**IMPLEMENTATION OF FURNITURE INVENTORY MANAGEMENT SYSTEM. CASE STUDY: SIRON FURNITURE COMPANY LTD**

**BY**

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**A RESEARCH PROJECT PROPOSAL SUBMITTED TO THE SCHOOL OF COMPUTING AND INFORMATION SCIENCE, DEPARTMENT OF COMPUTER SCIENCE IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF BACHELORS DEGREE OF INFORMATION TECHNOLOGY AND COMPUTING OF KYAMBOGO UNIVERSITY**

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# List of Acronyms

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| **Abbreviations**  CSS  CAG  DFDs  EAC  EOQ  ERP  ERD  FIMS  HTML  HTTP  IAS2  IMS  ITR  JIT  MRO  PHP  PFC  PPDA  SMEs  SQL  US  VMI  WIP | **Acronyms Glossary**  Cascading Style Sheets  Compound Annual Growth Rate  Data Flow Diagrams  East African Countries  Economic Order Quantity  Enterprise Resource Planning  Entity Relationship Diagram  Furniture Inventory Management System  Hypertext Markup Language  Hypertext Transfer Protocol  International Accounting Standards 2  Inventory Management System  Inventory Turnover Ratio  Just-in-Time  Maintenance, Repair & Operations  Hypertext Preprocessor  Prominent Furniture Companies  Public Procurement and Disposal of Assets  Small and Medium-sized Enterprises  Structured Query Language  United States  Vendor Managed Inventory  Work-in-progress |

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# CHAPTER ONE

# INTRODUCTION

## Introduction

This chapter summarizes the background of the study**,** problem statement, Research questions, objectives, Definition of key terms and significance are all effectively integrated throughout the chapter, offering a solid foundation for the investigation of this strategic task.

## Background to the Study

### Global Perspective

Inventory management is a critical aspect of organizational operations, with significant implications for performance and efficiency. Historically, East African Countries (EAC) employed the "eyes ball inventory method," where managers visually inspected inventory and reordered items as needed. However, this method was prone to errors, resulting in backorders, delayed cash flows, and loss of customers (Berry, 1998). Modern inventory control systems, predominantly based on barcode technology, have revolutionized inventory management. These systems operate in real-time, using wireless technology to transmit data to a central computer system as transactions occur. They find extensive application in retail, warehouses, manufacturing, shipping, and receiving, facilitating efficient order tracking and processing.

Basheka (2005) highlights inventory as a major cost in the supply chain, significantly impacting procurement efficiency. According to a survey by Prominent Furniture Companies (PFC), distribution costs of inventory constitute 3-5% of total revenue, with inventory control and management accounting for 60%. This underscores the potential for substantial savings through effective inventory control.

Today, inventory control directly impacts procurement efficiency and overall organizational performance. To achieve cost-effective management and control of inventory, procurement, and materials, managers must transition from traditional methods like eyeball inventory control to modern management techniques which is highly contributing to the current furniture market.

In 2024, Uganda's Furniture market is estimated to generate a revenue of US$116.80 million. The market is anticipated to grow annually at a Compound Annual Growth Rate (CAGR) of 8.77% from 2024 to 2028 (*Furniture - Uganda | Statista Market Forecast*, n.d.). The largest segment within this market is the Living Room Furniture segment, forecasted to reach a market volume of US$37.51 million in 2024. In comparison, the United States leads globally in Furniture market revenue, with an estimated value of US$253 billion in 2024. When considering the total population figures, the per person revenue in Uganda's Furniture market is projected to be US$2.34 in 2024. Moreover, there is a noticeable trend towards the demand for locally-made, handcrafted furniture in Uganda. This reflects an increasing interest in supporting local artisans and advocating for sustainable practices within the industry (*Furniture - Uganda | Statista Market Forecast*, n.d.).

### Historical Perspective

Siron Furniture Company which was first founded in 1990 as Chelat's General Workshop, it was a small carpentry and joinery business. The initial years were marked by limited resources, such as a small number of hand tools, just a few staff, and small workspaces. With its locally made goods, Siron Furniture showcased its craftsmanship while catering mostly to the local and domestic market (Latif, 2020).

The turning point for Siron Furniture Inventory System occurred in 2010 when the business underwent a transformative phase with the incorporation of machinery. This strategic decision marked the beginning of a significant growth trajectory for the company. The infusion of machines propelled Siron Furniture Company Ltd into a prominent player in the furniture industry, boasting a substantial production capacity and capturing a larger market share despite the existence of inefficiency in its inventory management (Edrisa, 2014).

### Theoretical Perspective

Inventory management, also known as stock control, involves striking a balance between inventory needs and minimizing associated costs. It encompasses managing stocks of finished products, semi-finished products, and raw materials within a firm. Inventory represents a significant investment and is typically a company's largest asset. Effective management of inventory is crucial for success in a competitive market, as it helps prevent overstocking and ensures adequate product availability to meet customer demands while maximizing profits (Arnold, 1991).

### Specific Perspective

Despite Siron Furniture Inventory System expanded operations, production capabilities and market size in the furniture industry, The Company still faces new challenges particularly in the realms of inventory and production management. The increased scale of production, diversified product offerings, and a broader market presence necessitated a more sophisticated and streamlined approach to managing inventory. The existing manual systems proved inadequate to cope with the complexities arising from the expanded business operations.

In response to these challenges, the Siron Furniture Inventory System is proposed to be developed as a strategic and comprehensive solution. This system will be designed to be a vital instrument for meeting the company's evolving needs. By offering efficient inventory and production management capabilities, the Siron Furniture Inventory System positions itself as an ideal solution to the company's challenges.

The incorporation of technology and a systematic approach through the Siron Furniture Inventory Management System aligns with the company's commitment to adapting and thriving in a dynamic business landscape. As the company continues to evolve and establish itself as a major player in the furniture industry, the Siron Furniture Inventory System stands as a testament to innovation, efficiency, and a commitment to overcoming operational challenges. This system not only streamlines internal processes but also contributes to sustaining the company's growth and competitiveness in the market.

## 1.1 Problem Statement

In previous years, there has been many registered cases of poor inventory management which is evident by the level of theft and loss of items in stores. There has also been many occasions inventory running out of supplies hence not only paralyzing operations of the organization but also causing uprisings (The New Vision, March 31, 2011). They have also been reports of poor procurement procedures that are responsible for acquisition of poor inventories and loss/wastage of funds (PPDA report, 2005).

Despite being a large-scale growing business with a large production and market size, Siron Furniture Company Ltd continues to experience significant inefficiencies in its inventory management operations due to a lack of a centralized, automated system. This results in incorrect stock levels, stockouts, and difficulties tracking inventory movements.

Manual inventory management processes are labor-intensive, time-consuming, and error-prone. The lack of a cohesive inventory management strategy hinders the company's ability to forecast demand, optimize inventory levels, and align production schedules with customer requirements. Implementing a Furniture Inventory Management System (FIMS) would address these inefficiencies, improve inventory performance positioning the company for sustainable growth, improve customer satisfaction, and enhance competitiveness in the furniture industry.

## 1.2 Research Questions

### 1.2.1 General Research Question

What inventory management system will address inventory inefficiencies and poor performance at Siron Furniture Company Ltd.?

### 1.2.2 Specific Research Questions

1. What are the specific requirements for implementing a Furniture Inventory Management System (FIMS)?
2. What is the design of the system to be developed?
3. What testing and validating procedures will be used?

## 1.3 Objectives

### 1.3.1 General Objective

To examine how the implementation of a Furniture Inventory Management System (FIMS) affects inventory management performance and efficiency.

### 1.3.2 Specific Objectives of the Study

1. To determine the requirements necessary for implementation of a Furniture Inventory Management System (FIMS).
2. To design a systematic and customized Furniture Inventory Management System (FIMS) that works effectively with Siron Furniture Company Ltd.
3. To test and validate the developed system.

## 1.4 Scope of Study

### 1.4.1 Subject Scope

This study will focus on the development and implementation of the Siron Furniture Inventory System, which is designed to reduce inefficiencies in inventory management operations at Siron Furniture Company Ltd due to a lack of a centralized, automated system to improve overall performance. It involves the aspects of inventory tracking, production management, and overall operational efficiency.

### 1.4.2 Geographical Scope

The geographical scope of this study focuses on Siron Furniture Company Ltd.’s operations, particularly its presence in Eastern Uganda. The town of Kapchorwa District, located in the Central Division, serves as an administrative center for analyzing the company's activities and determining their effects on the local community and economy.

### 1.4.3 Time Scope

This study will last for 6 months (from January 2024 to June 2024).

**January 2024**

The initial phase, beginning in January 2024, will focus on conducting a comprehensive assessment and survey of relevant literature related to the Siron Furniture Inventory System. The objective is to understand the current landscape, functionalities, and requirements of the Siron Furniture Inventory System platform, laying the groundwork for future development stages.

**February 2024 to March 2024**

Requirements Gathering and Planning, this period will be dedicated to gathering specific requirements for Siron Furniture Inventory System and outlining a detailed plan for development. Stakeholder consultations and feedback will be crucial in shaping the features and functionalities of Siron Furniture Inventory System. I will interview at least 10 employees from Siron Furniture Company Ltd for a maximum of 10 minutes, as a way collecting data including questionnaires.

**April 2024 to May 2024**

System Development, during this time, the main development phase will begin, with a focus on creating the Siron Furniture Inventory System platform in accordance with the defined requirements. This includes coding, testing, and developing the system to ensure that its functionality is consistent with the intended objectives.

**June 2024**

The final month of the development timeline will be dedicated to rigorous testing and evaluation of Siron Furniture Inventory System. This phase aims to identify and address any bugs, glitches, or performance issues, ensuring a stable and reliable platform. By the end of June 2024, the Siron Furniture Inventory System platform is expected to be developed, tested, and ready for deployment, marking the completion of the development phase.

## 1.5 Significance of the Study

This study has significance because it provides valuable insights into the relationship between inventory management controls and performance during the implementation of a Furniture Inventory Management System (FIMS). This will benefit the following groups;

### 1.5.1 Finance Administrators and Operational Staff

Finance administrators and operational personnel in furniture manufacturing enterprises may find particular value in the study's observations regarding the relationship between inventory management controls and performance during FIMS deployment.   
The study's recommendations can help these professionals make well-informed judgments on inventory management controls and use the FIMS's data-driven insights to improve overall organizational performance.

### 1.5.2 Decision-Makers and Executives

* Decision-makers within furniture manufacturing companies can utilize the findings and recommendations of this study to optimize inventory management strategies during FIMS implementation.
* Insights derived from the study can empower executives to allocate resources effectively and prioritize initiatives that enhance inventory management controls, ultimately leading to improved organizational performance.

### 1.5.3 Research Community and Academics

The study lays a solid foundation for future research endeavors aimed at delving deeper into the impact of FIMS implementation on inventory management performance within the furniture manufacturing sector.

### 1.5.4 Industry Practitioners and Innovators

Industry practitioners can leverage the findings to streamline inventory management processes, enhance productivity, and maintain competitiveness in the market.

## 1.6 Definition of key terms

* **Inventory**

Inventory refers to the goods and materials that a business holds for the ultimate purpose of resale or use in production processes. It includes raw materials, work-in-progress, and finished goods. In retail, inventory typically consists of products available for sale to customers, while in manufacturing, it may include raw materials, components, and finished products. Effective inventory management is crucial for businesses to ensure they have enough stock to meet customer demand without overstocking, which can tie up capital and lead to wastage.

* **Inventory management**

Inventory management is a strategic approach to control an organization's assets and resources, aiming to enhance shareholder value and stakeholder satisfaction. It involves policies, procedures, and practices to efficiently allocate, procure, store, and distribute inventory for operational efficiency.

* **Inventory management system**

An Inventory Management System (IMS) is a software application or platform that businesses use to track, manage, and control their inventory levels. It helps businesses optimize their inventory by providing real-time visibility into stock levels, orders, sales, and deliveries. Key features of inventory management systems typically include:

1. **Inventory Tracking,** Allows businesses to track stock levels across multiple locations, warehouses, or stores.
2. **Order Management,** Enables businesses to create, process, and track orders for replenishing inventory or fulfilling customer orders.
3. **Inventory Optimization**, Provides tools for analyzing sales data, demand forecasts, and lead times to optimize inventory levels and reduce stockouts or overstock situations and many others.

## 1.7 Chapter Summary

This chapter explores deeply into Siron Furniture Company Ltd.’s history and lays out the foundation for the project. It describes the company's origins, focusing on its transformative phase in 2010 with the introduction of machinery. This evolution provides context for understanding the company's current inventory and production management challenges. In addition, the chapter introduces the proposed solution using the Siron Furniture Inventory System. Finally, it summarizes key elements such as the historical context, problem statement, objectives, research questions, and study significance, laying the groundwork for further investigation.

# CHAPTER TWO

# LITERATURE REVIEW

## 2.0 Introduction

This chapter provides a summary of the relevant literature on inventory management systems. It covers topics such as inventory management techniques, the impact of having too much or too little stock, how inventory control influences organizational performance, and inventory control principles. It also provides a theoretical and empirical summary of the body of recent research on inventory management systems. This chapter also covers the idea of inventory, rationales for maintaining stock, types of stock, expenses related to stock, importance of stock control, challenges with existing procedures, and inventory decisions.

## 2.1 Concepts and systems of Inventory

Inventory, as defined by various scholars, encompasses a range of materials and resources crucial for business operations. Kenneth and Lysons (1996) and the International Accounting Standards (IAS2) delineate inventory as comprising raw materials, work in progress, finished goods, and consumables, reflecting standard accounting practices.

Barneth (1996) emphasizes the role of inventory in meeting market demand, focusing on raw materials and sub-components held by enterprises for this purpose. Nahmias (2001) broadens the scope, defining inventory as any resource serving present or future needs, underlining its adaptive nature. Saleemi (2000) highlights inventory's pivotal position, linking production to the sale of products, while Nair (2003) offers a comprehensive view by including various stages of production and assembly.

Profitability, according to Pandy (1998), signifies the return on business operations after deducting expenses from income, although interpretations may differ among accountants and economists, with the former concentrating on financial metrics and the latter considering broader economic indicators. Together, these perspectives underscore the complexity and significance of inventory management and profitability assessment in business contexts, reflecting diverse viewpoints and considerations.

### 2.1.1 Inventory

Inventory is a quantity or store of goods that is held for some purpose or use. The term may also be used as a verb, meaning to take inventory or to count all goods held in inventory. Inventory may be kept “in-house,’ meaning on the premises or nearby for immediate use; or it may be held in a distant warehouse or distribution center for future use. With the exception of firms utilizing just-in-time methods, more often than not, the term “inventory” implies a stored quantity of goods that exceeds what is needed for the firm to function at the current time (*Yang, S. Y. (2007). An Integrated Inventory Model under Supplier Credits Linked to Order Quantity. International Journal of Production Economics, 107(2), 486-493. - Google Search*, n.d.).

Oslon (2008) argues that inventory, in itself, is not inherently negative and serves various purposes within a business context. These purposes include: the ability to sell products, safeguard against shortages, mitigate risks associated with poor quality, and alleviate the impacts of inefficient systems. The perception and utilization of inventories vary depending on the nature of the business. Gardener and Danmerbring (1991) categorize inventories into three main types: raw materials, work in progress, and finished goods. They define raw materials as inputs used in manufacturing processes that are transformed into finished products. Work in progress refers to partially manufactured goods requiring further processing, while finished goods are fully completed products ready for sale or use. Additionally, supplies, as noted by Gardener and Danmerbring, are resources utilized to facilitate office and business operations, distinct from goods intended for resale or direct production use. This classification is echoed by Maire (2011) and Meredith, Jack, Scott (2002), who also acknowledge the importance of distinguishing between various inventory types, including supplies. Lysons (2000) further emphasizes the significance of inventory management, describing it as the process of planning and controlling inventories from raw material acquisition to customer delivery as needed. He elaborates on the comprehensive scope of inventory management, encompassing raw materials, components, assemblies, consumables, work in progress, and finished stock. Overall, these perspectives highlight the multifaceted nature of inventory management and the diverse roles inventories play in business operations.

### 2.1.2 Inventory Control.

Inventory control, also known as stock control, is a critical aspect of managing resources within an organization, as outlined by www.businesslink.gov.uk. It entails monitoring the quantity of stock available at any given time and the methods employed to track it. This encompasses every item utilized in the production of goods or services, ranging from raw materials to finished products. Inventory control spans the entirety of the production process, from procurement and delivery to utilization and replenishment. Effective inventory control ensures the optimal amount of stock is available in the right place and at the right time, preventing unnecessary capital tie-up and safeguarding production continuity in the face of supply chain disruptions.

Brown (2001) further defines inventory control as the management of resources held by an organization for future use, encompassing inputs and outputs held for prospective customer consumption. It involves planning, ordering, and scheduling materials used in manufacturing processes and oversees three types of stock: raw materials, work-in-progress, and finished goods (Zenz, 1994).

According to Lysons (2003), inventory control involves employing technologies to maintain optimal stock levels of raw materials, work-in-progress, and finished goods, ensuring maximum service delivery at minimum costs. It encompasses determining the range and quantities of stock to be held, as well as their receipt and issuance within stores operations.Slack et al. (1998) add that inventory represents an accumulation of resources within transformation systems, primarily referring to transformed inputs or resources rather than those awaiting transformation or requisition by customers.

Morse (1981) characterizes inventory management as the process through which management establishes optimal policies to maintain adequate inventory levels at minimum costs, covering raw materials, work-in-progress, and finished goods.

### 2.1.3 Adequate Inventory Control

Adequate inventory control involves maintaining an optimal balance of inventory, neither too much nor too little, as emphasized by Pandey (1998). This balance is essential for addressing two conflicting needs within inventory management:

* The need to maintain a sufficient inventory size for smooth production and sales operations.
* The need to minimize investment in inventory to maximize profitability.

Assessing inventory adequacy involves scrutinizing two main areas: excess inventory and insufficient inventory.

(*Hsieh, T. Y. (2002). A Production-Inventory Model with Fuzzy Total Demand and Fuzzy Production Quantity. European Journal of Operational Research, 140(3), 562-570. - Google Search*, n.d.) Organizations typically do not intentionally carry excess inventory as part of a strategic plan. Instead, inventory increases gradually, often due to various factors such as fear of loss of sales, promotional deals, lack of measurement, limited planning, supplier performance issues, and absence of efficient processes, as noted by LTD Management: Philadelphia, PA.

Excess inventory accumulation usually results from multiple factors rather than a single cause, indicating a lack of prioritization, processes, and control. However, excess inventory can serve several purposes within an organization, such as ensuring supply continuity and satisfying clients.

Nevertheless, excessive inventory can have detrimental effects, including financial liquidity issues, potential obsolescence, and missed market opportunities, as highlighted by Olson (2008) and LTD Management.

To address excess inventory challenges, strategies and processes must be implemented, such as lean practices, comprehensive inventory measurement, supply chain optimization, segmentation of inventory by velocity and profitability, and implementation of sales and operations planning programs.

Overall, achieving a balance in inventory control is crucial for organizational success, as asserted by Salemi (1990). Inventory control remains both an art and a science, requiring human judgment, experience, and expertise to meet organizational objectives effectively.

### 2.1.4 Inventory Control Techniques

* Coding involves assigning unique codes to items in stock to facilitate easy identification and tracking throughout the inventory management process.
* Economic Order Quantity (EOQ) is a method used to determine the optimal order quantity that minimizes both holding and ordering costs, thereby optimizing inventory management efficiency.
* Fixed Re-order Level is a technique where a minimum inventory level is established, triggering the reordering process once inventory falls below this level, ensuring that stock is replenished in a timely manner.
* Standardization involves establishing uniform identification and specifications for materials, parts, and consumables, streamlining procurement processes and reducing costs associated with inventory management.
* Just-in-Time (JIT) is a strategy aimed at reducing inventory levels by receiving goods only when needed for production or sale, thereby minimizing holding costs and improving operational efficiency.
* Reduced variety refers to the practice of standardizing and rationalizing the selection of materials, parts, and consumables, simplifying inventory management processes and reducing costs associated with inventory complexity.
* Integrating inventory management with Enterprise Resource Planning (ERP) systems enhances coordination and visibility across organizational systems, enabling better decision-making and resource allocation. Each technique offers specific advantages and challenges, depending on organizational needs and contexts. For example, EOQ helps minimize holding and ordering costs, while JIT reduces inventory holding costs but requires precise coordination with suppliers.
* Despite the diversity of techniques, the overarching goal remains the same: to optimize inventory levels to meet customer demand efficiently while minimizing costs and improving overall organizational performance.

## 2.2 Types of inventory

Inventory have been recognized as being of three types and these include: raw materials (the resources required in the production processing activity of the firm in the context of manufacturing or else those materials which require machining for instance steel bars). Work in progress, (material in various stages of manufacture in the machine shop) and finished goods (final products which are ready for sale).

On the list Lyson (1996) include consumables (end products to the consumer. *Panday (1995)* points out another kind of inventory called supplies, these are maintained by the enterprises and these include office and plant clearing materials oil, to mention but a few. Nair 2003 also identified another set of inventory namely purchased (which include standard parts; proprietary items parts

Manufactured by sub constructors to prime manufacturers own design sub assembly and final assembly.

## 2.3 Inventory Management Practices

Inventory management practices are essential components of organizational operations, with various studies evaluating their impact and effectiveness. Narayanapillai (2010) categorized inventory management practices into conventional/traditional and modern, with modern practices such as EOQ and VMI associated with higher inventory turnover rates (ITRs). Farooquie and Khan (2010) highlighted the cost-saving benefits of modern practices like JIT and Lean Procurement, emphasizing their superiority over traditional models. However, strategies must align with specific business objectives, emphasizing the importance of tailored approaches(Salameh & Jaber, 2000). For SMEs like Siron Furniture Company Ltd, effective inventory control strategies are critical for maintaining stability and profitability, often utilizing inventory classification methods like ABC classification to prioritize resources. Moreover, Lopez et al. (2013) identified EOQ as a critical model for inventory management due to its role in determining reorder points and optimal order quantities.

### 2.3.1 Factors that Influence the Adoption of Inventory Management Practices

Research has explored the influence of factors such as industry type and institutional pressures on inventory management practices. Shah and Shin (2007) noted variations in practices across sectors and the differential impact of IT investments on inventory performance. Prakash (2002) emphasized the role of institutional theory, suggesting that firms adopt strategies based on normative pressures and environmental influences. Chandler and Hwang (2015) further elaborated on how firms respond to external pressures by implementing institutionalized practices. This study aims to investigate similarities and differences in inventory management practices between retail and manufacturing/distribution SMEs in Jamaica, exploring the influence of institutional factors on strategy adoption.

### 2.3.2 Importance of Inventory Management

Effective inventory management contributes significantly to organizational productivity, competitiveness, and financial performance. Chalotra (2013) highlighted the role of inventory management in enhancing supply chain efficiency, minimizing costs, and achieving high ITRs. However, challenges in implementing inventory management practices may hinder performance improvement, as observed by Narayanapillai (2010) and Farooquie and Khan (2010). Moreover, Piasecki (2001) cautioned against aggressive inventory turnover goals, stressing the importance of balanced inventory management strategies. This research seeks to assess the impact of inventory management practices on the financial performance of Jamaican SMEs, focusing on the use of ITR as a performance metric.

### 2.3.3 Measuring Inventory Management through ITR

Inventory turnover ratio (ITR) serves as a critical measure of inventory management effectiveness, reflecting the frequency of inventory replenishment. Narayanapillai (2010) found that SMEs adopting modern inventory practices achieved higher ITRs and improved competitiveness. However, Choudhary and Tripathi (2012) argued that factors beyond inventory, such as marketing strategies, influence financial performance. Additionally, Piasecki (2001) cautioned against solely relying on ITR to evaluate performance, emphasizing the need for a balanced approach to inventory management. This study aims to investigate the relationship between inventory management practices, ITR, and financial performance among Jamaican SMEs.

## 2.4 Inventory Management Practices

Research examining inventory management practices has often categorized them into traditional and modern strategies such as Vendor Managed Inventory (VMI), Enterprise Resource Planning (ERP), Just-in-time (JIT), and Economic Order Quantity (EOQ). Narayanapillai (2010) classified inventory management practices into modern and conventional, with modern practices like EOQ and VMI resulting in higher Inventory Turnover Ratios (ITRs). Farooquie and Khan (2010) suggested that modern practices offer cost savings and improved profitability compared to basic models, emphasizing the importance of tailoring strategies to business objectives. SMEs in Jamaica, particularly in retailing and manufacturing, face challenges in inventory management due to complexities in managing raw materials, work-in-progress, and finished goods. Hatefi, Torabi, and Bagheri (2014) highlighted the significance of inventory classification, with the widely accepted ABC classification helping firms prioritize resources effectively. Flores, Olson, and Dorai (1992) proposed factors like lead times and obsolescence, alongside financial considerations, for inventory classification, stressing the need for customization based on business nature. Buxey (2006) underscored the importance of implementing control systems and utilizing ABC classification, emphasizing that not all items should be treated equally. Despite advancements in technology, Piasecki (2001) argued that companies still struggle with implementing fundamental inventory models due to data inaccuracies, suggesting a gap between knowledge and practice.

### 2.4.1 Factors Influencing Adoption of Inventory Management Practices

Shah and Shin (2007) observed contrasting patterns of inventory practices across sectors, indicating differences in performance impact and IT investment influence. Prakash (2002) suggested that firms adopt strategies based on external pressures and institutional norms, with Chandler and Hwang (2015) emphasizing the role of institutional theory in shaping firm practices. This research aims to explore similarities and differences in inventory strategies among retail and manufacturing SMEs in Jamaica, investigating the influence of institutional pressures on practice adoption.

### 2.4.2 Value of Inventory Management

Effective inventory management enhances business operations, optimizing productivity, competitive advantage, and market diversification (Chalotra, 2013). Small-scale industries recognize inventory management's role in improving asset productivity and targeting customers (Chalotra, 2013). However, Narayanapillai (2010) found that despite understanding its importance, some SMEs failed to implement inventory management practices, leading to missed financial benefits. This study aims to examine the impact of inventory management practices on SME performance in Jamaica, focusing on ITR as a critical performance indicator.

### 2.4.3 Measuring Inventory Management through Inventory Turnover Ratio (ITR)

Inventory Turnover Ratio (ITR) serves as a key metric for assessing inventory management effectiveness, indicating how often inventory is replenished over time (Narayanapillai, 2010). High ITRs suggest efficient inventory use, while low ratios indicate overstocking or poor sales (Farooquie and Khan, 2010). Despite its significance, there is inconclusive evidence on the impact of inventory management on firm performance (Choudhary and Tripathi, 2012). This study aims to evaluate the relationship between inventory management practices, ITR, and SME performance in Jamaica's retail and manufacturing sectors.

## 2.5 Impact of Inventory Control on Organizational Performance

Inventory control plays a crucial role in influencing organizational performance across various dimensions. Effective inventory management directly impacts the cost structure, customer service levels, and profitability of an organization.

* Expense Control According to Bancroft (1997) and Dibb (1997), effective inventory control helps reduce holding costs, setup costs, and purchasing costs, all of which contribute to overall cost reduction and increased profitability.
* Client Support According to Saunders (1997), efficiently managed inventory guarantees prompt order fulfillment, cutting down on delays and raising customer satisfaction. Higher customer satisfaction increases loyalty and repeat business.
* Operational Efficiency Marcouse (1998) emphasizes how effective inventory management streamlines processes, reduces non-value-added activities, and improves resource utilization. Techniques such as JIT lead to faster deliveries, higher stock turnover, and improved facility utilization.
* Profitability According to Frank (1996) and Glartier (2002), proper inventory control has a direct impact on profitability because it lowers operational costs, increases customer satisfaction, and improves resource utilization.
* Time Management According to Saunders (1997) and Marcouse (1998), effective inventory management frees up time for procurement, warehouse management, and manual record-keeping, allowing organizations to focus on core activities and strategic initiatives.   
  Overall, inventory control has a significant impact on organizational performance by lowering costs, improving customer service, increasing operational efficiency, and boosting profitability. Thus, investing in strong inventory management practices is critical for long-term success.

## 2.6 Challenges of Inventory in Siron Furniture Company Ltd in Kapchorwa

Despite the benefits of inventory control, organizations face several challenges in implementing and maintaining effective inventory management practices. These challenges include:

* Limited technology. Manual inventory tracking and data entry processes can result in errors, delays, and inefficiencies, preventing accurate inventory management and decision-making.
* Theft. Both internal and external theft can lead to inventory losses, reducing profitability and operational efficiency. Implementing strong security measures and inventory controls is critical for mitigating theft risks. Supply and Demand Variability: Delays in supply chain operations and fluctuations in demand can lead to inventory imbalances, resulting in stockouts or excess inventory. Organizations must anticipate and respond to supply and demand changes proactively to minimize disruptions.
* High Inventory Management Costs. Labor-intensive inventory management processes can result in high operational costs, reducing profitability. Leveraging technology and automation can help streamline inventory management and reduce costs.

Addressing these challenges requires a combination of technology adoption, process optimization, risk mitigation strategies, and continuous improvement initiatives. By overcoming these challenges, organizations like Siron Furniture Company Ltd in Kapchorwa can optimize inventory management practices and enhance overall performance.

## 2.7 Inventory Control Systems

### 2.7.0 Inventory Control

Obtaining realistic input values for mathematical inventory model parameters is challenging due to the uncertain environment in which decision-makers operate. Uncertainty in inventory control stems from factors like unknown customer demand rates, manufacturing, and delivery lead times. Existing inventory management theories primarily focus on deterministic parameters, which may not fully capture real-world complexities. In response, fuzzy models of inventory management, based on fuzzy set theory proposed by Zadeh (1965), have gained prominence. Fuzzy logic provides methods for handling imprecision and uncertainty quantitatively, often used in conjunction with artificial intelligence techniques like expert systems and artificial neural networks.

Galbraith (1973) defines uncertainty as the gap between the information required for a task and the information currently possessed. In production management, various forms of uncertainty, categorized by Ho (1989) into environmental and system uncertainty, impact processes. Environmental uncertainty encompasses factors beyond production processes, such as demand and supply fluctuations, while system uncertainty relates to uncertainties within the production process itself, including operational yield, lead time, quality, and system failures.

A new stage in inventory management theory involves developing models that account for uncertainty, recognizing its pervasive influence on production processes.

### 2.7.1 Main types of inventory control systems

Perpetual and periodic inventory control methods are widely used across industries, with periodic inventory being better suited for small businesses with fewer processes and fewer stock handling, compared to large-scale businesses with multiple distribution centers(*Types of Inventory Control Systems - Google Search*, n.d.).

1. **Perpetual Inventory System**  
   Perpetual inventory systems are designed to record and manage inventory data in real time, and this is done by auditing inventory at every point of contact in the distribution cycle, documenting each time inventory is received, moved, stocked, or sold. This recursive process continually updates your inventory so it essentially gets double-checked each time it goes through a different process(Huston et al., 2020).
2. Periodic Inventory System  
   A more cost-effective system to maintain, the periodic inventory system operates with a before-and-after approach that’s based on scheduled inventory audits. For example, inventory might be checked periodically (once a month, for example), and at that point your inventory data would be corrected to reflect any fluctuations due to human error, damage, or waste(Kurdi et al., 2022).

2.8 Chapter Summary

The second chapter explores the multiple inventory management systems. It begins by outlining the fundamental concepts of inventory, including its various forms and functions in business operations. The chapter covers a range of topics, from scholars defining inventory as raw materials, work in progress, and finished goods to the classification of inventory types such as supplies and consumables. Through an overview of scholarly insights, it emphasizes the importance of inventory in facilitating production, sales, and overall business continuity.

The chapter finally explores inventory management challenges, including technological limitations, supply chain disruptions, and costs, and provides strategies for organizations to address these issues and maintain operational efficiency.

# CHAPTER THREE

# RESEARCH METHODOLOGY

## 3.0 Introduction

This chapter presents a comprehensive research methodology aimed at actualizing the objectives of the Furniture Inventory Management System (FIMS). It involves requirements identification and analysis, system design, system implementation, system testing, and validation. The chosen research design integrates methods for data collection, with a significant emphasis on interviews, questionnaires, and surveys. The analytical techniques applied aim to ensure the effectiveness and durability of FIMS in addressing the stated difficulties within Siron Furniture Company Ltd. by carefully evaluating the particulars of inventory management systems, inventory control, and production management.

## 3.1 Research Design

The research design adopted for this study employs a mixed-methods approach, seamlessly integrating both quantitative and qualitative research techniques. With the use of this hybrid design, it is possible to thoroughly investigate the various aspects that impact inventory management at Siron Furniture Company Ltd. It guarantees an in-depth understanding of the difficulties of operational staff and inventory manager’s encounter when negotiating the complexity of production management and inventory control. The study's integration of surveys and questionnaires allows for a comprehensive inquiry, utilizing both statistical data and qualitative insights to reveal the unique characteristics of inventory management techniques and their influence on organizational performance.

## 3.2 Target Group

This study aims to target all personnel involved in inventory management and control within Siron Furniture Company Ltd., including inventory managers, warehouse staff, operational personnel, as well as procurement officers responsible for supplies acquisition. Additionally, the study encompasses customers who interact with the inventory system, particularly those involved in the procurement and sales processes. The primary focus is on adults above 18 years, encompassing both males and females, who are directly engaged in inventory-related activities and decision-making processes at various levels within the organization.

## 3.3 Sample Size and Selection

The sample size selected will encompass all employees involved in inventory management and control within Siron Furniture Company Ltd., including warehouse staff, inventory managers, operational personnel, and procurement officers, aged between 18 and 70 years, with at least 5 members in each group. Additionally, it will include customers who engage with the inventory system, particularly those involved in procurement and sales processes, aged 18 years and above, also with at least 5 members in each group. The aim is to involve individuals actively engaged in inventory-related decision-making processes and activities within the organization.

## 3.2 Systems Analysis

Systems analysis will lead to gaining wide understanding of the existing systems. Literatures will be read and data will be collected from the system users to analyze and determine the functional and non-functional requirements of the new system.

### 3.2.1 Determining System Requirements

The Requirement determination involves data collection and data analysis in order to determine the functional and non-functional requirements for the new system implementation. A system requirement is the feature to be included in a system and system requirements are often used as a guideline as opposed to an absolute rule. The requirements are either Functional or non-functional.

1. **Functional requirements**

Defines a function of a software system or its component, the specifications of what the system is exactly supposed to do and their main output is the actual product of the system. In short, they are the basic functions that the system will be able to perform.

**ii) Nonfunctional requirements**

These are specifications that characterize the behavior of the system and their output is the effect the system has on the users. Non-functional requirement is a requirement that specifies criteria that can be used to judge the operation of a system, rather than specific behaviors.

## 3.4 Data Collection Methods

### 3.4.1 Literature reviews

Literature reviews will be conducted by exploring various sources, ranging from scholarly articles to case studies, unveiling the requirements within the field of inventory management systems. As the literature unfolds, it will not only inform the project team about proven functionalities and successful approaches but also serve as a compass for navigating challenges faced by contemporary systems. In this process, industry trends and cutting-edge innovations will be identified, ensuring that the Siron Furniture Inventory Management System (SFIMS) is not only a response to current needs but also a forward-looking solution. This approach will facilitate the addressing of the first and third research questions effectively.

### 3.4.2 Questionnaires

Specialized surveys will be carefully created with the intention of gathering information from administrators, professionals in inventory management, and potential consumers at Siron Furniture Company Ltd. These surveys will be an essential tool for exploring the numerous requirements and demands pertaining to the features and attributes of the Furniture Inventory Management System (FIMS). Every query will be carefully constructed to generate in-depth answers, guaranteeing a thorough comprehension of the various viewpoints within the user population. The development team will be able to better align FIMS with the strategic and practical requirements found during this data collection phase by using the questionnaires as a direct platform for stakeholders to express their unique desires, preferences, and challenges. This strategy successfully responds to the first and follow-up research questions.

### 3.4.3 Interviews

Participants who are involved in inventory-related activities at Siron Furniture Company Ltd., such as inventory managers, warehouse employees, operational staff, procurement officers, and customers, will be the subject of customized interviews. These interviews will be an essential tool for examining the complex needs and expectations pertaining to the features and details of the Inventory Management System for Siron Furniture. Strategic question formulation will yield in-depth answers, guaranteeing a thorough grasp of the range of viewpoints present within the user population. Through direct communication channels such as interviews, stakeholders will be able to express their unique wants, preferences, and challenges. This will enable the development team to better align FIMS with the strategic and practical requirements that were established during this data collecting phase. The first and second research questions can be successfully addressed with this strategy.

### 3.4.4 Observation

This process will involve witnessing or watching activities and processes that are taking place so as to collect information on day-to-day processing and tracking of management activities.

### 3.4.5 Document review

This will involve the use of books and other related projects that have been done. This will help to identify the indicators that have been used before in similar projects and then see how these can be applied in the system being developed.

### 3.4.6 Data analysis

This will involve the interpretation of data gathered through the use of analytical and logical reasoning to determine patterns, relationships or trends. The data collected by the various tools mentioned above will be grouped, analyzed and interpreted. This will enable better decision-making and ultimately increasing the likelihood of its acceptance and successful implementation.

### 3.4.7 Surveys

Surveys will be deployed to gather quantitative data on user satisfaction, system usability, and overall performance of the Siron Furniture Inventory Management System. Structured survey questions will provide insights into specific aspects of the system, while open-ended questions will allow users to share detailed feedback.

## 3.5 Data Analysis Techniques

Both qualitative and quantitative data analyses will be employed in this study. For qualitative data obtained from literature reviews, thematic analysis and content analysis will be utilized to unveil recurring themes, strengths, weaknesses, and evolving trends within the field.

Questionnaire responses will undergo descriptive statistics to summarize closed-ended responses and content analysis for open-ended questions. This approach aligns with the methodology proposed by Smith and Johnson (2019).

Surveys will encompass both quantitative and qualitative data analyses. Frequency distributions will be used to gauge response patterns, while correlation analysis will explore relationships between variables. Visual representation through data visualization techniques will be utilized for quantitative insights. For qualitative aspects of survey responses, content analysis and coding will be employed. The methodology will conclude with a recommendation for a combined analysis, utilizing a mixed-methods approach to integrate both quantitative and qualitative findings. Analytical tools such as R and Python will be utilized for efficient data processing and interpretation, as suggested by Anderson et al. (2020).

## 3.6 Agile Development Life Cycle Model

The Agile Development Life Cycle Model is an iterative and incremental approach to software development that emphasizes flexibility, collaboration, and responsiveness to change. Unlike the Waterfall Model, Agile is more adaptive and allows for continuous improvement throughout the development process (Agile Development, 2018).

### 3.6.1 Overview of the Agile Development Life Cycle

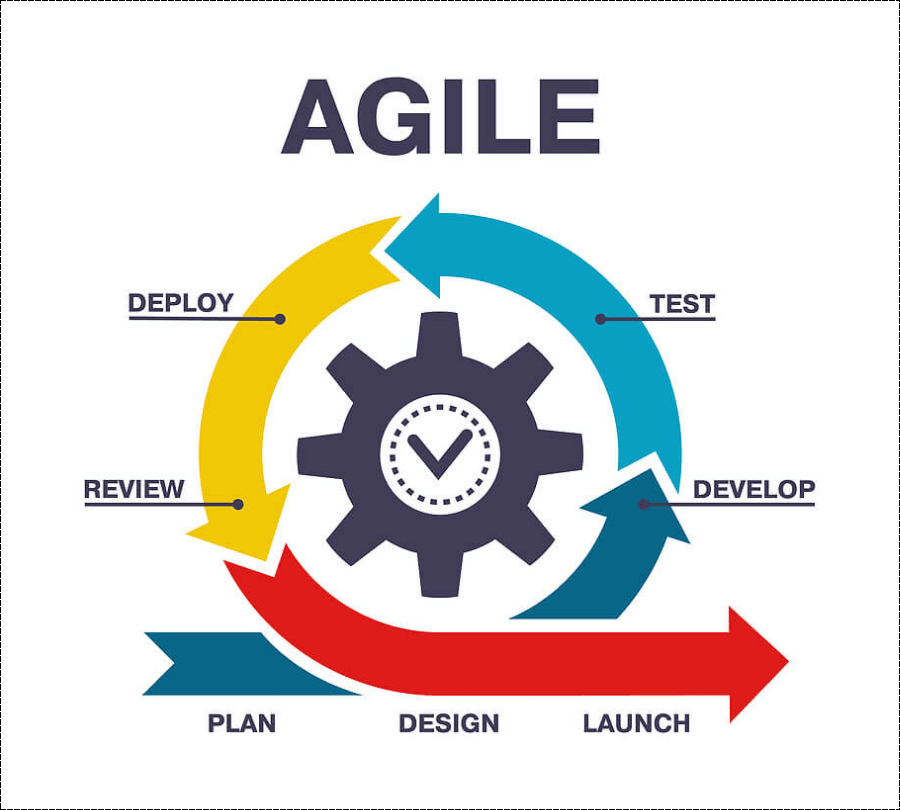


Figure 1: Agile Development Life Cycle Model (Agile Development, 2018)

### 3.6.2 Phases of the Agile Development Life Cycle

1. **Requirements Gathering and Analysis**

During this phase, detailed requirements are gathered from stakeholders, including clients and end-users using various techniques such as questionnaires, interviews, surveys etc. The goal is to understand the project scope, objectives, and user needs.

1. **System Design**

Based on the gathered requirements, the system design phase involves creating a high-level architecture and defining key components. Design decisions are made iteratively to accommodate changes and feedback. System design involves three phases that is Conceptual design, Prototyping, and a detailed design.

* **Architectural design**. This will involve a database engine to store data, a web server, and user interface and communication channel for exchanging data.
* **Database design**. This will involve Entity Relationship Diagrams (ERD). The entity-relationship data model shows the relationships between the entities involve in the system together with their attributes and indicates the number of occurrences an entity can exist for a single occurrence of the related entity. Entity Relationship Diagrams (ERDs) are used to model both the logical and physical database structure designs. ERDs are user-friendly and they can provide a unified view of data, which is independent of any data model. ERDs are also used to identify the data to be captured, stored and retrieved in order to support the activities performed in the pharmacy management systems.
* **Process design**. This involves using Data Flow Diagrams (DFDs). Charts known as DFDs are used to display how data flows through a system. DFDs are used to model the processes and conceptual level design in addition to providing a thorough representation of the system components. When presenting the system, DFDs are easier for both technical and non-technical audiences to understand.

1. **Implementation (Coding)**

The coding phase involves the actual development of the software in short iterations called sprints. Developers work closely with stakeholders to prioritize features and deliver functional increments of the product. For my application to be developed or implemented into a fully working application system, I shall use bootstrap for creating a responsive system JavaScript for logic instructions, xampp as a local server and visual studio code as my code editor, among others as given below.

* **Visual studio code**

Visual studio code is an editor redefined and optimized for building and debugging modern web and cloud applications. It is free software and really light software to download from the internet. It will be used as the code editor.

* **Xampp**

It is a free and open cross platform webserver solution stack package developed by Apache friends, consisting mainly of the apache HTTP server, MariaDB database and interpreters for scripts written in PHP and perl programming languages. It will be used as the local server for hosting the system locally during development phase.

* **Bootstrap**

Bootstrap is a popular open-source web development framework for creating responsive websites. It provides a set of reusable HTML, CSS, and JavaScript components that will be used to build prototypes or production-ready websites quickly. Bootstrap's grid system allows you to create layouts that look great on any screen size, and its built-in responsive design features ensure that your website will look great on phones, tablets, and desktop displays

1. **Testing**

Testing will be performed continuously throughout the development process, with a focus on automation and collaboration. Test-driven development ensures that each increment is thoroughly tested for quality and functionality.

1. **Deployment (Installation)**

Once a set of features is completed and tested, it will be deployed to a staging environment for review by stakeholders. Feedback is incorporated into subsequent iterations, and the product is deployed to the production environment.

1. **Maintenance**

Maintenance of the system will be included and this involves monitoring the system in production, addressing issues as they arise, and making enhancements based on user feedback and changing requirements.

## 3.7 Validation and Testing

The Siron Furniture Inventory Management System will undergo rigorous testing and validations in real-world environments to ensure its effectiveness and reliability. User feedback, surveys, and performance metrics will be used to validate the system against predefined criteria. The main reason for validation and testing is to:

(i) To ensure that the system meet the requirements specification.

(ii) To ensure that the system operates or functions according to the demands of the users to satisfy their needs.

## 3.8 Ethical Considerations

Ethical approval will be obtained from relevant institutional review boards prior to data collection. Informed consent will be obtained from all participants, and measures will be taken to ensure confidentiality and privacy. Respect for the dignity, rights, and well-being of all participants will be paramount throughout the research process.

## 3.9 Chapter Summary

This chapter has provided an in-depth overview of the research methodology adopted for the development and evaluation of the Siron Furniture Inventory Management System. The Agile Development Life Cycle Model, coupled with a focus on iterative development and stakeholder collaboration, promises a robust and responsive approach to addressing inventory management challenges. Subsequent chapters will present and discuss the findings derived from the implemented research methodology, contributing to the refinement and enhancement of the inventory management system with a comprehensive understanding of both qualitative and quantitative dimensions.

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