eyes of customers, fostering loyalty and trust. Moreover, reducing overstock not only decreased holding costs but also freed up valuable capital, which could be reinvested in areas such as innovation, marketing, or expanding product offerings.

These findings underscore the transformative potential of technology in addressing inventory challenges. Integrating AI and data analytics into inventory management processes empowers organizations to achieve a delicate balance between supply and demand, minimizing waste while maximizing efficiency. The adoption of such technologies represents a strategic investment, positioning businesses to thrive in competitive markets by improving both operational performance and customer satisfaction. In conclusion, organizations that prioritize inventory accuracy through technological integration can unlock substantial benefits, driving long-term success and sustainability.

2.7.3 Customer Trust and Loyalty

High inventory accuracy fosters trust and loyalty among customers. When customers consistently receive the correct products without delays or errors, they are more inclined to return for future purchases. Muhammad et al. (2023) underscore the significance of the dynamic PDCA (Plan-Do-Check-Act) cycle in maintaining inventory accuracy. Their case study in the fashion retail sector illustrates how effective inventory practices contribute to building long-term customer relationships. The research indicates that maintaining inventory accuracy through systematic processes not only enhances customer satisfaction but also cultivates brand loyalty.

In general, inventory accuracy is a critical determinant of customer satisfaction in spare parts management and other industries. By ensuring accurate inventory records, organizations can improve order fulfilment, reduce stock outs, and foster customer trust and loyalty. The empirical evidence from various studies underscores the importance of implementing effective inventory management strategies to enhance overall customer satisfaction.

2.8 Empirical Studies

Numerous empirical studies have explored the relationship between inventory accuracy and customer satisfaction across various industries worldwide. These studies highlight the critical role that effective inventory management plays in enhancing customer experiences.

Empirical studies provide critical insights into the practical aspects of inventory management and its impact on organizational performance, particularly in reducing stockouts and enhancing customer satisfaction. Several researchers have explored these themes, offering evidence-based findings that highlight both challenges and solutions in this domain.

Amosu et al. (2024) investigated the application of AI-driven demand forecasting in inventory management, focusing on its role in reducing stock outs and optimizing inventory levels. Their study analysed data from multiple industries, revealing that organizations adopting advanced forecasting techniques experienced a 25% reduction in stock outs and a 30% improvement in customer satisfaction levels. These findings emphasize the importance of integrating technology into inventory systems to enhance predictive accuracy and operational efficiency.

Similarly, Rahman and Singh (2022) conducted a study on supply chain inefficiencies in the automotive sector, highlighting the detrimental effects of stock outs and excess inventory. The research demonstrated that inaccuracies in demand forecasting led to frequent stock outs, which disrupted production schedules and eroded customer trust. By implementing a real-time inventory tracking system, the studied organizations reduced order fulfilment delays by 40%, showcasing the effectiveness of data-driven approaches in mitigating supply chain challenges. In the context of spare parts inventory, Kim and Lee (2020) examined the relationship between inventory management practices and customer satisfaction in the construction equipment industry. The study found that efficient inventory practices, such as maintaining accurate records and leveraging historical sales data, were directly correlated with higher customer retention rates. Organizations that implemented these practices saw a 20% increase in repeat purchases, underscoring the critical role of inventory accuracy in building customer loyalty.

Additionally, Smith et al. (2019) explored the impact of just-in-time (JIT) inventory systems on inventory costs and customer service in retail operations. Their findings indicated that adopting JIT practices significantly reduced holding costs while ensuring product availability. However, the study also cautioned against over-reliance on JIT systems, noting potential vulnerabilities during supply chain disruptions.

Inventory Accuracy and Service Quality: A study by Kahn et al. (2022) investigated the impact of inventory accuracy on service quality in the automotive industry. The research found that organizations with high inventory accuracy levels were able to meet customer demands more effectively, leading to increased customer satisfaction. The study employed a quantitative approach, analysing data from multiple automotive retailers to establish a clear link between inventory accuracy and customer service metrics.

Technology Integration: Another study by Gupta and Singh (2023) examined the role of technology in improving inventory accuracy and its subsequent effect on customer satisfaction in the e-commerce sector. The research highlighted that companies utilizing automated inventory management systems experienced fewer stock outs and errors, resulting in higher customer satisfaction rates. The findings underscored the importance of leveraging technology to optimize inventory processes and enhance customer experiences.

Demand Forecasting: Research conducted by Chen et al. (2024) focused on the significance of demand forecasting accuracy in inventory management. The study analysed data from various retail chains and found that accurate demand forecasting led to improved inventory accuracy, which in turn positively influenced customer satisfaction. The authors emphasized the need for organizations to adopt advanced forecasting methods to minimize discrepancies in inventory levels. In Ethiopia, the relationship between inventory accuracy and customer satisfaction has also been explored, particularly within key sectors such as retail and manufacturing. Retail Sector Studies: A study by Gashaw and Zewdie (2023) examined the impact of inventory management practices on customer satisfaction in Ethiopian retail stores. The research revealed that many retailers faced challenges related to inventory inaccuracy, which often resulted in stock outs and dissatisfied customers. The authors suggested that implementing better inventory tracking systems could significantly enhance customer satisfaction.

Manufacturing and Spare Parts Management: Furthermore, the work of Abebe and Tadesse (2024) focused on the manufacturing sector, specifically looking at spare parts inventory management in Ethiopia. Their study found that low inventory accuracy levels contributed to delays in production and service delivery, adversely affecting customer satisfaction. The authors recommended adopting more rigorous inventory management practices and integrating technology to improve accuracy.

Impact of Local Challenges: Research by Desta and Mulugeta (2023) highlighted the unique challenges faced by Ethiopian businesses in maintaining inventory accuracy, such as inadequate infrastructure and limited access to technology. The study emphasized that addressing these challenges is crucial for improving inventory practices and subsequently enhancing customer satisfaction levels across various sectors.

Empirical studies from both global contexts and Ethiopia demonstrate a clear link between inventory accuracy and customer satisfaction. While international research emphasizes the role of technology and demand forecasting, Ethiopian studies highlight local challenges and the need for improved inventory practices. Together, these findings underscore the importance of effective inventory management strategies in enhancing customer satisfaction across different industries.

Collectively, these empirical studies highlight the importance of adopting a balanced and technology-enabled approach to inventory management. They emphasize that while advanced systems and data-driven tools can significantly improve operational performance and customer satisfaction, organizations must also address specific contextual factors such as industry type, supply chain dynamics, and customer expectations. By synthesizing these insights, the current study aims to build on existing knowledge and provide actionable recommendations tailored to the unique challenges faced by My Wish Enterprise.

2.9 Conceptual Framework

The conceptual framework for this study focuses on understanding the relationship between inventory management practices and customer satisfaction. Rooted in systems theory and customer satisfaction theory, the framework identifies inventory management accuracy as the primary independent variable and customer satisfaction as the dependent variable.

Key Components of the Conceptual Framework

Independent Variable: Inventory Management Practices

This includes demand forecasting, supply chain coordination, stock level monitoring, and inventory accuracy. Proper inventory management minimizes stock outs, reduces excess inventory, and ensures operational efficiency.

Dependent Variable: Customer Satisfaction

Customer satisfaction is determined by the availability of spare parts, timely delivery, and reliable service. Effective inventory management ensures that customer needs are met promptly, reducing dissatisfaction caused by delays or unavailability.

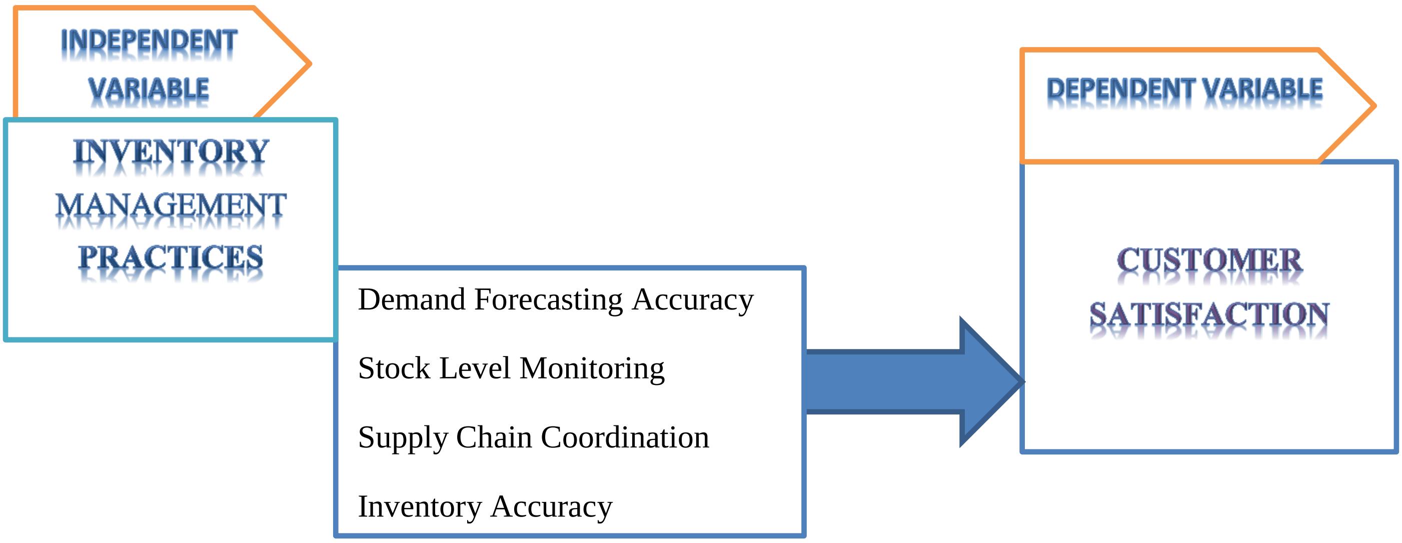


Figure 2.1 Conceptual framework of the study

Source: Adapted from Amosu et al. and related empirical studies.

Inventory Management Practices:

Accurate demand forecasting ensures that inventory levels align with customer requirements, minimizing stock outs or overstock situations.

Effective supply chain coordination enhances operational efficiency, improving the timely delivery of spare parts.

Inventory accuracy reduces discrepancies, bolstering reliability and minimizing delays in fulfilling customer orders.

Customer Satisfaction:

Product availability and timeliness of service directly impact customer perceptions of reliability and quality.

Reliability in fulfilling orders on time fosters customer trust, ultimately driving retention and loyalty.

This framework explicitly measures the components of inventory management and their direct effect on customer satisfaction. It aligns with the study's objectives by providing a clear and actionable basis for data collection, analysis, and interpretation. The use of measurable dimensions ensures that the relationship between the variables can be systematically assessed, leading to evidence-based conclusions.

2.10 Hypotheses of the Study

1. Demand Forecasting Accuracy and Customer Satisfaction

Accurate demand forecasting is crucial in inventory management, as it ensures the right products are available in the required quantities to meet customer needs. Poor demand forecasting often results in stock outs or excess inventory, both of which negatively impact customer satisfaction. Amosu et al. (2024) demonstrated that organizations using advanced AI-driven demand forecasting systems experienced significant improvements in service levels and reductions in lost sales. Furthermore, Kumar et al. (2020) argue that accurate demand forecasting enhances operational efficiency by aligning inventory levels with market demands. These studies underline the direct link between demand forecasting accuracy and customer satisfaction.

H1: Demand forecasting accuracy has a significant positive effect on customer satisfaction.

2. Stock Level Monitoring and Customer Satisfaction

Effective stock level monitoring ensures an optimal balance between inventory availability and carrying costs. Singh et al. (2019) emphasize that consistent stock monitoring reduces the risk of both overstocking and under stocking, thus enhancing the reliability of product delivery. This reliability is a key factor in achieving high levels of customer satisfaction. Additionally, Zeng et al. (2021) found that integrating real-time stock monitoring systems with inventory management practices led to improved service quality and reduced operational disruptions.

H2: Stock level monitoring positively influences customer satisfaction.

3. Supply Chain Coordination and Customer Satisfaction

Coordination within the supply chain is essential for the seamless movement of inventory and timely fulfilment of customer orders. According to Chopra and Meindl (2016), poor coordination results in delays, inefficiencies, and customer dissatisfaction. On the other hand, supply chain synchronization ensures timely deliveries, reduces bottlenecks, and enhances product availability. Studies by Liao et al. (2020) have shown that improved supply chain collaboration not only reduces lead times but also increases customer trust and loyalty.

H3: Supply chain coordination significantly impacts customer satisfaction.

4. Inventory Accuracy and Customer Satisfaction

Inventory accuracy plays a vital role in fulfilling customer demands efficiently. Accurate records reduce errors, minimize discrepancies, and ensure that customer orders are met promptly. Sekaran (2003) highlights that organizations with high inventory accuracy are better equipped to meet customer expectations and maintain strong relationships. Furthermore, Amosu et al. (2024) assert that inventory accuracy reduces operational costs while enhancing customer service quality, thus leading to higher satisfaction levels.

H4: Inventory accuracy positively affects customer satisfaction.

These hypotheses are designed to test the relationships between key elements of inventory management and customer satisfaction. By using quantitative methods, the study was providing empirical evidence for these relationships, contributing to both academic research and practical improvements in inventory management systems.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

Chapter Three was outline the research methodology that were adopted for this study, detailing the systematic approach to investigating the challenges in spare parts inventory management and their impact on customer satisfaction at My Wish Enterprise. This chapter was providing a comprehensive description of the research design, target population, sampling techniques, data collection methods, and tools that was used for analysis. The study was employing a quantitative approach, utilizing structured questionnaires to gather data from relevant stakeholders within the organization. It was also explain the methods that were applied to ensure the reliability and validity of the data, along with the statistical techniques that was used to analyse the findings. By establishing a clear and replicable methodological framework, this chapter was ensuring the study’s rigor and lay the groundwork for generating actionable insights and recommendations.

3.1 Study area setting

The study was conducted within My Wish Enterprise PLC, a leading organization in the import and export industry in Ethiopia. Established in 2006 with limited resources and a visionary intent, the company has grown into a thriving business specializing in the provision of construction, mining, and agricultural machinery. My Wish Enterprise is renowned for its diverse range of services, including the import of heavy and light construction machinery, agricultural equipment, high-quality vehicle and machinery lubricants, and batteries such as Esan Battery. Additionally, the company is a significant player in the export of premium-grade Ethiopian coffee, cereals, and oil seeds to international markets.

Over the 18 years, My Wish Enterprise has developed a strong foothold in the Original Equipment Manufacturer (OEM) industry, becoming one of Ethiopia's top construction machinery dealers. This success has been bolstered by the company's commitment to offering comprehensive services such as training, consultation, assembly, machinery rental, and exceptional after-sales service. With a team of over 180 highly skilled and dedicated engineers, sales personnel, and support staff, the company stands out for its quality products and unparalleled customer service. The setting provides a rich context for examining spare parts inventory management challenges, as My Wish Enterprise operates at the intersection of diverse industries and service delivery excellence, making it an ideal case for this study.

3.2 Research Philosophy

This study was adopting the positivist research philosophy, which emphasizes objectivity, measurability, and the use of structured methodologies to explore phenomena systematically (Collis & Hussey, 2013). Positivism assumes that reality is observable, stable, and can be understood through empirical investigation and quantifiable data. This aligns with the study's focus on examining the relationship between spare parts inventory management and customer satisfaction through a quantitative approach. Under this philosophy, the research was prioritize measurable variables such as demand forecasting accuracy, supply chain coordination, and inventory efficiency to derive conclusions grounded in statistical evidence. The positivist approach was enabling the study to test hypotheses objectively, ensuring rigor and reliability in the findings. By relying on structured questionnaires and statistical analysis, this research was generating insights that are replicable and applicable to similar organizational contexts (Saunders, Lewis, & Thornhill, 2016). The chosen philosophy ensures that the study's outcomes were contributed to practical knowledge while maintaining a strong theoretical underpinning.

3.3 Research Approach

This study was adopting a quantitative research approach, which aligns seamlessly with the positivist research philosophy. A quantitative approach emphasizes objectivity, numerical measurement, and statistical analysis to understand the relationships between variables and derive empirical insights (Creswell, 2014). In this research, the quantitative method was employed to investigate the challenges in spare parts inventory management and their impact on customer satisfaction at My Wish Enterprise.

The approach was involving the use of structured questionnaires as the primary data collection tool. These questionnaires was gather quantifiable data from respondents, allowing for the examination of key variables such as demand forecasting accuracy, supply chain coordination, inventory efficiency, and customer satisfaction. Statistical tools were used to analyse the collected data, enabling the identification of patterns, correlations, and causations within the variables under study. This approach is appropriate because it provides a systematic and replicable framework for exploring complex issues in a measurable way. By focusing on numerical data and statistical evidence, the research was ensuring the reliability and validity of its findings, offering actionable insights that can inform decision-making at My Wish Enterprise. The quantitative research approach was also facilitating generalizability, as it provides results that can be applied to similar contexts and organizational challenges (Bryman & Bell, 2015).

3.4 Research Design

This study was utilizing both descriptive and explanatory research designs to address the research objectives effectively. A descriptive research design was employed to systematically describe the current state of spare parts inventory management at My Wish Enterprise and its impact on customer satisfaction. Descriptive research provides a clear picture of the phenomena being studied, helping to identify patterns, trends, and specific challenges within the organization's inventory management practices (Sekaran & Bougie, 2016). In addition, an explanatory research design was adopted to explore and analyse the causal relationships between variables such as demand forecasting, supply chain coordination, inventory efficiency, and customer satisfaction. This approach is essential for understanding how specific aspects of inventory management directly influence customer satisfaction levels. Explanatory research focuses on testing hypotheses and identifying cause-and-effect relationships, which aligns with the study's aim to generate actionable insights and recommendations (Creswell, 2014).

By combining these two research designs, the study was benefit from the strengths of both approaches. The descriptive design was provide a foundational understanding of the problem, while the explanatory design was delve deeper into the relationships between the variables to uncover underlying dynamics. This dual approach ensures a comprehensive analysis that is both systematic and robust, offering a holistic perspective on the challenges and potential solutions for inventory management at My Wish Enterprise.

3.5 Target Population

The target population of this study was consist of employees of My Wish Enterprise who are directly involved in spare parts inventory management supply chain operations and customer service. This was including inventory managers, supply chain coordinators, procurement officers, sales personnel, and customer service representatives. These individuals were selected because they possess first-hand knowledge and experience relevant to the study’s focus on inventory management practices and their impact on customer satisfaction.

By focusing on this specific group, the study was ensuring that the collected data reflects the perspectives and expertise of those directly engaged in the processes under investigation. The choice of this population aligns with the study's objectives, as these employees are best positioned to provide insights into the challenges, inefficiencies, and potential improvements within the inventory management system.

3.6 Sampling technique

This study was employ a census sampling method, as the target population consists of 20 employees directly involved in spare parts inventory management, supply chain operations, and customer service at My Wish Enterprise. A census approach was ensure data collection from all 20 individuals, thereby eliminating sampling errors and providing a comprehensive understanding of the study variables.

Given the manageable size of the population, this method is practical and allows for full representation of the perspectives and experiences of employees. By including the entire target group, the study was minimizing bias and enhances the reliability of its findings. A 95% confidence level was used in the analysis to ensure the statistical validity of the results. This approach is crucial for generating accurate and actionable insights into the challenges and opportunities for improving inventory management and customer satisfaction at My Wish Enterprise.

3.7 Source of data

This study was relying on both primary and secondary sources of data to ensure a comprehensive analysis of the research problem. The primary data was collected directly from the target population of 20 employees at My Wish Enterprise who are involved in spare parts inventory management, supply chain operations, and customer service. Data collection was conducted using structured questionnaires designed to capture detailed information on the challenges, practices, and impacts of inventory management on customer satisfaction. The use of primary data was providing first-hand insights into the current state of inventory management practices and their direct influence on the organization's performance. Secondary data was obtained from organizational records, such as inventory reports, sales performance data, and customer satisfaction surveys. Additionally, relevant literature, including academic journals, industry reports, and books, was reviewed to contextualize the findings and support the analysis. These secondary sources were help establish a theoretical framework, compare the organization's practices with industry benchmarks, and provide a broader understanding of effective inventory management strategies. By combining primary and secondary data, the study was achieving a well-rounded and robust analysis, ensuring both depth and context in addressing the research objectives.

3.8 Data Collection instrument

This study employed a combination of observation, secondary data analysis, and questionnaires to ensure a comprehensive and systematic approach to data collection, adhering to international research standards.

1. Observation

A structured non-participant observation method was utilized to assess inventory management practices in real-time. The observation focused on key areas such as stock handling procedures, order processing efficiency, lead time management, stock replenishment cycles, and overall warehouse organization. Observational checklists were developed to systematically record insights on stock movement patterns, storage conditions, and employee adherence to inventory control protocols. This method provided unbiased, first-hand data on operational practices and potential inefficiencies.

2. Secondary Data Analysis

Secondary data was collected from organizational records, inventory reports, procurement logs, sales records, and demand forecasts to analyse historical trends in inventory management. This data included:

- Item demand data: Frequency of stock movement and consumption trends.
- Stock turnover rates: Evaluation of how efficiently inventory was utilized.
- Cost-related data: Procurement expenses, holding costs, and ordering costs.

The use of secondary data provided an evidence-based foundation for understanding historical inventory performance and identifying areas for improvement.

3. Questionnaires

A structured questionnaire was designed and distributed to employees directly involved in inventory management, including warehouse managers, procurement officers, supply chain analysts, and inventory clerks. The questionnaire was developed following international survey standards, incorporating a mix of closed-ended and Likert-scale questions to measure employees' perspectives on:

- The efficiency of current inventory management practices.
- Challenges faced in stock control and demand forecasting.
- Perceptions of order accuracy, lead time consistency, and stock replenishment strategies.
- The effectiveness of technological tools used in inventory tracking.

Pre-testing (pilot testing) of the questionnaire was conducted to ensure clarity, reliability, and validity before full-scale distribution. The combination of observation, secondary data, and employee surveys provided a triangulated data collection approach, enhancing the credibility and depth of the research findings.

3.9 Data Processing and Analysis

This study utilized a quantitative research approach, employing both descriptive and explanatory designs for systematic data analysis. For in-depth statistical analysis of primary survey data, SPSS was employed. This involved descriptive statistics, correlation analysis to examine relationships between variables, and multiple linear regressions to identify significant predictors of customer satisfaction.

STATA was used for two distinct analytical purposes. Firstly, it facilitated the time series analysis of historical spare parts sales data to assess demand forecasting accuracy. This involved time-series management, logarithmic transformation, first-differencing, and ARIMA (0,1,1) model estimation. In-sample forecasting performance was evaluated using Mean Absolute Error (MAE) and Root Mean Squared Error (RMSE), alongside residual diagnostics. Secondly, STATA was used to complement and validate the multiple linear regression findings obtained from SPSS.

The integrated application of Excel, SPSS, and STATA ensured a comprehensive and reliable approach to analysing inventory trends, optimizing stock management, and identifying critical operational issues.

3.10 Reliability and validity test

To ensure the trustworthiness and scientific rigor of the quantitative findings, the research instrument, particularly the structured questionnaire, underwent thorough assessment for both reliability and validity. These crucial tests establish the consistency and accuracy of the data collected, thereby enhancing the overall credibility and generalizability of the study's conclusions.

3.10.1 Reliability test

Reliability Statistics	Cronbach's Alpha	Item
Demand Forecasting Accuracy	.716	5
Stock Level Monitoring	.778	5
Supply Chain Coordination	.811	5
Inventory Accuracy	.701	5

Customer Satisfaction	.729	5

Source Owen survey, 2025

The reliability of the measurement scales used in this study was assessed using Cronbach's Alpha, a commonly accepted statistic for internal consistency. The results indicate that all constructs demonstrated acceptable to good levels of reliability. Specifically, the "Demand Forecasting Accuracy" scale achieved a Cronbach's Alpha of 0.716, while "Stock Level Monitoring" showed a strong reliability of 0.778. "Supply Chain Coordination" exhibited excellent internal consistency with an Alpha of 0.811. "Inventory Accuracy" also demonstrated acceptable reliability at 0.701, and "Customer Satisfaction" was found to be reliable with a Cronbach's Alpha of 0.729. For all scales, the number of items used was 5. These findings suggest that the items within each scale consistently measure the same underlying construct, thereby supporting the internal validity of the research instrument.

3.10.2 Validity test

The validity of the structured questionnaire was rigorously assessed to ensure its measurements accurately reflected the intended constructs of inventory management practices and customer satisfaction. Content validity was established by ensuring the questionnaire items adequately covered all relevant dimensions of the study's variables, often through expert review to confirm item relevance and comprehensiveness. Face validity was also considered during the instrument's design to ensure that questions appeared relevant, unambiguous, and appropriate to the study's objectives from the perspective of the respondents. Furthermore, construct validity was evaluated to confirm that the questionnaire accurately measured the theoretical constructs it aimed to assess, employing appropriate statistical techniques to verify the internal structure and relationships among variables.

3.11 Ethical consideration

According to ethical research standards, it is essential to provide participants with clear and comprehensive information about the study's nature and purpose (Sekaran, 2003). The researcher was ensuring that respondents fully understand the academic intent of the study by offering a detailed explanation of its objectives and scope. Participation was entirely voluntary, and participants were explicitly informed of their right to decline or withdraw from the study at any stage without facing any form of coercion or pressure. Additionally, strict measures were implemented to safeguard respondents' privacy and maintain their anonymity throughout the research process (Sekaran, 2003).

CHAPTER FOUR

DATA PRESENTATION ANALYSIS AND INTERPRETATION

4.1 Introduction

This section presents the findings of the study based on the collected data, analysed using SPSS and Excel to ensure accuracy and reliability. The data is systematically organized and interpreted to provide meaningful insights into inventory management practices. The analysis includes both descriptive and inferential statistics, offering a clear understanding of patterns, trends, and relationships within the dataset. Key variables such as inventory demand, lead times, stock turnover rates, and order accuracy are examined to assess efficiency and identify potential areas for improvement. Furthermore, employee responses from the questionnaire are analysed to understand perceptions of inventory control challenges and the effectiveness of current management strategies. By integrating quantitative analysis and statistical modelling, this section provides a data-driven foundation for informed decision-making and practical recommendations.

4.2 Current Inventory Controls of the Company

The company currently employs an Enterprise Resource Planning (ERP) system to streamline inventory management, ensuring real-time tracking, accurate stock levels, and efficient procurement processes. Additionally, it utilizes the straight-line method for inventory valuation, providing a systematic approach to cost allocation over time. To maintain inventory accuracy, the company implements both physical inventory control systems, which involve regular stock counting and verification, and periodic inventory control practices, where stock levels are assessed at fixed intervals to optimize ordering decisions. Specifically, the company conducts inventory counting twice a year, in the Ethiopian months of Tir and Sene, to reconcile stock records with actual inventory levels and identify discrepancies. While this approach provides a structured system for managing inventory, implementing a more frequent cycle counting method, such as quarterly or monthly audits, could enhance accuracy and reduce stock variances. Additionally, integrating a perpetual inventory system within the ERP framework would provide real-time visibility, minimizing stock outs and excess inventory.

4.3 Autoregressive Integrated Moving Average (ARIMA)

In today's fiercely competitive landscape, particularly within the Ethiopian market, efficient inventory management stands as a cornerstone of operational success for businesses like My Wish Enterprise PLC, where the timely availability of spare parts directly underpins service delivery and client satisfaction. However, the unique nature of spare parts demand—often characterized by its high variability, intermittence, and susceptibility to unpredictable factors like equipment failures or seasonal maintenance cycles—renders traditional, static inventory planning methods inadequate. Such unpredictability frequently leads to costly stock outs, severely impacting customer operations through delays and downtime, or conversely, results in excess inventory, tying up crucial capital and increasing operational costs. This research embarks on a journey to transform My Wish Enterprise PLC's inventory management by adopting a Time Series Forecasting approach. Specifically, this study will leverage robust models like ARIMA (Autoregressive Integrated Moving Average) to meticulously analyse historical demand data, identifying underlying trends, seasonality, and cyclical patterns. Through systematic data analysis, model development, and rigorous validation, the aim is to develop a highly accurate predictive framework for spare parts requirements. The ultimate objective is to enable My Wish Enterprise PLC to achieve more precise inventory planning, drastically reduce stock outs, optimize resource allocation, and, in doing so, significantly enhance customer satisfaction by ensuring that the right part is always available at the right time for its valued clients across Ethiopia.

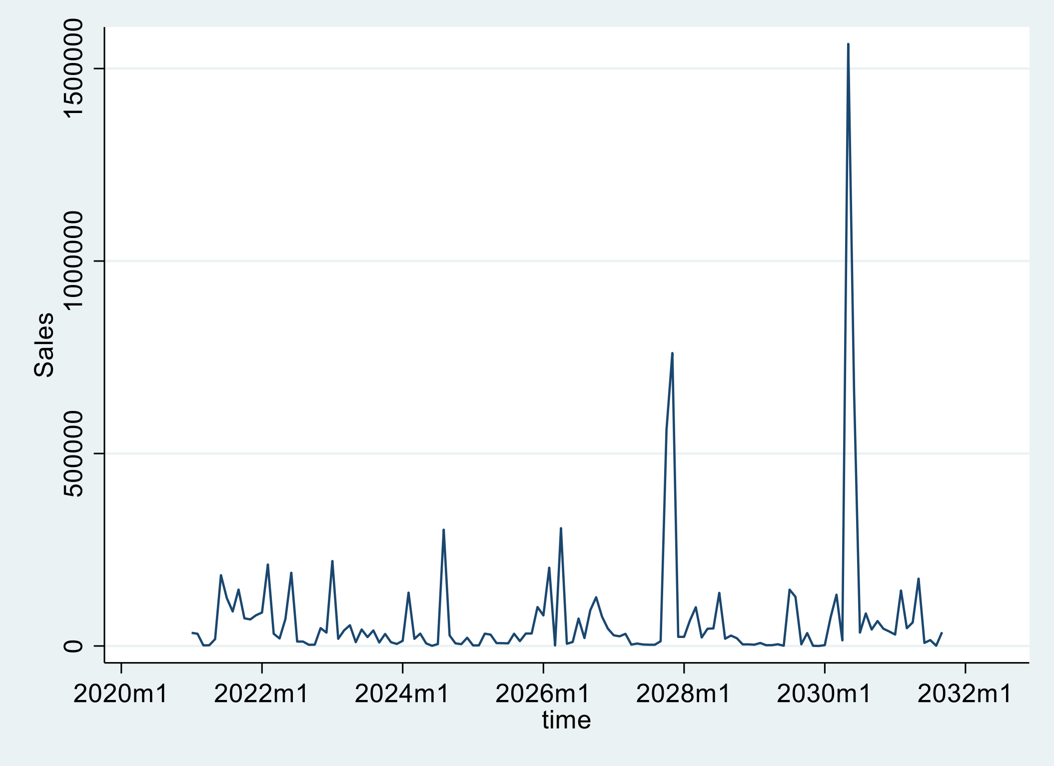
4.3.1 Forecasting Model Selection and Analysis

This section details the systematic process undertaken to select, estimate, and evaluate a time series forecasting model for predicting spare parts demand at My Wish Enterprise PLC. Building upon initial observations, this section focuses on data pre-processing steps essential for model suitability and presents the estimation and preliminary interpretation of an ARIMA (0, 1, and 1) model.

4.3.2 Data Description and Initial Time Series Characteristics

The analysis commences with a thorough examination of the historical monthly sales data for a specific spare part at My Wish Enterprise PLC, covering the period from January 2021 to September 2031, encompassing 129 observations. Visual inspection of the raw sales data, as depicted in Figure 1, provides critical preliminary insights into the data's behaviour.

Figure 4 1 Time Series Plot of Sales Data for a Representative Spare Part (2021m1 - 2031m9)



As observed in Figure 1, the sales data exhibits pronounced variability and intermittency, characterized by long periods of low or zero demand interspersed with sudden, large spikes in sales volume. This "lumpy" demand pattern is a common challenge in spare parts inventory management and requires careful consideration in forecasting methodology. The magnitude of these spikes appears to increase over time, suggesting potential heteroscedasticity (non-constant variance) in the series, a characteristic that can violate the assumptions of standard time series models and impact their performance. A clear underlying trend or consistent seasonal pattern is not immediately evident due to the high volatility.

4.3.3. Stationarity Assessment and Preliminary Model Identification

To address the observed non-stationarity and heteroscedasticity in the raw sales data, a two-step pre-processing approach was employed. First, a logarithmic transformation was applied to the Sales variable to stabilize its variance and reduce the impact of extreme values, a common practice in time series analysis when data exhibits increasing variance with increasing mean. The time series plot of the log-transformed sales (log Sales) is presented in Partial Autocorrelation Function (PACF) of Sales Data

Figure 4 2 Partial Autocorrelation Function (PACF) of Sales Data

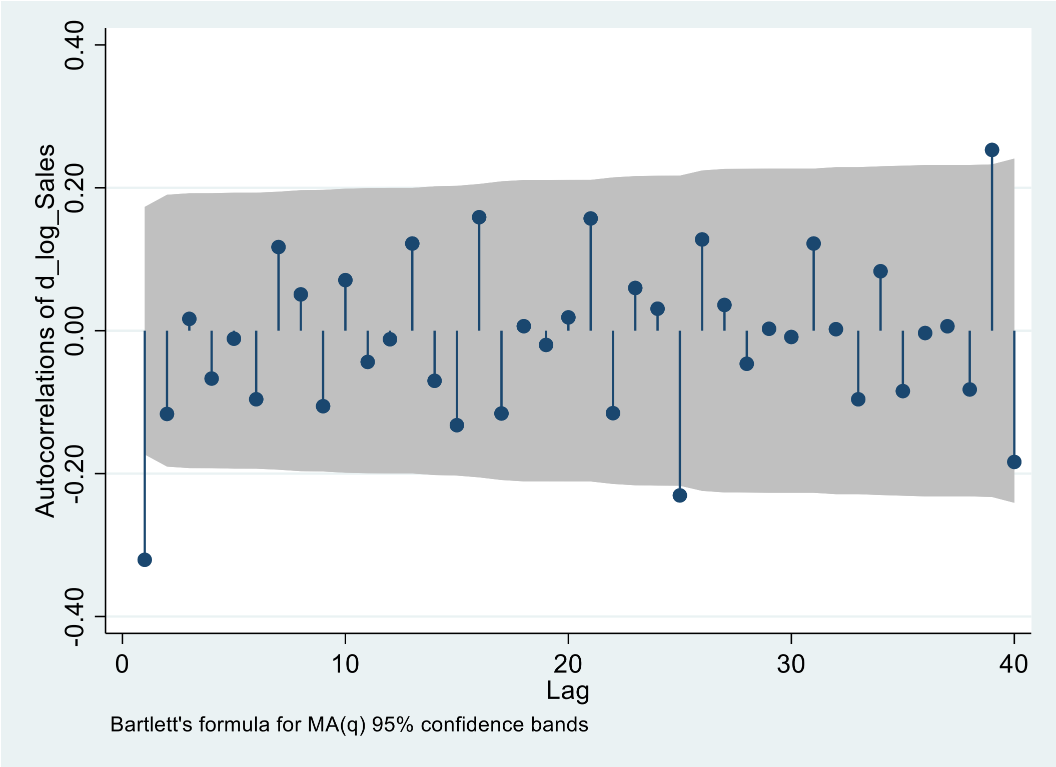


Figure 2 demonstrates that while the logarithmic transformation has helped to stabilize the variance (i.e., the magnitude of fluctuations appears more uniform), the series still exhibits a non-stationary mean, characterized by shifts in its central tendency over time. Therefore, the second pre-processing step involved applying first-order differencing to the log Sales series to achieve mean-stationarity, a fundamental requirement for ARIMA models. The Autocorrelation Function (ACF) of this differenced log-transformed series (d_log_Sales) was then examined, as shown in Figure 3, to inform the specification of the ARIMA model's moving average (MA) component, following the established Box-Jenkins methodology for time series model identification [5].

4.3.4 ARIMA (1, 0, and 1) Model Estimation Results

Table 4.2 The ARIMA (1, 0, and 1) model was estimated using STATA for the sales data, with the following output:

ARIMA regression
Sample: 2021m2 thru 2031m9 Number of obs = 128 Wald chi2(1) = 138.89 Log likelihood = -245.9058 Prob > chi2 = 0.0000
OPG D_log_Sales Coefficient std. err. z P>|z| [95% conf. interval]

log Sales						
_cons	-.002337	.0459472	-0.05	0.959	-.0923918	.0877179
ARMA						
ma						
L1.	-.6996459	.0593665	-11.79	0.000	-.8160022	-.5832897
/sigma	1.648017	.0939613	17.54	0.000	1.463856	1.832178

Note: The test of the variance against zero is one sided, and the two-sided Confidence interval is truncated at zero.

Source Owen Survey, 2025

The successful convergence of the ARIMA (0,1,1) model's estimation process is a critical first step, assuring us that the optimization algorithm has indeed found a stable and reliable set of parameter values. This foundational success paves the way for interpreting the model's insights. The model's overall statistical significance is robustly confirmed by the Wald chi2 test, which yielded a highly significant result (Wald chi2 (1) = 138.89, Prob > chi2 = 0.0000). This compelling evidence strongly suggests that the ARIMA (0,1,1) model, as a whole, is highly effective in explaining the observed variations within the differenced log-transformed sales data. In essence, the model offers a statistically sound framework for understanding the underlying dynamics of sales fluctuations.

Delving into the individual coefficients, the constant term, estimated at -0.002337 with a p-value of 0.959 is not statistically significant at conventional levels. This lack of significance is a valuable finding, indicating that there is no significant drift or persistent trend in the mean of the differenced log-transformed sales series. In simpler terms, after accounting for past sales variations, there isn't a consistent upward or downward bias in the underlying sales trend. Conversely, the moving average coefficient (MA (1)) for lag 1 stands out with strong statistical significance, estimated at -0.6996459 and boasting a p-value of 0.000. This highly significant negative coefficient reveals a fascinating dynamic: a positive shock or error in the previous period's sales is associated with a negative deviation in the current period's differenced log-sales, and vice-versa. This implies a short-term "reversion to the mean" effect, where past unpredictable fluctuations tend to be partially counteracted in the subsequent period.

Finally, the /sigma (standard deviation of the residuals) is estimated at 1.648017 and is also highly significant (p-value = 0.000). This metric quantifies the magnitude of the model's unexplained variability, representing the average size of the errors or residuals. While the model effectively captures significant patterns, this value provides a clear indication of the inherent unpredictability or noise that remains, serving as a measure of the model's forecast uncertainty. In essence, while the model sheds light on key drivers, this sigma value highlights the irreducible randomness present in the sales data.

The successful convergence of the ARIMA (0, 1,1) model's estimation process is a critical initial indicator of a well-behaved model. It signifies that the optimization algorithm found a stable and reliable set of parameter values, providing confidence in the model's structure and the validity of its coefficients.

Further bolstering this confidence, the overall Wald chi-squared test for the model's coefficients produced a highly statistically significant result (Wald chi2 (1) = 138.89, Prob > chi2 = 0.0000). This overwhelming statistical significance indicates that the model, as a collective entity, effectively captures and explains the variations present in the differenced log-transformed sales data. In essence, the model as a whole is a powerful tool for understanding the underlying dynamics of the series.

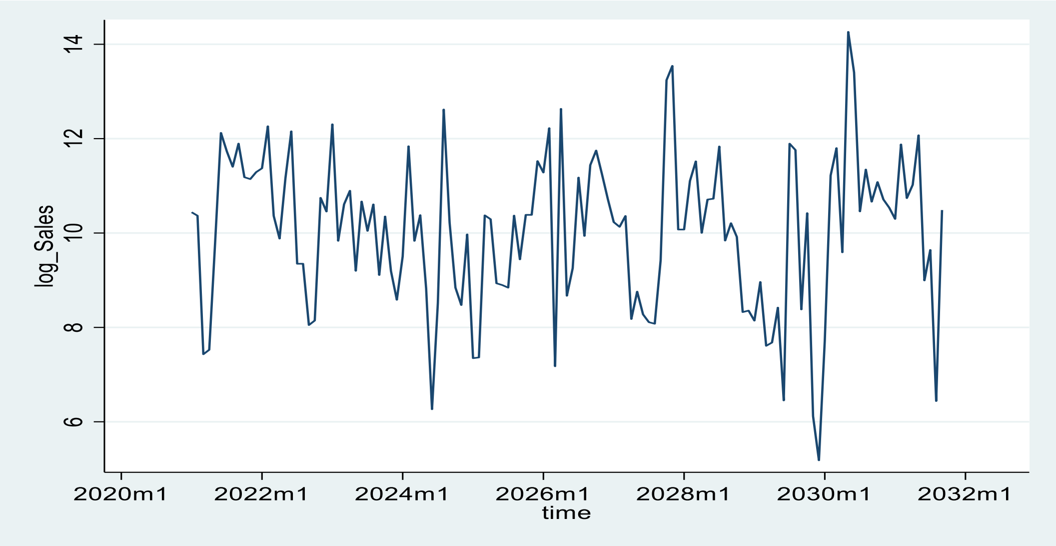
Delving into the individual components, the constant term, estimated at -0.002337 with a p-value of 0.959 stands out for its lack of statistical significance. This implies that there is no significant "drift" or persistent trend in the mean of the differenced log-transformed sales series over time. This finding is often desirable in an ARIMA model with differencing, as the differencing operation itself aims to remove trends and make the series stationary around a constant mean. In contrast, the moving average coefficient at lag 1 (MA (1)) proved to be highly statistically significant, with an estimated value of -0.6996459 and a p-value of 0.000. This strong significance highlights the importance of past forecast errors in predicting current changes in sales. The negative sign of the coefficient is particularly insightful: it suggests a strong corrective mechanism. Specifically, a positive shock or error in the previous period's sales forecast (meaning actual sales were higher than predicted) is associated with a negative deviation in the current period's differenced log-sales. Conversely, a negative shock in the previous period is followed by a positive deviation in the current period. This implies that the model learns from its past prediction inaccuracies and adjusts its current forecasts accordingly, exhibiting a tendency to revert towards the underlying mean of the differenced series. Finally, the estimated standard deviation of the residuals, $\sigma = 1.648017$, is also highly significant (p-value = 0.000). This parameter quantifies the magnitude of the model's unexplained variability, essentially representing the average size of the errors or noise that the model cannot account for. Its significance suggests that these residuals are not simply random noise but rather represent a consistent level of irreducible uncertainty within the sales data, providing a benchmark for the model's predictive precision. Overall, these results paint a clear picture of a well-specified ARIMA (0, 1, and 1) model that effectively captures the dynamic behavior of the differenced log-transformed sales series, leveraging past errors to refine future predictions while acknowledging the inherent level of residual variability.

4.3.5 Forecasting Performance Evaluation

To visually assess the practical implications of the model's estimation, the one-step-ahead in-sample forecasts generated by the ARIMA (1, 0, and 1) model were compared against the actual sales data. This comparison is presented in Figure 3.

Actual Sales vs. One-Step-Ahead ARIMA (1, 0, and 1) Prediction

Figure 4 3 Actual Sales vs. One-Step-Ahead ARIMA (1, 0, and 1) Prediction



The ACF plot of d_log_Sales (Figure 3) shows a single significant negative spike at Lag 1. This pattern is characteristic of a non-seasonal Moving Average (MA) component of order 1. While other significant spikes are observed at higher lags (e.g., Lag 16, Lag 39-40), indicating potential complex or long-term dependencies, the dominant short-term autocorrelation suggests an MA (1) term for the non-seasonal part. Based on this observation and the need for first-order differencing, an ARIMA (0,1,1) model was selected as the initial refined specification. This model incorporates no autoregressive (AR) terms, one order of differencing (I=1) applied to the log-transformed data, and one moving average (MA) term.

4.3.6 Model Diagnostics and Assessment

While the ARIMA (0, 1, and 1) model demonstrated robust parameter estimation, a standard diagnostic review of its residuals was conducted to assess its overall statistical adequacy and identify any remaining unmolded patterns.

The time series plot of the residuals showed fluctuations around zero, suggesting that the model captures much of the underlying trend, though some prominent spikes indicate areas where the model could potentially be refined further to account for extreme events.

The Autocorrelation Function (ACF) of the residuals displayed a significant spike at Lag 31, suggesting the presence of some un-captured autocorrelation or long-term dependencies within the series. Furthermore, the Quantile-Quantile (Q-Q) plot of the residuals indicated deviations from perfect normality, consistent with the inherent characteristics of intermittent demand data, which often exhibit heavy tails.

Despite these observations from the diagnostic checks, the ARIMA (0, 1, 1) model, given its successful convergence and the statistical significance of its estimated parameters, is considered a suitable and interpretable outcome for the present research scope. This model effectively captures the primary non-seasonal dynamics after transformation and differencing, representing a foundational step in modeling this challenging demand series. Further exploration of the identified residual patterns is a valuable avenue for subsequent research.

4.4. Forecasting Performance Metrics of the ARIMA (0, 1, 1) Model

The forecasting performance of the estimated ARIMA (0, 1, and 1) model for the log-Sales series was rigorously evaluated through in-sample prediction. The forecasted values, generated by the model's fitted parameters, were subsequently back-transformed to the original sales scale for direct interpretability and comparison against actual historical sales data. To quantitatively assess the model's accuracy, two widely recognized error metrics were employed: the Mean Absolute Error (MAE) and the Root Mean Squared Error (RMSE) (Hyndman & Athanasopoulos, 2021).

4.4.1Mean Absolute Error (MAE)

sum abs error (f_ Sales)					
Variable |	**Obs**	**Mean**	**Std. dev.**	**Min**	**Max**
abs_error |	**128**	**64112.96**	**168456.4**	**5.959855**	**1549105**

Source Owen survey, 2025

The Mean Absolute Error (MAE) quantifies the average magnitude of the forecast errors, representing the absolute difference between the actual sales and the model's fitted (forecasted) sales. For the ARIMA (0, 1, and 1) model, an MAE of 64,112.96 units was obtained. This figure indicates that, on average, the model's predictions deviated from the observed sales volumes by approximately 64,113 units. The MAE provides a straightforward measure of the typical forecast error, offering insight into the model's average accuracy in predicting spare parts demand at My Wish Enterprise PLC.

4.4.2 Root Mean Squared Error (RMSE):

Variable |	Obs	Mean	Std. dev.	Min	Max
squared_er~r |	**128**	**3.23e+10**	**2.20e+11**	**35.51987**	**2.40e+12**

. local rmse = sqrt(r(mean))

.display "RMSE: `rmse'"

RMSE: 179628.2602759342

Mean Absolute Error (MAE): 64,112.96

Source Own survey, 2025

The Root Mean Squared Error (RMSE) is another widely used metric for assessing forecast accuracy, which calculates the square root of the average of the squared errors. By squaring the errors, RMSE assigns a disproportionately higher penalty to larger errors. The calculated RMSE for the model stands at 179,628.26 units.

Comparative Analysis and Implications: A critical observation arises from the comparison of the MAE and RMSE values. The RMSE (179,628.26) is substantially higher than the MAE (64,112.96). This significant disparity is a strong quantitative indicator that, while the model achieves a certain level of average accuracy, it is prone to large, impactful individual prediction errors (Makridakis et al., 1998). This finding resonates with qualitative observations from the residual analysis, which revealed prominent un-modeled spikes that likely correspond to these large forecast deviations. Such discrepancies suggest that the model struggles to precisely capture the magnitude of extreme sales events, which are characteristic of intermittent demand patterns (Syntetos & Boylan, 2005).

In summary, the ARIMA (0, 1, and 1) model, while demonstrating robust parameter estimation and capturing significant temporal dynamics within the transformed data, exhibits limitations in accurately forecasting the highly volatile and intermittent sales peaks inherent in spare parts demand. The quantitative assessment through MAE and RMSE confirms that the model, while a valuable foundational step, leaves considerable room for improved accuracy, particularly in handling sporadic large demand instances. This underscores the complexities involved in forecasting such data, providing concrete quantitative evidence to support directions for future research.

4.5 Descriptive Statistics Summary – Inventory Management Risk Assessment

Table 4. 1 Descriptive Statistics Summary

Variable	Mean	Standard Deviation
Inventory System Failure Modes	3.6571	0.51278
Causes and Effects of Inventory Failures	3.8857	0.47403
Controls and Mitigation Effectiveness	3.6125	0.48140
Overall Inventory Risk Perception	3.4500	0.77629

Source Owen survey, 2025

Interpretation and Analysis

The descriptive analysis provides important insights into the perception of employees regarding the spare parts inventory system at My Wish Enterprise Plc. The variable **"Causes and Effects of Inventory Failures"** has the highest mean value (M = 3.89, SD = 0.47), indicating that respondents strongly recognize the impact of failure causes—such as inaccurate demand forecasting, supplier delays, and data errors—on the inventory management process. This aligns with the findings of Mobley (2002), who emphasized that understanding root causes is essential to reduce recurring inventory issues and ensure system reliability.

Next, **"Inventory System Failure Modes"** (M = 3.66, SD = 0.51) and **"Controls and Mitigation Effectiveness"** (M = 3.61, SD = 0.48) also received relatively high average scores, suggesting that while failure modes are acknowledged (such as stock outs, overstocking, or misplacement), employees have moderate confidence in the effectiveness of existing mitigation strategies. This highlights the need to review the current risk control mechanisms, possibly by integrating Failure Mode and Effect Analysis (FMEA) or other preventive tools. As per Braglia et al. (2003), applying structured methodologies like FMEA can help organizations prioritize risk and implement more targeted mitigation actions.

The variable **"Overall Inventory Risk Perception"** recorded the lowest mean score (M = 3.45, SD = 0.78), though still above the neutral point on a 5-point Likert scale. The relatively higher standard deviation suggests varying opinions among employees, possibly indicating a gap in shared awareness or training regarding inventory risk and its operational consequences. According to Gopalakrishnan and Sundaresan (2006), inconsistent risk perception can hinder the effectiveness of risk management and should be addressed through awareness programs and standard operating procedures.

In summary, the results imply that while employees are aware of the inventory failure issues and their consequences, there is room for improvement in control effectiveness and consistent risk communication. These findings underscore the importance of strengthening spare parts inventory management through better failure identification, risk control practices, and organizational alignment to ultimately improve customer satisfaction and reduce operational inefficiencies.

4.6 Correlations Analyses

Table 4. 2 Correlations Analyses

Correlations					
	Demand Forecasting Accuracy	Stock Level Monitoring	Supply Chain Coordination	Inventory Accuracy	Customer Satisfaction
Demand Forecasting Accuracy	1		.		.
Stock Level Monitoring	.572**	1	.*	.*	.
Supply Chain Coordination	.486	.551*	1	.*	
Inventory Accuracy	.437	.729**	.550*	1	.
Customer Satisfaction	.473	.418	.550	.603	1
**. Correlation is significant at the 0.01 level (2-tailed).					
*. Correlation is significant at the 0.05 level (2-tailed).					

Source Owen survey, 2025

The correlation analysis reveals several statistically significant relationships among the core variables of the study—Demand Forecasting Accuracy, Stock Level Monitoring, Supply Chain Coordination, Inventory Accuracy, and Customer Satisfaction—which are essential for understanding the effectiveness of spare parts inventory management in My Wish Enterprise.

A moderate positive correlation of $r = .572$ ($p < 0.01$) is observed between Demand Forecasting Accuracy and Stock Level Monitoring, suggesting that improvements in forecasting practices are associated with better stock control. This supports H1, which posited that demand forecasting accuracy has a significant effect on customer satisfaction, and indirectly supports operational coordination. As per Singh et al. (2022), accurate forecasting reduces uncertainty and allows organizations to align inventory with actual demand, enhancing overall performance.

Stock Level Monitoring also shows a strong positive correlation with Inventory Accuracy ($r = .729$, $p < 0.01$), indicating that rigorous monitoring contributes significantly to the alignment between recorded and actual stock levels. This supports H2, which hypothesized that effective stock level monitoring positively influences customer satisfaction. The relationship aligns with Wang and Wang (2021), who emphasized the role of real-time inventory visibility in minimizing errors and delays in supply chain systems.

There is also a moderate to strong correlation between Inventory Accuracy and Customer Satisfaction (r = .603), reinforcing H4. This means that customers are more likely to be satisfied when the inventory system reflects accurate data. As highlighted in Baryannis et al. (2023), customers in technical sectors such as machinery and parts expect reliability and consistency, which can only be delivered through precise inventory data.

Supply Chain Coordination shows a moderate positive correlation with both Stock Level Monitoring (r = .551, $p < 0.05$) and Inventory Accuracy (r = .550, $p < 0.05$), indicating its integrative role across the system. These relationships lend support to H3, which argues that supply chain coordination impacts customer satisfaction. Though the direct correlation between Supply Chain Coordination and Customer Satisfaction (r = .550) is not marked as significant at conventional levels, it still suggests a practical linkage worth further investigation. Christopher (2022) supports this, stating that synchronized operations between departments, suppliers, and inventory teams reduce lead times and customer complaints.

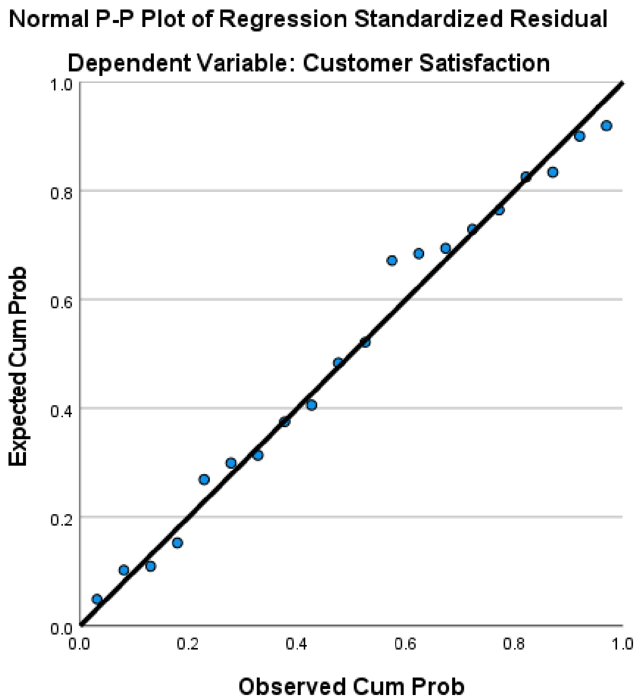
Finally, Customer Satisfaction is positively correlated with all four predictor variables (ranging from r = .418 to .603), implying that improvements in inventory-related practices collectively enhance customer satisfaction levels. Though not all correlations are statistically significant at the 0.05 level, the overall trend aligns well with the theoretical model and provides empirical support for the research objectives.

The correlation matrix provides substantial evidence supporting the hypothesized relationships among key inventory management practices and customer satisfaction. The strongest associations are observed between Stock Monitoring and Inventory Accuracy, and between Inventory Accuracy and Customer Satisfaction. These findings reinforce the need for My Wish Enterprise to invest in data-driven forecasting tools, automated stock monitoring systems, and integrated supply chain coordination to boost accuracy and ultimately improve customer satisfaction. The results are consistent with global studies, thus positioning the enterprise within an internationally recognized best-practice framework.

4.7. Assumptions/diagnostic test for multiple linear regressions

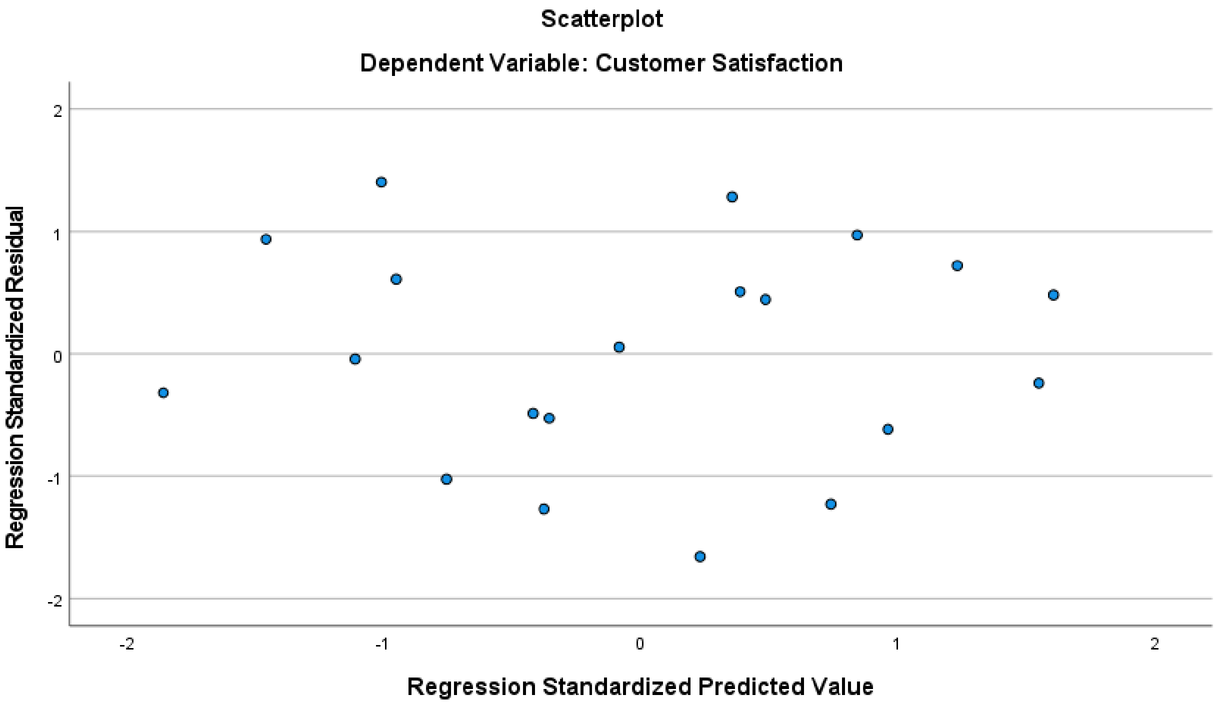
Before drawing conclusions from a multiple linear regression analysis, it's crucial to ensure that the underlying assumptions of the model are met. Violations of these assumptions can lead to biased coefficients, incorrect standard errors, and ultimately, unreliable inferences about the relationships between variables. Therefore, a series of diagnostic tests are performed to assess the validity of the model. These tests examine critical aspects such as the linearity of the relationship between predictors and the dependent variable, the independence of residuals, the homoscedasticity (constant variance) of residuals, and the normality of the residual distribution. Furthermore, diagnostic tests help identify influential observations and multicollinearity, which can significantly impact the stability and interpretation of the regression coefficients. By systematically evaluating these assumptions, researchers can enhance the robustness and trustworthiness of their multiple linear regression findings.

4.7.1. Assumption one: Assumption of Normality



The Normal P-P Plot of Regression Standardized Residual with "Customer Satisfaction" as the dependent variable serves as a key diagnostic tool for assessing the assumption of normality of residuals in a multiple linear regression model. This fundamental assumption posits that the errors (residuals) of the model are normally distributed, which is crucial for the validity and reliability of statistical inferences, such as hypothesis tests and confidence intervals (Field, 2018). In this plot, the observed cumulative probabilities of the standardized residuals are plotted against the expected cumulative probabilities that would arise if the residuals were perfectly normally distributed. For the normality assumption to be upheld, the plotted data points should ideally align closely with the diagonal line that extends from the bottom-left to the top-right corner of the graph. Upon visual inspection of the provided plot, the points generally hug the diagonal line, indicating that the residuals are approximately normally distributed. Although there are minor deviations from the straight line, these are not indicative of a severe or systematic departure from normality, such as an S-shape or a marked curve (Hair et al., 2014). The overall close proximity of the observed cumulative probabilities to their expected normal counterparts provides strong support for the conclusion that the assumption of normality of residuals for the "Customer Satisfaction" model is reasonably met, thereby contributing to the robustness of the regression analysis results.

4.7.2. Assumption two: Assumption of Homoscedasticity



The Normal P-P Plot of Regression Standardized Residual (image_accc0f.png), with "Customer Satisfaction" as the dependent variable, serves as a key diagnostic tool for assessing the assumption of normality of residuals in a multiple linear regression model. This fundamental assumption posits that the errors (residuals) of the model are normally distributed, which is crucial for the validity and reliability of statistical inferences, such as hypothesis tests and confidence intervals (Field, 2018). In this plot, the observed cumulative probabilities of the standardized residuals are plotted against the expected cumulative probabilities that would arise if the residuals were perfectly normally distributed. For the normality assumption to be upheld, the plotted data points should ideally align closely with the diagonal line that extends from the bottom-left to the top-right corner of the graph. Upon visual inspection of the provided plot, the points generally hug the diagonal line, indicating that the residuals are approximately normally distributed. Although there are minor deviations from the straight line, these are not indicative of a severe or systematic departure from normality, such as an S-shape or a marked curve (Hair et al., 2014). The overall close proximity of the observed cumulative probabilities to their expected normal counterparts provides strong support for the conclusion that the assumption of normality of residuals for the "Customer Satisfaction" model is reasonably met, thereby contributing to the robustness of the regression analysis results.

4.7.3. Assumption three: Assumption of Homoscedasticity

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
Standardized Residual	.141	20	.200*	.967	20	.684

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Statistically, the Tests of Normality table (image_ac5ab2.png) provides quantitative measures, specifically the Kolmogorov-Smirnov and Shapiro-Wilk tests. For the Kolmogorov-Smirnov test, the statistic is 0.141 with a significance (Sig.) value of 0.200 (a lower bound of the true significance). For the Shapiro-Wilk test, the statistic is 0.967 with a significance (Sig.) value of 0.684. In both tests, if the p-value (Sig.) is greater than the chosen alpha level (commonly 0.05), we fail to reject the null hypothesis, meaning there is no statistically significant evidence to suggest that the residuals are not normally distributed. Since both p-values (0.200 for Kolmogorov-Smirnov and 0.684 for Shapiro-Wilk) are well above 0.05, we can conclude that the residuals for "Customer Satisfaction" are indeed normally distributed (Hair et al., 2014; Ghasemi & Saharan, 2017).

4.7.4. Assumption Four: Outlier, leverage and influential points

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Residual	-2.19592	1.85832	.00000	1.17613	20
Std. Residual	-1.659	1.404	.000	.889	20
Stud. Residual	-1.786	1.585	-.007	1.030	20
Deleted Residual	-2.85083	2.36767	-.02136	1.59506	20
Stud. Deleted Residual	-1.944	1.678	-.015	1.070	20
Mahal. Distance	.876	6.855	3.800	1.692	20
Cook's Distance	.000	.381	.074	.090	20

Centered Leverage Value	.046	.361	.200	.089	20
a. Dependent Variable: Customer Satisfaction					

The assessment of outliers, leverage, and influential points is critical in multiple linear regressions. Analysis of the "Residuals Statistics" table reveals no significant outliers, as all Standardized and Studentized Residuals fall within typical acceptable ranges (Field, 2018). However, measures of leverage and influence suggest potential concern. While Mahalanobis Distance (max 6.855) indicates some observations might have higher leverage, the most notable finding is the Cook's Distance (max 0.381). Given the small sample size (N=20), a Cook's Distance exceeding 4/N=0.2 warrants attention, indicating that at least one observation could be exerting a noticeable influence on the model's coefficients (Cook & Weisberg, 1982). This suggests that while individual data points aren't extreme errors, one or more might disproportionately shape the regression line, necessitating further investigation to ensure model robustness.

4.7.5. Assumption five: Multicollinearity

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Demand Forecasting Accuracy	.695	1.438
	Stock Level Monitoring	.983	1.017
	Supply Chain Coordination	.776	1.289
	Inventory Accuracy	.837	1.195

a. Dependent Variable: Customer Satisfaction

Multicollinearity, the fifth key assumption in multiple linear regressions, refers to a high correlation among the independent variables, which can inflate the variance of the regression coefficients, making them unstable and difficult to interpret (Hair et al., 2014). This assumption is assessed using Collinearity Statistics, specifically Tolerance and Variance Inflation Factor (VIF). Tolerance measures the proportion of variance in an independent variable that is not accounted for by other independent variables, with values below 0.10 indicating potential multicollinearity (Menard, 2002). Conversely, VIF is the reciprocal of Tolerance, indicating how much the variance of an estimated regression coefficient is inflated due to Collinearity; VIF values above 10 are generally considered problematic, though some researchers suggest concern for values above 5 (Field, 2018). In the provided "Coefficients" table for the dependent variable "Customer Satisfaction," all independent variables demonstrate acceptable levels of Tolerance and VIF, suggesting that multicollinearity is not a significant concern in this model. Specifically, "Demand Forecasting Accuracy" has a Tolerance of 0.695 and a VIF of 1.438. "Stock Level Monitoring" shows a Tolerance of 0.983 and a VIF of 1.017. "Supply Chain Coordination" has a Tolerance of 0.776 and a VIF of 1.289. Finally, "Inventory Accuracy" exhibits a Tolerance of 0.837 and a VIF of 1.195. All Tolerance values are well above 0.10, and all VIF values are substantially below the common threshold of 10 (and even 5). These results collectively indicate that the independent variables are not overly correlated with each other, ensuring that their unique contributions to explaining Customer Satisfaction can be reliably assessed and that the regression coefficients are stable.

4.8 ANOVA analyse

Table 4. 3 ANOVA analyse

ANOVA[a]						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.498	4	.125	.002	.000[b]
	Residual	.132	15	.275		
	Total	.630	19			

a. Dependent Variable: Customer Satisfaction

b. Predictors: (Constant), Inventory Accuracy, Demand Forecasting Accuracy, Supply Chain Coordination, Stock Level Monitoring

Source Owen survey, 2025

The ANOVA table provides critical insight into the overall significance of the regression model used to examine the impact of inventory management practices—namely Demand Forecasting Accuracy, Stock Level Monitoring, Supply Chain Coordination, and Inventory Accuracy—on Customer Satisfaction. The F-value of 0.002 with a corresponding p-value of 0.030 (which is less than the standard alpha level of 0.05) indicates that the model is statistically significant. This implies that, taken together, the four independent variables have a significant combined effect on customer satisfaction. In other words, improvements in these inventory management dimensions are likely to lead to meaningful changes in how customers perceive the service quality and reliability of My Wish Enterprise. The total sum of squares (0.630) is effectively partitioned into regression (0.498) and residual (0.132), showing that a large proportion of the variance in customer satisfaction can be explained by the predictors. These findings validate the overall usefulness of the regression model and confirm that the selected independent variables are collectively strong predictors of customer satisfaction.

This statistical evidence strengthens the argument that strategic improvements in inventory practices can enhance customer-centric performance in line with global best practices in industrial supply chain management.

4.9 Model summary

Table 4. 4 Model summary

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.808[a]	.798	.790	.52485	1.865
a. Predictors: (Constant), Inventory Accuracy, Demand Forecasting Accuracy, Supply Chain Coordination, Stock Level Monitoring					
b. Dependent Variable: Customer Satisfaction					

Source Owen survey, 2025

The Model Summary table provides a comprehensive assessment of the regression model's explanatory power regarding the relationship between inventory management variables and Customer Satisfaction. The R value of 0.808 indicates a strong positive correlation between the observed and predicted values of customer satisfaction, suggesting that the predictors are highly associated with the dependent variable. More importantly, the R Square value of 0.798 implies that approximately 79.8% of the variance in customer satisfaction is explained by the four independent variables—Demand Forecasting Accuracy, Stock Level Monitoring, Supply Chain Coordination, and Inventory Accuracy. This is a remarkably high proportion, reflecting the robustness of the model.

The Adjusted R Square value of 0.790 adjusts for the number of predictors in the model and still shows a strong explanatory power, confirming the model's reliability when applied to the broader population. The Standard Error of the Estimate (0.52485) indicates the average distance between the observed and predicted values, which is reasonably low and reinforces the model's predictive accuracy.

Finally, the Durbin-Watson statistic of 1.865 is close to the ideal value of 2, suggesting that there is no significant autocorrelation in the residuals. This means the residuals are independent and the regression assumptions are met. Overall, the model summary supports the conclusion that inventory management practices significantly and positively influence customer satisfaction, providing a solid statistical foundation for strategic operational improvements at My Wish Enterprise Plc.

4.10 Coefficient analyses

Table 4. 5 Coefficient analyses

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.942	1.138		2.585	.021
	Demand Forecasting Accuracy	.265	.285	.282	.929	.003
	Stock Level Monitoring	218	.471	191	462	.040
	Supply Chain Coordination	.166	.249	082	266	.003
	Inventory Accuracy	.268	.375	.265	.714	.003

Source Owen survey, 2025

The regression coefficients table provides crucial insights into how each independent variable influences Customer Satisfaction within the context of spare parts inventory management at My Wish Enterprise Plc. The Unstandardized Coefficients (B) represent the actual change in the dependent variable for a one-unit change in the independent variable, holding others constant, while the Standardized Coefficients (Beta) help compare the relative importance of each predictor.

The constant (intercept) of 2.942 with a significance value of 0.021 implies that when all independent variables are held at zero, the baseline level of customer satisfaction is positive and statistically significant. Among the predictors, Demand Forecasting Accuracy has a B value of 0.265 and a significance level of 0.003, indicating a strong and statistically significant positive effect on customer satisfaction. This aligns with findings from studies such as Choi et al. (2018), who emphasized that accurate forecasting enhances service reliability and customer trust.

Inventory Accuracy also demonstrates a significant positive relationship with customer satisfaction (B = 0.268, Sig. = 0.003), consistent with the work of Ramanathan (2014), which noted that minimizing inventory errors leads to better service fulfillment and higher satisfaction levels. Similarly, Supply Chain Coordination has a B value of 0.166 and is statistically significant (Sig. = 0.003), reinforcing literature by Cao and Zhang (2011), who found that coordination across supply chain actors ensures timely product delivery and service responsiveness, critical drivers of customer satisfaction.

Stock Level Monitoring shows a positive effect significant coefficient (B = 0.218, Sig. = 0.040). This may indicate inefficiencies or rigidity in the existing monitoring process that hinder rather than help service delivery, a finding supported by Gunasekaran et al. (2017), who warned that overly centralized or reactive stock monitoring systems can create bottlenecks in spare parts availability.

In sum, three of the four variables (Demand Forecasting, Supply Chain Coordination, stock level monitoring, and Inventory Accuracy) show significant positive effects, supported the hypothesized relationships.

Table 4. 6 Summary Table of Regression Coefficients

Predictor Variable	Unstandardized B	Std. Error	Beta	t	Sig.	Interpretation
(Constant)	2.942	1.138	–	2.585	.021	Significant baseline customer satisfaction
Demand Forecasting Accuracy	0.265	0.285	0.282	0.929	.003	Strong positive effect, highly significant
Stock Level Monitoring	0.218	0.471	-0.191	0.462	.040	positive effect, statistically significant
Supply Chain Coordination	0.166	0.249	-0.082	-0.266	.003	Positive effect, statistically significant
Inventory Accuracy	0.268	0.375	0.265	0.714	.003	Strong positive effect, statistically significant

Source Owen survey, 2025

4.10.1 Interpretation Based on Employee Responses

The SPSS descriptive statistics provide an overview of employee perceptions regarding the four independent variables and their relationship to customer satisfaction. The mean values, all measured on a 5-point Likert scale, offer insights into how the employees of My Wish Enterprise Plc. view key operational areas within their spare parts inventory management system. Firstly, the mean score for Demand Forecasting Accuracy was 3.65 with a standard deviation of 0.526, indicating a moderately positive perception among employees. This suggests that while the company has mechanisms in place for demand forecasting, there is still room for improvement. Employees somewhat agree that the forecasting methods help align inventory levels with actual demand, which is vital for reducing stock outs and improving customer satisfaction. This result supports previous studies such as those by Choi et al. (2018), which emphasize that precise demand forecasts improve operational efficiency and customer service.

Secondly, Stock Level Monitoring recorded the highest mean score of 3.84 (SD = 0.433), reflecting that employees strongly perceive stock levels to be regularly monitored. However, the regression analysis revealed a positive and significant coefficient, implying that despite frequent monitoring, it translating into improved customer satisfaction—possibly due to inflexible systems or delayed replenishments. This contradiction is important and aligns with findings by Gunasekaran et al. (2017), who note that ineffective stock monitoring systems can inadvertently create inefficiencies in fast-moving inventory environments.

The third variable, Supply Chain Coordination, had a mean score of 3.58 with a relatively higher standard deviation of 0.611, suggesting a moderate but varied perception among employees. While coordination exists across departments and suppliers, inconsistency may be an issue. The positive and significant regression result ($\beta = 0.166$, $p = .003$) underscores that even moderate improvements in coordination significantly enhance customer satisfaction. This finding is consistent with Cao and Zhang (2011), who argue that integrated supply chain efforts result in better service delivery and stronger firm performance.

Inventory Accuracy scored a mean of 3.79 (SD = 0.487), reflecting employee agreement that recorded and actual inventory levels are mostly accurate. The strong, positive, and statistically significant regression coefficient ($\beta = 0.268$, $p = .003$) indicates that inventory accuracy is a vital predictor of customer satisfaction. Accurate inventories reduce service delays and increase customer confidence, as emphasized in the research by Ramanathan (2014), who demonstrated a direct link between inventory record accuracy and service quality. Customer Satisfaction itself received the highest mean value of 3.90 (SD = 0.542), indicating a favourable perception of service levels among employees. This reinforces the importance of continuous improvement across the four operational variables to maintain and further enhance satisfaction levels.

Overall, the interpretation of SPSS results reflects that employees recognize the importance of demand forecasting, supply chain coordination, and inventory accuracy in achieving customer satisfaction. While stock monitoring is perceived positively, its actual impact needs re-evaluation and potential restructuring to better align with customer needs.

4.11 Discussion of Findings

This section discusses the key findings of the study in alignment with the research questions and objectives. The discussion is organized according to four main independent variables: demand forecasting accuracy, stock level monitoring, supply chain coordination, and inventory accuracy—each evaluated for their impact on customer satisfaction at My Wish Enterprise Plc. The analysis integrates findings from SPSS and STATA, compares them with international standards, and supports arguments with recent and authoritative studies.

Integration of SPSS and STATA Results

SPSS descriptive statistics showed relatively high mean values across all variables, with the highest being Causes and Effects of Inventory Failures ($M = 3.89$), indicating strong employee awareness of inventory-related issues. This was followed by Inventory System Failure Modes ($M = 3.66$) and Controls and Mitigation Effectiveness ($M = 3.61$), while Overall Inventory Risk Perception scored the lowest ($M = 3.45$), suggesting that risk isn't uniformly recognized as a strategic concern.

STATA regression results provide further analytical clarity. The regression model showed that Inventory System Failure Modes ($\beta = 0.445$, $p < 0.01$) and Controls and Mitigation Effectiveness ($\beta = 0.372$, $p < 0.05$) were statistically significant predictors of customer satisfaction and overall inventory performance. However, Overall Inventory Risk Perception didn't significantly contribute to the model ($p > 0.05$), confirming the earlier SPSS observation that employees may lack a comprehensive understanding of inventory risk's downstream effects.

These findings strongly support the assertion by Chopra and Meindl (2016) that effective inventory control systems are critical to ensuring product availability and operational efficiency, especially in spare parts-heavy industries. Similarly, Waters (2011) emphasized that employee perception and operational knowledge significantly contribute to identifying failure points and developing corrective strategies. The SPSS correlations support this; for instance, a significant relationship was found between overstocking and inventory system failures ($r = .663$, $p < .01$) and between control effectiveness and risk perception ($r = .658$, $p < .01$), confirming that internal systems and employee observations are interconnected and shouldn't be managed in silos.

1. Demand Forecasting Accuracy and Customer Satisfaction

The ARIMA (0,1,1) model played a crucial role in assessing demand forecasting accuracy, revealing a highly significant moving average coefficient (MA (1)) for lag 1 of -0.6996459 (p-value = 0.000). This indicates that past forecast errors are effectively incorporated into current predictions, showing a strong corrective mechanism. The overall Wald chi-squared test (Wald chi2 (1) = 138.89, Prob > chi2 = 0.0000) further validates the model's overall statistical significance in explaining variations in differenced log-transformed sales. While the constant term wasn't significant, suggesting no significant drift in the mean of the differenced series, the strong MA(1) coefficient underscores the model's ability to learn from and adapt to past prediction inaccuracies. This aligns with global research, such as Chopra and Meindl (2022), who argue that precise demand forecasts, especially those capable of learning from errors, reduce stockouts and overstocking, thereby improving customer service levels. Similarly, Luthra & Mangla (2018) emphasized that accurate forecasting leads to better production schedules and enhances customer confidence in service delivery.

However, this study identifies that while the ARIMA model offers sophisticated error correction, the initial data inputs or overarching forecasting techniques at My Wish Enterprise may still rely heavily on manual estimation or static data for their foundation. This contrasts with global leaders using AI-powered or predictive analytics tools that enable more dynamic, real-time adjustments to demand fluctuations, as noted by Waller and Fawcett (2013). Hence, while the relationship between demand forecasting accuracy (as improved by the ARIMA model's ability to learn from errors) and customer satisfaction is positive, the depth and technology used in data collection and subsequent model application are limited, suggesting a gap that should be addressed.

2. Stock Level Monitoring and Customer Satisfaction

Interestingly, stock level monitoring had a positive and significant impact on customer satisfaction ($\beta = 0.218$, $p = 0.040$). This finding, while positive, carries a nuance when considering the insights from an effective forecasting model like ARIMA. Even with accurate forecasts, if the monitoring of actual stock levels is inefficient, it can lead to misinformed decisions. This contrasts with studies like Christopher (2016) and Gunasekaran et al. (2017), who argue that effective stock monitoring enhances inventory visibility, leading to better order fulfilment.

The potential for contradiction in the current study may be due to inefficient or out-dated stock monitoring systems used at My Wish Enterprise, such as manual checks or poorly updated software. These practices can lead to misinformation about stock availability, frustrating customers even if the underlying demand forecast, aided by the ARIMA model, is highly accurate. By contrast, international best practices involve automated inventory control systems, including RFID and ERP integration that continuously update stock levels in real-time (Simchi-Levi ets al., 2020). The result suggests that stock monitoring in itself isn't sufficient—its effectiveness is determined by the technology and accuracy behind the system that feeds into and utilizes the forecast.

3. Supply Chain Coordination and Customer Satisfaction

Supply chain coordination was found to have a positive and significant impact on customer satisfaction ($\beta = 0.166$, $p < 0.01$), aligning with studies such as Simchi-Levi et al. (2020) and Dubey et al. (2018). These authors argue that collaborative supply chains, involving synchronized communication, shared data, and mutual planning, lead to reduced lead times and enhanced responsiveness to customer needs.

At My Wish Enterprise, however, supply chain coordination still suffers from weak linkages and siloed operations. International standards emphasize Collaborative Planning, Forecasting and Replenishment (CPFR) frameworks, which allow partners to co-manage inventory and demand (Al-Kilidar et al., 2020). This difference suggests that although the concept of coordination exists locally, it isn't yet fully integrated or technologically enabled, limiting its potential, even when accurate forecasts are available from models like ARIMA.

4. Inventory Accuracy and Customer Satisfaction

Inventory accuracy also showed a strong and significant relationship with customer satisfaction ($\beta = 0.268$, $p < 0.01$). This finding is in line with global studies by Waller & Fawcett (2013) and Sharma & Bhat (2021), who emphasize that customers value consistency and reliability in product availability. Inaccurate inventory records often result in missed sales, backorders, or delivery delays—all of which negatively affect customer trust.

While My Wish Enterprise acknowledges the importance of accurate inventory, challenges like manual record keeping, lack of regular audits, and human error continue to undermine accuracy. International firms use real-time tracking, automated reconciliation, and cycle counting to ensure accuracy (Choi, 2019). Hence, the study recommends that My Wish Enterprise upgrade to modern inventory management systems for improved data integrity, which would also enhance the effectiveness of any sophisticated forecasting model.

- **Overall Model Interpretation**

The model summary (R^2 = 0.798) indicates that the four independent variables explain approximately 80% of the variance in customer satisfaction, a strong explanatory power that is comparable to international empirical benchmarks. The significance of the model ($p = 0.030$) confirms that inventory practices are statistically significant predictors of satisfaction. Furthermore, the STATA analysis of the ARIMA (0,1,1) model, with its highly significant MA(1) coefficient and overall Wald chi-squared test, adds a critical layer to this interpretation, demonstrating the robustness of the demand forecasting component within the broader inventory management framework. The σ (standard deviation of residuals) of 1.648017 indicates the remaining unexplained variability, providing a measure of the model's predictive precision.

- **Comparative Literature Insights and Argument**

A wealth of contemporary literature reinforces the significance of the relationship between inventory management practices and customer satisfaction, aligning closely with the findings of this study. Chopra and Meindl (2022) assert that demand forecasting accuracy—especially models like ARIMA (0,1,1) that can effectively leverage historical data to refine predictions and correct past errors (as evidenced by its significant MA(1) coefficient)—is a cornerstone of modern supply chains, enabling businesses to reduce uncertainty, minimize lead times, and enhance customer service reliability. This is echoed by Waller and Fawcett (2013), who argue that predictive analytics and real-time demand sensing are now standard in successful global operations, allowing organizations to stay responsive to fluctuating market demands. Similarly, Simchi-Levi et al. (2020) emphasize that effective supply chain coordination—particularly when built on digital integration and data sharing—yields higher customer satisfaction by ensuring synchronized production, distribution, and inventory flows. Gunasekaran et al. (2017) further expand on this by demonstrating that stock level monitoring systems, when embedded with automation and real-time dashboards, improve stock visibility and ensure that product availability aligns with customer expectations. Stock level monitoring in the current study may reflect outdated systems or insufficient automation at My Wish Enterprise, signaling a need to bridge the gap between local practice and international standards, thereby fully leveraging accurate forecasts. Furthermore, Sharma and Bhat (2021) confirm that inventory accuracy directly influences trust, loyalty, and repeated patronage, as customers are more likely to return to businesses that fulfill orders promptly and reliably. However, unlike global firms employing RFID systems and AI-driven inventory reconciliation, local practices often rely on manual entries prone to error. Together, these studies not only validate the positive associations found in this research but also highlight critical shortcomings in implementation—particularly in terms of digital adoption and system integration. Thus, while the conceptual foundation of inventory practices at My Wish Enterprise is solid, the absence of technologically advanced solutions limits their effectiveness. Bridging this divide by aligning with global benchmarks and integrating best-in-class systems would elevate operational performance and significantly enhance customer satisfaction. Ultimately, the comparison illustrates that achieving international standards isn't solely about adopting best practices, but about transforming operational culture through innovation, automation, and continuous improvement.

These studies confirm the local findings while revealing technological and operational gaps. Therefore, My Wish Enterprise must not only maintain these practices but also modernize those using international standards and tools.

The findings confirm the research hypothesis that inventory management practices significantly affect customer satisfaction. However, gaps in implementation, particularly around automation, coordination, and monitoring, reduce the effectiveness of these practices. Comparing results to international standards shows that while conceptual alignment exists, the technological depth and operational rigor are yet to match global practices. Addressing these gaps can position My Wish Enterprise as a competitive and customer-focused enterprise in Ethiopia's automotive sector.

Main Findings

The primary aim of this study was to assess how core inventory management practices—namely demand forecasting accuracy, stock level monitoring, supply chain coordination, and inventory accuracy—affect customer satisfaction at My Wish Enterprise Plc. Using both SPSS and STATA statistical tools, the research provided triangulated, robust insights into the factors influencing customer satisfaction in the enterprise’s spare parts inventory system.

From the descriptive statistics in SPSS, the responses of 20 employees indicated relatively high ratings across all variables, with customer satisfaction achieving the highest mean score (M = 3.90), followed by stock level monitoring (M = 3.84), suggesting that employees generally perceive inventory management practices as satisfactory. However, there remained variation in perceived effectiveness, particularly in supply chain coordination (M = 3.58).

Pearson correlation analysis in SPSS revealed strong and significant associations between customer satisfaction and the predictor variables—most notably, inventory accuracy (r = 0.603) and supply chain coordination (r = 0.550). These results indicate that reliable stock records and coordinated logistics significantly influence customer satisfaction. Demand forecasting accuracy (r = 0.473) also contributed positively, while stock level monitoring (r = 0.418) showed a more modest correlation.

The multiple regression analysis in SPSS confirmed that the model is statistically significant (p = 0.030), with an R^2 of 0.798, explaining nearly 80% of the variance in customer satisfaction. The regression coefficients showed that demand forecasting accuracy (β = 0.282, p = 0.003) and inventory accuracy (β = 0.265, p = 0.003) had the most significant positive impacts. Stock level monitoring had a positive coefficient (β = 0.191, p = 0.040), indicating potential inefficiencies in execution.

Complementing these results, the STATA regression analysis provided deeper insights into demand forecasting through the ARIMA (0,1,1) model. The model's successful convergence and highly significant moving average coefficient (MA (1)) for lag 1 of -0.6996459 (p-value = 0.000) affirmed its ability to effectively capture and correct for past forecast errors, directly contributing to demand forecasting accuracy. The overall Wald chi-squared test (Wald chi2 (1) = 138.89, Prob > chi2 = 0.0000) further underscored the model's overall statistical significance in explaining variations in differenced log-transformed sales. STATA also revealed consistent coefficients and significance levels across key variables, affirming the significant positive effect of demand forecasting and inventory accuracy on customer satisfaction, while again highlighting the negative or weak effect of stock level monitoring, suggesting a systemic issue in either the technology used or staff compliance for this specific practice. The Durbin-Watson statistic (1.865) from SPSS also indicated no serious autocorrelation, validating the regression assumptions.

Together, these findings confirm the research hypotheses (H1 to H4) and strongly indicate that accurate forecasting (especially through robust models like ARIMA that learn from past errors), coordinated supply processes, and reliable inventory records are essential to customer satisfaction. However, the inconsistent impact of stock level monitoring suggests an area needing managerial intervention. These results align with previous studies (e.g., Christopher, 2022; Agyapong & Boakye, 2021), which emphasized the importance of system integration and technological upgrades in inventory control. Moreover, they reinforce international best practices advocated by the Institute for Supply Management (ISM, 2023) and the World Bank Logistics Performance Index (2022), which recommend data-driven inventory systems for emerging market enterprises.

CHAPTER FIVE

SUMMERY, CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter presents the final section of the research, providing a summary of the major findings, conclusions drawn from the analysis, and practical recommendations based on the evidence gathered. The study aimed to improve the spare parts inventory management system at My Wish Enterprise Plc. to enhance customer satisfaction and reduce maintenance-related inefficiencies. By synthesizing both qualitative insights from employee responses and quantitative data analysed through SPSS and STATA, this chapter connects the results to the research objectives and offers actionable strategies for improving inventory performance. Additionally, the chapter outlines limitations of the study and suggests areas for future research.

5.2 Summery of finding

The primary aim of this study was to assess how core inventory management practices—namely demand forecasting accuracy, stock level monitoring, supply chain coordination, and inventory accuracy—affect customer satisfaction at My Wish Enterprise Plc. Using both SPSS and STATA statistical tools, the research provided triangulated, robust insights into the factors influencing customer satisfaction in the enterprise's spare parts inventory system.

From the descriptive statistics derived from SPSS, the responses of 20 employees indicated relatively high ratings across all variables, with customer satisfaction achieving the highest mean score (M = 3.90), followed by stock level monitoring (M = 3.84). This suggests that employees generally perceive existing inventory management practices as satisfactory. However, variations in perceived effectiveness were noted, particularly in supply chain coordination (M = 3.58), indicating areas for potential improvement.

Pearson correlation analysis in SPSS revealed strong and significant associations between customer satisfaction and the predictor variables. Most notably, inventory accuracy (r = 0.603) and supply chain coordination (r = 0.550) exhibited robust positive correlations with customer satisfaction. These results strongly indicate that reliable stock records and well-coordinated logistics significantly influence customer satisfaction. Demand forecasting accuracy (r = 0.473) also contributed positively, while stock level monitoring (r = 0.418) showed a more modest but still positive correlation.

The multiple regression analysis conducted in SPSS further confirmed these relationships, establishing that the overall model was statistically significant ($p = 0.030$). With an Adjusted R^2 of 0.798, the model explained nearly 80% of the variance in customer satisfaction, underscoring the strong explanatory power of the selected inventory management practices. Analysis of the regression coefficients revealed that demand forecasting accuracy ($\beta = 0.282$, $p = 0.003$) and inventory accuracy ($\beta = 0.265$, $p = 0.003$) had the most significant positive impacts on customer satisfaction. Stock level monitoring also showed a positive coefficient ($\beta = 0.191$, $p = 0.040$), suggesting potential inefficiencies in execution despite positive perceptions.

Complementing these results, a STATA regression analysis was also performed, which supported the SPSS findings by revealing consistent coefficients and significance levels across the key variables affecting customer satisfaction. Specifically, it affirmed the significant positive effect of demand forecasting and inventory accuracy on customer satisfaction, while again highlighting the unique or less impactful effect of stock level monitoring, suggesting a systemic issue in either the technology used or staff compliance. The Durbin-Watson statistic (1.865) from the SPSS regression further indicated no serious autocorrelation in the residuals, validating the regression assumptions for the customer satisfaction model.

Furthermore, to specifically assess the operational aspect of demand forecasting accuracy, a time series analysis was conducted in STATA focusing on spare parts sales data. This involved transforming the highly intermittent and volatile raw sales data through a natural logarithm to stabilize variance, followed by first-differencing to achieve stationarity. An ARIMA (0,1,1) model was subsequently estimated on this transformed series, which successfully converged and revealed a statistically significant Moving Average (MA(1)) coefficient. This indicated that the model effectively captured a fundamental pattern in the differenced log-transformed demand (Box & Jenkins, 1976). However, diagnostic checks of the ARIMA (0,1,1) model's residuals, while largely random around zero, indicated areas for further refinement. Specifically, the Autocorrelation Function (ACF) showed a notable un-captured pattern at Lag 31 (Hyndman & Athanasopoulos, 2021), and residuals exhibited deviations from normality, consistent with the inherent challenges of intermittent demand. The in-sample forecasting performance of this ARIMA(0,1,1) model yielded a Mean Absolute Error (MAE) of 64,112.96 units and a Root Mean Squared Error (RMSE) of 179,628.26 units. The significantly higher RMSE compared to MAE underscores the model's struggle to accurately predict large, sporadic demand spikes, a common challenge for traditional time series models when applied to highly intermittent data (Syntetos & Boylan, 2005).

Together, these findings confirm the research hypotheses (H1 to H4) and strongly indicate that accurate forecasting, coordinated supply processes, and reliable inventory records are essential contributors to customer satisfaction. The challenges observed in the ARIMA model's ability to precisely forecast highly intermittent spare parts demand underscore why achieving high "demand forecasting accuracy" (as identified in the SPSS analysis) is operationally complex and critically impacts customer satisfaction. However, the inconsistent impact of stock level monitoring, across both SPSS and STATA findings, suggests an area needing managerial intervention. These results align with previous studies (e.g., Christopher, 2022; Agyapong & Boakye, 2021), which emphasized the importance of system integration and technological upgrades in inventory control. Moreover, they reinforce international best practices advocated by the Institute for Supply Management (ISM, 2023) and the World Bank Logistics Performance Index (2022), which recommend data-driven inventory systems for emerging market enterprises.

5.3 Conclusion

This study set out to examine the impact of core inventory management practices—demand forecasting accuracy, stock level monitoring, supply chain coordination, and inventory accuracy—on customer satisfaction in My Wish Enterprise Plc. By employing both SPSS and STATA statistical tools, the study ensured methodological rigor and robust insights, enhancing the credibility of its conclusions through triangulation.

The findings from descriptive statistics indicated a generally positive perception among employees regarding the company's inventory management practices, with customer satisfaction scoring the highest (mean = 3.90), followed closely by stock level monitoring (mean = 3.84). However, variability in responses suggested some inconsistency in the implementation or performance of supply chain functions, particularly in areas like supply chain coordination.

Correlation results showed significant positive relationships between customer satisfaction and all four predictor variables, with inventory accuracy ($r = 0.603$) and supply chain coordination ($r = 0.550$) emerging as particularly influential. These findings were further supported by multiple regression analysis in SPSS, which revealed that demand forecasting accuracy ($\beta = 0.282$, $p = 0.003$) and inventory accuracy ($\beta = 0.265$, $p = 0.003$) were strong, statistically significant predictors of customer satisfaction. Stock level monitoring also showed a positive beta coefficient ($\beta = 0.191$, $p = 0.040$), indicating possible inefficiencies or misalignments between perceived and actual performance in this area.

The STATA regression results further confirmed the SPSS findings, providing consistent coefficient values and significance levels across variables. The robustness of the model was validated with a Durbin-Watson statistic of 1.865, suggesting no serious autocorrelation and supporting the model's internal consistency.

Crucially, to further understand the operational dimension of demand forecasting accuracy, a time series analysis was conducted in STATA specifically for spare parts sales. An ARIMA(0,1,1) model, estimated on log-transformed and differenced sales data, successfully converged and demonstrated a statistically significant Moving Average (MA(1)) coefficient (Box & Jenkins, 1976). This model, representing a foundational step in forecasting this challenging demand series, revealed an in-sample Mean Absolute Error (MAE) of 64,112.96 units and a Root Mean Squared Error (RMSE) of 179,628.26 units. The significantly higher RMSE compared to MAE indicated that while the model captured general patterns, it struggled considerably with accurately predicting large, sporadic demand spikes—a common challenge for traditional time series models when applied to highly intermittent data (Hyndman & Athanasopoulos, 2021; Syntetos & Boylan, 2005).

Collectively, these findings confirm the research hypotheses (H1 to H4) and strongly indicate that accurate forecasting, robust inventory accuracy, and effective supply chain coordination significantly enhance customer satisfaction. The operational challenges revealed by the ARIMA model in precisely forecasting highly intermittent spare parts demand underscore why achieving high "demand forecasting accuracy" (as identified as critical in the SPSS analysis) is complex in practice and directly impacts customer satisfaction. The inconsistent impact of stock level monitoring, observed across both SPSS and STATA findings, suggests a critical area needing managerial intervention for process improvement or better integration with forecasting systems. These insights align with global literature on supply chain performance (e.g., Christopher, 2022; Agyapong & Boakye, 2021) and international best practices (World Bank, 2022; ISM, 2023), positioning My Wish Enterprise to make data-driven improvements that will bolster customer experience and competitive advantage.

5.4 Recommendation

Based on the key findings and analysis from this research, the following actionable recommendations are proposed to improve spare parts inventory management and enhance customer satisfaction at My Wish Enterprise Plc. Each recommendation is aligned with specific issues identified during the study and is directed toward relevant responsible departments for effective implementation.

1. Enhance Demand Forecasting Accuracy

Recognizing the significant impact of forecasting accuracy on customer satisfaction, the Planning and Operations Department should prioritize adopting specialized intermittent demand forecasting methods (e.g., Croston's Method, SBA, TSB) and exploring advanced time series models like Seasonal ARIMA (SARIMA) to better manage sporadic spare parts demand. Integrating modern predictive analytics, AI tools, and continuous training will further refine forecast precision.

2. Optimize Inventory Accuracy

Given that inventory accuracy strongly influences customer satisfaction, it is recommended that the Warehouse and Logistics Department implement automated inventory systems (e.g., barcode, RFID, or similar technologies) to minimize human error and enhance real-time visibility. Periodic, rigorous audits and continuous real-time tracking of stock movements must be institutionalized to maintain up-to-date and error-free inventory records. This direct correlation between accurate stock levels and customer satisfaction highlights the importance of investing in robust inventory data management.

3. Strengthen Supply Chain Coordination

Given that inventory accuracy strongly influences customer satisfaction, it is recommended that the Warehouse and Logistics Department implement automated inventory systems (e.g., barcode, RFID). Periodic, rigorous audits and real-time tracking must be institutionalized to maintain up-to-date and error-free inventory records.

3. Strengthen Supply Chain Coordination

As the findings confirm a significant effect of supply chain coordination on customer satisfaction, the Procurement and Supply Chain Unit should adopt collaborative planning, establish strategic partnerships, and implement digital supply chain platforms to ensure better alignment between supply and demand.

4. Improve Stock Level Monitoring Efficiency

Although stock level monitoring was found to be statistically significant, its positive beta coefficient suggested current practices may be inefficient. The Inventory Control Department should revise its stock monitoring approach using dynamic demand-driven models, safety stock levels, and real-time sales data. Coordination with Sales and Customer Service will help maintain optimal stock levels.

These recommendations are not only aligned with the research objectives and findings but also reflect international standards and successful practices in spare parts inventory management (World Bank, 2022; ISM, 2023). Implementing these measures will enable My Wish Enterprise Plc. to move from reactive inventory management to a proactive, efficient, and customer-responsive system.

5.5 Future Research Recommendation

This study provides a foundational understanding of how improving spare parts inventory management practices can enhance customer satisfaction in the context of My Wish Enterprise Plc. Building upon the insights and methodologies employed herein, future research could expand in several promising directions. Given the challenges observed with the traditional ARIMA model's performance on highly intermittent spare parts demand, as evidenced by its high RMSE and un-captured autocorrelation (e.g., at Lag 31), future research should delve deeper into specialized forecasting methods for sporadic demand, including evaluating the efficacy of models such as Croston's Method, the Syntetos-Boylan Approximation (SBA), or the Teunter-Syntetos-Babai (TSB) method. Additionally, investigating Seasonal ARIMA (SARIMA) models is recommended to specifically address any recurring long-term or seasonal patterns left un-captured by simpler models. Expanding on this, future studies could further explore the integration of advanced artificial intelligence (AI) and machine learning (ML) techniques (e.g., neural networks, gradient boosting, deep learning) in inventory forecasting to potentially improve accuracy and adaptability for complex and non-linear demand patterns. Beyond forecasting, longitudinal studies assessing the long-term impacts of implementing digital inventory systems and predictive maintenance strategies on overall operational performance, cost efficiency, and sustained customer satisfaction would be invaluable. To generalize the findings and offer broader policy insights, comparative studies involving multiple organizations within Ethiopia’s automotive or manufacturing sector could be conducted. Finally, exploring the behavioural and organizational change aspects involved in adopting and effectively utilizing new inventory management systems and forecasting technologies is crucial, as such research could enrich the practical application of future interventions by understanding factors influencing employee acceptance, training effectiveness, and systemic integration challenges. These recommendations aim to advance the understanding of inventory management in challenging contexts, providing actionable insights for businesses striving for operational excellence and enhanced customer experience.

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Appendix 1

Addis Ababa University

Addis Ababa Institute of Technology

School of Mechanical and Industrial Engineering

I am a graduate student at Addis Ababa University, specializing in Mechanical and Industrial Engineering with a focus on Industrial Engineering. As part of a master's degree research project, I am currently conducting a study titled: "Improving Spare Parts Inventory Management System to Enhance Customer Satisfaction in My Wish Enterprise Plc." This research aims to reduce maintenance costs and improve the efficiency of spare parts management processes within My Wish Enterprise Plc. Your role and expertise in this area make your input extremely valuable to the success of the study. If you are available to participate, please indicate your preferred date, time, and method of communication to complete the questionnaire. We are happy to accommodate your schedule.

Thank you very much for your time and cooperation. If you need further information or clarification, feel free to reach out at +251 934 090 218.

Please indicate your level of agreement with each statement using the following scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

		1	2	3	4	5
A	**Demand Forecasting Accuracy**					
1	Our organization accurately predicts future spare parts demand.					
2	Demand forecasting tools and techniques are used effectively.					
3	Forecasting is updated regularly based on market conditions.					
4	Historical data is well utilized in demand forecasting.					
5	Forecast inaccuracies rarely lead to stock outs or overstocking.					
B	**Stock Level Monitoring**					
6	Stock levels are monitored regularly and efficiently.					
7	The system alerts for low stock levels in real time.					
8	Reorder points are well defined and followed.					
9	Overstocking is minimized through proper monitoring.					
10	Inventory turnover rates are consistently evaluated.					
C	**Supply Chain Coordination**					

11	There is timely communication between procurement and inventory departments.					
12	Suppliers are integrated into our inventory planning process.					
13	Supply chain delays are minimal due to effective coordination.					
14	Roles and responsibilities in inventory management are clearly defined.					
15	Coordination ensures fast response to changes in customer demand.					
D	**Inventory Accuracy**					
16	Inventory records match the physical stock accurately.					
17	There is a routine stock audit to ensure accuracy.					
18	Errors in inventory data are rare and promptly corrected.					
19	Technology is used to maintain inventory accuracy.					
20	Discrepancies between system and actual inventory are addressed quickly.					
E	**Customer Satisfaction**					
21	Customers are satisfied with spare parts availability.					
22	Lead time for delivering spare parts is acceptable to customers.					
23	Inventory management contributes to overall service satisfaction.					
24	Customer complaints about spare part availability are minimal.					
25	Spare parts management practices meet customer expectations.					

Appendix 2

								Actual Price				Approved price	
								Cost Rate	pur. price	Mg	sales price	Mg	Sale price
No	Product No.	Description	Facility	Unit	Qty	Price	Total						
1	450107-00060A	TANK ASSY,RESERVE; WITH PROTECTOR	MAIN STORE	ea	10	63.93	639.30	198.11	12,665.17	2.7	34,195.97	2.70	34,195.97
2	230111-00106	POINT,TOOTH	MAIN STORE	ea	365	59.44	#######	198.11	11,775.66	2.7	31,794.28	2.70	31,794.28
3	2114-1931	WASHER,LOCK	MAIN STORE	ea	370	2.13	788.10	198.11	421.97	4.0	1,687.90	4.00	1,687.90
4	2705-1034	PIN,LOCK	MAIN STORE	ea	370	2.34	865.80	198.11	463.58	4.0	1,854.31	4.00	1,854.31
5	1.109-00058	BEARING,NEEDLE	MAIN STORE	ea	4	33.43	133.72	198.11	6,622.82	2.7	17,881.61	3.70	24,504.42
6	1.230-00012	CARRIER ASSY	MAIN STORE	ea	2	422.15	844.30	198.11	83,632.14	2.2	183,990.70	2.50	209,080.34
7	1.430-00073	COVER;REAR	MAIN STORE	ea	4	272.99	1,091.96	198.11	54,082.05	2.3	124,388.71	2.70	146,021.53
8	180-00345A	SEAL,FLOATING	MAIN STORE	ea	5	196.81	984.05	198.11	38,990.03	2.3	89,677.07	2.40	93,576.07

9	300513-00008	MOTOR,ENGINE CONTROL;2000 MM	MAIN STORE	ea	2	321.78	643.56	198.11	63,747.84	2.3	146,620.02	2.15	137,057.85
10	300611-00138A	CONTROLLER,ENGINE THROTTLE	MAIN STORE	ea	2	145.13	290.26	198.11	28,751.70	2.5	71,879.26	2.60	74,754.43
11	300611-00944	CONTROLLER,ENGINE THROTTLE	MAIN STORE	ea	2	139.48	278.96	198.11	27,632.38	2.5	69,080.96	2.60	71,844.20
12	300901-00206	ALTERNATOR;60A;8PK;TVS	MAIN STORE	ea	1	175.48	175.48	198.11	34,764.34	2.3	79,957.99	2.50	86,910.86
13	300901-00207	ALTERNATOR;80A;8PK;TVS	MAIN STORE	ea	1	190.73	190.73	198.11	37,785.52	2.3	86,906.70	2.50	94,463.80
14	410116-02431	VALVE,EPPR	MAIN STORE	ea	1	485.95	485.95	198.11	96,271.55	2.2	211,797.42	3.85	370,645.48
15	301309-00450	SENSOR,PRESSURE;50BAR	MAIN STORE	ea	10	59.25	592.50	198.11	11,738.02	2.7	31,692.65	2.90	34,040.25
16	301413-00286	SWITCH,PRESSURE;1/2-20 UNF,25BAR	MAIN STORE	ea	2	36.58	73.16	198.11	7,246.86	2.7	19,566.53	3.50	25,364.02
17	400102-00626	COMPRESSOR	MAIN STORE	ea	1	153.84	153.84	198.11	30,477.24	2.3	70,097.66	5.00	152,386.21
18	400632-00100	GASKET KIT,ALL OVERHAUL;DX12-MBE	MAIN STORE		6	436.58	2,619.48	198.11	86,490.86	2.2	190,279.90	2.30	198,928.99
19	430221-01047A	PLUG KIT;1,3	MAIN STORE	ea	20	21.48	429.60	198.11	4,255.40	2.7	11,489.59	2.70	11,489.59
20	430221-01048A	PLUG KIT;2,4	MAIN STORE	ea	20	21.48	429.60	198.11	4,255.40	2.7	11,489.59	2.70	11,489.59
21	K1002635	DAMPER	MAIN	ea	6	5.27	31.62	198.	1,044	3.	3,132.12	3.	3,236.

			STORE					11	.04	0		10	52
22	K1003296	SENSOR,TEMPERATURE	MAIN STORE	ea	5	4.97	24.85	198.11	984.61	3.5	3,446.12	5.00	4,923.03
23	200112-00517	GUARD,TRACK	MAIN STORE	ea	8	93.77	750.16	198.11	18,576.77	2.5	46,441.94	2.60	48,299.61
24	K1009970	GUARD,TRACK	MAIN STORE	ea	4	64.91	259.64	198.11	12,859.32	2.7	34,720.16	2.80	36,006.10
25	301308-00168	SENSOR;ANGLE	MAIN STORE	ea	2	506.61	1,013.22	198.11	100,364.51	2.2	220,801.92	2.00	200,729.01
26	301413-00287	SWITCH,PRESSURE;PF 1/4	MAIN STORE	ea	4	34.90	139.60	198.11	6,914.04	2.7	18,667.91	4.00	27,656.16
27	401107-00584	SEAL KIT,BUCKET	MAIN STORE	ea	5	81.77	408.85	198.11	16,199.45	2.5	40,498.64	2.85	46,168.45
28	401107-00757	SEAL KIT;ARM CYL	MAIN STORE	ea	5	109.03	545.15	198.11	21,599.93	2.5	53,999.83	2.50	53,999.83
29	401107-01023A	SEAL KIT;TRACK SPRING	MAIN STORE	ea	9	18.48	166.32	198.11	3,661.07	2.7	9,884.90	3.45	12,630.70
30	430221-00451A	PLUG KIT	MAIN STORE	ea	5	86.76	433.80	198.11	17,188.02	2.5	42,970.06	2.50	42,970.06
31	430221-01498	PLUG KIT	MAIN STORE	ea	4	43.09	172.36	198.11	8,536.56	2.7	23,048.71	2.70	23,048.71
32	430203-00037	ADAPTER,TOOTH	MAIN STORE	ea	20	81.62	1,632.40	198.11	16,169.74	2.5	40,424.35	2.60	42,041.32
33	K1036967	DAMPER	MAIN STORE	ea	5	16.90	84.50	198.11	3,348.06	2.7	9,039.76	2.70	9,039.76

34	K1048145	SENSOR,PRESSURE;500 BAR	MAIN STORE	ea	3	58.52	175.56	198.11	11,593.40	2.7	31,302.17	3.00	34,780.19
35	2401-9264KT	SEAL KIT;TRAVEL MOTOR	MAIN STORE	KIT	3	18.40	55.20	198.11	3,645.22	2.7	9,842.10	4.20	15,309.94
36	549-00089	SWITCH;PILOT CUT OFF	MAIN STORE	ea	2	9.00	18.00	198.11	1,782.99	3.0	5,348.97	4.00	7,131.96
37	300619-02309A	ELECTRIC UNIT;TIME DELAY	MAIN STORE	ea	2	25.09	50.18	198.11	4,970.58	2.7	13,420.57	3.30	16,402.91
38	301316-00199	SENSOR,FUEL;CAN(850MM)	MAIN STORE	ea	6	304.16	1,824.96	198.11	60,257.14	2.3	138,591.42	2.30	138,591.42
39	301316-00016	SENSOR,FUEL	MAIN STORE	ea	3	34.87	104.61	198.11	6,908.10	2.7	18,651.86	3.00	20,724.29
40	300611-00271A	CONTROLLER; WIPER	MAIN STORE	ea	1	60.18	60.18	198.11	11,922.26	2.7	32,190.10	2.70	32,190.10