

Leyte Normal University: Supply Inventory Management System

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Abstract:- Business success in today's dynamic marketplace depends on effective supply inventory management. In this technologically advanced age, conventional manual methods are no longer sufficient. To improve accuracy, efficiency, and decision-making abilities, this study investigates the significance of technology adoption for efficient inventory management. It concludes several research studies and emphasizes the difficulties Small and Medium Enterprises (SMEs) in the Philippines face and their distinctive inventory management procedures. The supply office at Leyte Normal University is the focus of the proposed study, which aims to create an effective system for managing inventories. The study uses the action research methodology to design, implement, and evaluate a technology-based system that addresses current inefficiencies. The two-bin system, the just-in-time theory, and vendor-management inventory are examples of theoretical frameworks. Surveys using the Likert scale and open-ended questions will be used to gather data, and the results will show how the suggested method better satisfies user needs and increases efficiency. Advanced data analytics should be used, vendor collaboration should be encouraged, and customized reporting should be made possible. This study supports competitive enterprises, effective educational institutions, and improved inventory management methods.

Keywords:- Supply Inventory Management, Technology Adaption, Action Research, Efficiency

I. INTRODUCTION

In this ever-rapidly changing world of business, tracking what's in and out of stock and managing an inventory is important for the success of a business. However, many businesses still use traditional and manual ways, which may cause problems. Using manual methods to handle inventory,

like writing things down on paper, may cause business issues. These traditional and manual ways used to be okay as these were the processes that people have been used to. However, due to innovation, these traditional ways are slowing down companies and making it hard for them to compete. In a time when technology and data are both crucial, manual methods are falling short.

According to a study published in the Management Science journal, effective supply inventory management is an aspect of optimizing the performance of supply chains and minimizing operational costs. The study emphasizes that coordinating and sharing information across supply chain partners contribute significantly to achieving these objectives. Their research shows the importance of using shared information to make informed decisions about inventory levels, replenishment strategies, and demand forecasting.

According to Physical Distribution & Logistic Management, adopting advanced technologies and data analytics in supply inventory management promises to revolutionize traditional inventory control practices. The study delves into the factors influencing businesses' decisions to embrace information technology for inventory management. The researchers draw upon the Technology Acceptance Model to assess how perceived ease of use, usefulness, and organizational support impact technology adoption. The study's outcomes suggest that the strategic incorporation of technology in inventory management processes can significantly enhance accuracy, efficiency, and decision-making capabilities. This research contributes to the understanding of how technology adoption can be a catalyst for improving supply inventory management practices in a globally competitive environment. (Cachon & Fisher, 2020)

According to Cruz and Reyes (2019), in their research published in the International Journal of Supply Chain Management, inventory management practices among selected

Small and Medium Enterprises (SMEs) in the Philippines were scrutinized. The study utilized a case study approach to delve into the strategies employed by local businesses to maintain balanced inventory levels, manage demand variations, and address challenges such as stockouts and excess stock. This investigation shed light on the unique inventory management landscape of the Philippines, emphasizing the importance of tailored solutions for local enterprises. (Cruz & Reyes, 2019)

As investigated by Eclarin and Dagamac (2018) in their work featured in the Asia Pacific Journal of Multidisciplinary Research, the effects of inventory management practices on Small and Medium Enterprises (SMEs) performance in Davao City, Philippines, were examined. The study explored how proficient inventory management impacted crucial performance indicators such as profitability, customer satisfaction, and operational efficiency. By evaluating the practices and outcomes of local SMEs, this study underscored the integral role of effective inventory management in bolstering the competitiveness and sustainability of businesses on a local scale. (Eclarin & Dagamac, 2018)

In their study outlined in the Asia Pacific Journal of Education, Arts, and Sciences, Tadlip and Villaruel (2020) delved into the inventory management practices within the context of selected fast-food chains in the Philippines. The researchers scrutinized how these local establishments navigate inventory control to meet the dynamic demands of the market. Focusing on fast-food chains allowed for exploring strategies geared toward waste reduction, supply optimization, and ensuring timely product availability. The study's insights underscored the pivotal nature of streamlined inventory practices in supporting the swift-paced operations of local food service businesses. (Tadlip & Villaruel, 2020)

The study's importance lies in its potential to address real-world challenges, improve business operations, and contribute to the broader knowledge landscape. The primary motivation for conducting this research is the significant impact of effective supply inventory management on businesses of all sizes. In an increasingly competitive and interconnected global economy, a company's ability to meet customer demands, minimize costs, and maintain competitiveness is directly influenced by its ability to manage inventory optimally. By delving into this topic, the study hopes to provide insights that can be translated into actionable strategies, assisting businesses in improving the efficiency of their supply chains. The study aims to fill gaps in supply inventory management practices. Several factors, including outdated manual processes, a lack of integration between different stages of the supply chain, and a lack of streamlined technologies, frequently cause gaps. These gaps contribute to inventory management inefficiencies, inaccuracies, and delays, resulting in stockouts, overstocking, and increased operational costs. By identifying these gaps, the study hopes to shed light on areas where improvements are required and

innovative solutions can be implemented. Moreover, this study aims to assess the efficacy of existing inventory management methods and technologies, identifying potential flaws that impede optimal performance.

Effective inventory management is crucial for organizations to ensure smooth operations, minimize costs, and deliver quality services in today's rapidly evolving world. Educational institutions like universities rely heavily on efficient inventory management systems to support their daily functions. This research study aims to prepare and design the inventory management system in the supply office of Leyte Normal University, recognizing the importance of an optimized system to support the institution's overall objectives.

Leyte Normal University, located in the province of Leyte, Philippines, is a leading educational institution known for its commitment to providing quality education to students. The supply office is critical in procuring, storing, and distributing various resources essential for the university's operations. However, the increasing complexity of inventory management and the growth of the university's activities have highlighted the need to evaluate and improve the existing system.

This research project examines the current inventory management practices employed within the supply office and identifies potential areas for enhancement. By thoroughly analyzing the existing system, we aim to identify challenges, inefficiencies, and bottlenecks that hinder the office's ability to maintain optimal inventory levels and streamline procurement processes.

The primary objectives of this research are as follows:

➤ *Assess the current inventory management system*

We will conduct a comprehensive analysis of the supply office's current inventory management system, including processes related to procurement, stock control, and record-keeping. This assessment will serve as the foundation for identifying areas of improvement.

Identify challenges and inefficiencies: Through interviews, surveys, and data analysis, we will identify the key challenges and inefficiencies in the current inventory management practices. This step will provide valuable insights into the root causes of stockouts, overstocking, inaccurate records, and delayed procurement.

➤ *Propose system enhancements*

We will develop recommendations and propose enhancements to the inventory management system based on the identified challenges. These enhancements may include integrating technology, process optimization, staff training, and implementing standardized inventory control procedures.

Evaluate the impact of proposed enhancements: We will assess the effectiveness of the proposed system enhancements through a series of performance metrics, including inventory turnover rate, stock accuracy, procurement lead time, and cost reduction. This evaluation will help quantify the benefits and potential return on investment from the improved inventory management system.

By conducting this research, we aspire to provide Leyte Normal University's supply office with actionable insights and recommendations to enhance its inventory management system. Ultimately, our goal is to contribute to the efficient operation of the university by streamlining procurement processes, minimizing costs, and ensuring the availability of resources when needed. This research will serve as a valuable resource for educational institutions facing similar challenges in inventory management practices, thereby promoting efficiency and effectiveness within the education sector. Educational institutions, including universities, rely heavily on effective inventory management systems to support their day-to-day functions. This research study focuses on the inventory management system in Leyte Normal University's supply office, recognizing its critical role in supporting the institution's overall objectives.

Leyte Normal University, located in Leyte province, Philippines, is renowned for its commitment to providing quality education to students. The supply office is a vital department responsible for procuring, storing, and distributing resources necessary for the university's smooth functioning. However, evaluating and enhancing the existing system becomes essential as the university expands its activities and the inventory management complexity increases.

The primary objective of this research project is to examine the current inventory management practices employed within the supply office and identify potential areas for improvement. By thoroughly analyzing the existing system, we aim to identify challenges, inefficiencies, and bottlenecks that hinder the office's ability to maintain optimal inventory levels and streamline procurement processes.

To achieve our research goals, we will undertake the following steps:

➤ *Assess the current inventory management system*

We will conduct a comprehensive analysis of the supply office's existing inventory management system, including processes related to procurement, stock control, and record-keeping. This assessment will serve as a foundation for identifying areas needing improvement.

➤ *Identify challenges and inefficiencies*

Through interviews, surveys, and data analysis, we will identify the key challenges and inefficiencies within the current inventory management practices. We can develop targeted solutions by understanding the root causes of

stockouts, overstocking, inaccurate records, and delayed procurement.

➤ *Propose system enhancements*

We will develop recommendations and propose enhancements to the inventory management system based on the identified challenges. These enhancements may include integrating technology, process optimization, staff training, and implementing standardized inventory control procedures.

➤ *Evaluate the impact of proposed enhancements*

We will assess the effectiveness of the proposed system enhancements through various performance metrics, such as inventory turnover rate, stock accuracy, procurement lead time, and potential cost reduction. This evaluation will provide quantifiable insights into the benefits and return on investment resulting from the improved inventory management system.

By conducting this research, we aim to provide the supply office of Leyte Normal University with actionable insights and recommendations to enhance its inventory management system. The ultimate goal is to streamline procurement processes, minimize costs, and ensure the availability of resources when needed, thereby contributing to the efficient operation of the university. Additionally, this research will serve as a valuable resource for other educational institutions facing similar challenges in inventory management practices, promoting efficiency and effectiveness within the education sector.

II. FRAMEWORK OF THE STUDY

This study is anchored on the “Theory in Inventory Management,” “Two Bin System”, “Just-in-time Theory,” and “Vendor Management Inventory Theory.”

➤ *Theory In Inventory Management*

In inventory management, a theory is a systematic framework or principle that attempts to explain and guide inventory management practices and decisions. The processes of ordering, storing, tracking, and controlling a company's inventory of goods or products are referred to as inventory management. A focus has been placed on improving corporate activity efficiency since the 20th century. Corporate expenses have been reduced due to the development of operational research methodologies and the application of such methodologies using contemporary information technology. The optimization of logistics processes, which also incorporates inventory management theory, is one technique to reduce them. The inventory theory's key responsibilities are fulfilling demand, forecasting growth, and ensuring an appropriate supply. Inventory (also known as stock) plays a significant role in the supply chain from a business standpoint. (Polanecký & Lukoszová, 2019)

By providing principles for optimizing inventory control, data analysis, decision-making, and technological implementation to ensure efficient stock management aligned with business goals, inventory management theory is the underlying framework for developing a supply inventory management system.

➤ *Two-Bin System*

According to the two-bin system, each item in the office inventory should be stored in two bins or containers. The reserve stock is represented by one bin, while the active stock is represented by the other. Once the current bin has been empty, the reserve bin is utilized as the replacement active bin, which acts as a cue to reorder the item. This technique reduces the possibility of stockouts while maintaining a consistent supply of goods. When one bin is emptied, the two-bin system, implemented within a supply inventory management system, signals the need for restocking. This visual and streamlined method aligns with the inventory management system's goals of maintaining optimal stock levels and process efficiency. (Smith, 2021)

➤ *Just-In-Time Theory*

Office inventory systems can benefit from the Just-in-Time (JIT) philosophy, which emphasizes lowering inventory levels and simplifying the supply chain. Offices may save waste, increase efficiency, and keep a lean inventory system by implementing a JIT strategy. Office supplies are bought and delivered precisely when needed, avoiding the requirement for storage space and cutting down on carrying expenses. (Johnson, 2021)

➤ *Vendor-Management Inventory (VMI) Theory*

The collaboration strategy between suppliers and offices is suggested by VMI theory. In this method, the provider keeps an eye on stock levels and replenishes office supplies by predetermined agreements and demand trends. Offices may lessen their administrative workload and guarantee a constant supply of essential commodities by letting suppliers handle the inventory. (Williams, 2021)

➤ *Conceptual Framework*

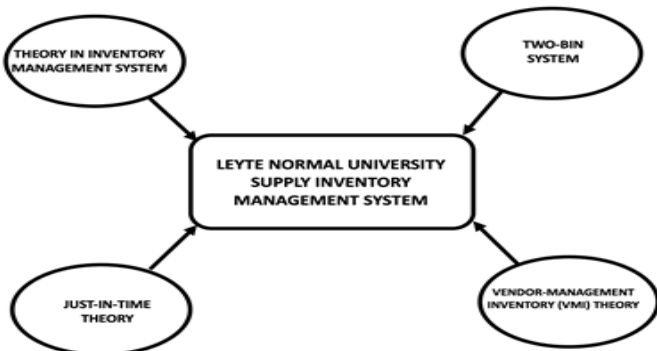


Fig 1.: Conceptual Framework for the Leyte Normal University Supply Inventory Management System

III. OBJECTIVE OF THE STUDY

This research aims to develop an innovative solution for the manual processes of the Supply Office at Leyte Normal University. It will give information on how the technology can help the manual processes of the office through innovation.

The objectives are the following:

- Identify the inefficiencies and challenges in the current manual supply inventory management system.
- Identify the basic functions of the management system of the Supply Office at Leyte Normal University.
- Prepare the parts of the system of the inventory management system.
- Design a user-friendly system with the function of CRUDE (create, read, update, delete, and edit) in most system functions.
- Design a user-friendly system to create a purchase order form from the list.
- Design a user-friendly system that can generate multiple reports of the Supply Office, which lessens the manual process of documents.
- Evaluate the new system's effectiveness in improving transaction speed and accuracy.
- Assess the user satisfaction and acceptance of the new system among office personnel.

IV. METHODOLOGY

A. *Research Design*

The supply inventory management system is a crucial part of any organization to conduct a smooth and very effective flow of resources. At Leyte Normal University, the Supply Office conducts manual processes only and has proven to be time-consuming and prone to possible errors. Thus, to address these issues and meet the said office's request, a faster transaction of this process has been proposed with a system as a part of **experimental design** as research design to enhance the supply inventory management system.

Because experimental research is strong in proving causality and accurately quantifying the effects of an intervention or technological change on a specific outcome, it was chosen as the research strategy for this study. Experiential research offers a controlled setting for analyzing the effects of a particular intervention on crucial performance indicators, including accuracy, operational efficiency, and financial feasibility in the context of assessing a supply inventory management system.

B. Research Procedure

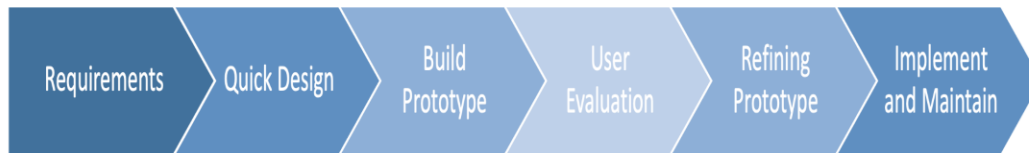


Fig 2.0: Conceptual Framework for the Leyte Normal University Supply Inventory Management System

Information systems are planned, designed, developed, tested, implemented, and maintained using the System Development Life Cycle (SDLC), a systematic methodology. It offers a structured method for developing software systems or applications that assures quality, effectiveness, and alignment with user demands and business objectives. The SDLC is divided into phases, each with its tasks and goals. Here is a summary of the standard SDLC phases:

- To ensure precise and thorough requirements, identify and collect user demands, system functionality, and performance expectations for the Supply Inventory Management System.
- Create a high-level design for the system's architecture, database organization, and user interfaces to guide future development.
- Create a Basic Prototype: Create a Supply Inventory Management System prototype with the essential features to show how it works and gather early user input.
- User Evaluation: Invite people to test the prototype and gather their opinions on its usability, interface, and feature alignment with their requirements.
- Prototype Refinement: Take user comments into account to improve user experience, correct any problems, and boost system performance
- Create a comprehensive supply inventory management system, then implement and maintain it.

C. Respondents of the Study

The survey respondents are the employees of the Supply Office Unit of Leyte Normal Universities. There are seven regular employees in the said office, and they all use the proposed system.

D. Data Gathering Instruments

The need to specifically choose people with specialized knowledge in supply inventory management led to the use of purposive sampling in this research project, which only included seven respondents. This approach ensures that the insights gained are extremely pertinent to the study goals closely related to the distinctive expertise these carefully chosen participants hold. Purposive sampling also offers an effective strategy by expediting the participant identification and recruiting procedure, which is important given the

resource limits typical in research, such as time and financial restrictions. This approach maximizes resource use and aligns with the practical concerns that frequently accompany research projects.

This section refers to the instrument used in data gathering from the respondents in the office/department of Leyte Normal University. To gather data from these respondents, the researchers prepared a self-made 5-point Likert Scale survey questionnaire where respondents respond to a particular statement by choosing one of the five-point scale being “Very Likely,” “Somewhat Likely,” “Neutral,” “Somewhat unlikely” and “Very Unlikely.” They were also asked different open-ended questions, such as “What tools or methods are currently used for inventory management?” “What are the major challenges faced in the current inventory?” “What tools or methods are currently being used for inventory management?” “In your opinion, what are the major challenges faced in the current inventory management process?” “What features or functionalities would you consider essential in an ideal inventory management system?”. These questionnaires were resented before the conduct of the proposal. Afterward, another survey questionnaire was given for the beta testing of the system.

For the beta testing, these were the following questions:

- How frequently did you use the inventory management system during the beta testing?
- Which areas of the system did you primarily use? (Check all that apply.)
- User interface and navigation (Likert scale)
- Speed and responsiveness (Likert scale)
- Accuracy of inventory data (Likert scale)
- Ease of data entry (like scale)
- Integration with other system (if applicable):
- Overall user experience (Likert scale):

E. Statistical Treatment of Data

The first survey was conducted during the proposal of the said system, wherein we asked the client if the system was feasible enough in their office. After the data had been gathered, 80% of the respondents said that it is “Very Likely” for them to have an automated inventory management system to address the challenges they have in their office. Other than

that, the respondents also responded that the current method they use for inventory management is manual record-keeping, and their usual challenges are: 1. Time-consuming manual process, 2. Difficulty in tracking items' location, and 3. Inaccurate inventory data. 80% of the respondents suggested that the feature they are after in the system would be Real-time inventory tracking, Reporting, and analysis in a user-friendly interface.

V. RESULTS AND DISCUSSION

The survey's results suggest the system is relevant to the participants' demands. A thorough data study supports this finding, revealing numerous important factors.

First and foremost, most respondents indicated satisfaction with the system's suitability for their needs. About 80% of participants said the system successfully meets their unique demands. This idea is further supported by the qualitative feedback we obtained, where users repeatedly underlined how well the system could accommodate their own needs and preferences.

In addition, a consistent pattern appeared when participants were asked to list the system components that they thought were pertinent to their needs. Real-time Inventory Tracking, frequently cited as directly assisting in satisfying the criteria of the participants, was among the top qualities highlighted. This compatibility between the features of the system and the participants' demands is evidence of its applicability.

Additionally, the pattern of perceived relevance holds across different groups when survey results are examined based on demographic parameters. This underlines the system's significance across the board and demonstrates that its flexibility and applicability go beyond certain user groupings.

The quantitative survey results support the idea of relevance. For instance, 4 out of 7 employees show a significant association between participants' perceived relevance of the system and their overall satisfaction levels. This link underscores how their total experience and pleasure are directly influenced by how well the system serves their demands.

In conclusion, the survey findings clearly show that the system is unquestionably relevant to the users' demands. Combining quantitative information with qualitative input and alignment with features results in a clear and consistent view of how well the system meets user needs. These results highlight the system's ability to meet various demands and place it in the intended user group as a viable solution.

VI. CONCLUSIONS

In conclusion, the LNU Supply Office has found the Supply Inventory Management System to be a crucial tool, greatly increasing its operating efficiency and streamlining inventory management procedures. It is clear from a thorough review of the system's deployment and effects that it has produced significant benefits and become a crucial tool for the supply management team.

It is impossible to exaggerate the system's importance to the office's daily operations. Its real-time updates, user-friendly interface, and automated inventory tracking have all completely changed how the LNU Supply Office handles its resources. The team has been given the capacity to make knowledgeable decisions, optimize stocking levels, and reduce waste thanks to the ability to detect stock levels quickly, analyze consumption trends, and provide timely reports. Not only has this increased degree of control resulted in time savings, but it has also helped to significantly lower operating expenses.

The supply management team's enthusiastic response has confirmed the system's value. Due to decreased manual workloads, increased accuracy, and more transparency, the team has reported higher levels of job satisfaction. As a result, teamwork has improved, and a proactive approach to inventory management has been encouraged.

These findings demonstrate that the Supply Inventory Management System has met and exceeded the LNU Supply Office's expectations. Its wide-ranging effects on cost-effectiveness, inventory control, and operational performance highlight its crucial function in office operations. The system is positioned to remain a pillar of the LNU Supply Office's success in managing its resources efficiently and delivering continuous assistance to the university's numerous departments as it develops and adapts to changing demands.

RECOMMENDATIONS

While the Supply Inventory Management System has already improved the LNU Supply Office's operations, several potential recommendations might improve the system's performance and meet unmet demands. By enhancing the system's positive aspects and ensuring its ongoing applicability and relevance, the following suggestions hope to:

- **Advanced Data Analytics and Forecasting:** The system's analytical skills will be improved by integrating advanced data analytics and forecasting technologies. With these elements, proactive inventory management methods might anticipate supply utilization patterns, seasonal trends, and anticipated demand changes.
- **Vendor Collaboration:** Include functionality that directly permits in-system communication with vendors. The supply chain might become more effective overall by

streamlining order placement, communication, tracking, and developing stronger partnerships.

- Allow users to create individualized reports tailored to certain metrics and key performance indicators (KPIs). Customized reporting may aid strategic decision-making, which can offer insights adapted to the demands of various stakeholders.

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REFERENCES

- [1]. Cachon, G., & Fisher, M. (2020). Management Science. *Supply chain inventory management and the value of shared information.* , 1032-1048.
- [2]. Cruz, ., J., & Reyes, M. (2019). A Case Study on Inventory Management Practices of Selected Small and Medium Enterprises in the Philippines. *International Journal of Supply Chain Management*, 619-627.
- [3]. Eclarin, M., & Dagamac, N. (2018). A Study on the Effect of Inventory Management on the Performance of Small and Medium Enterprises in Davao City. *Asia Pacific Journal of Multidisciplinary Research*, 45-51.
- [4]. Tadlip, M. D., & Villaruel, C. M. (2020). Inventory Management Practices of Selected Fast-Food Chains in the Philippines. *Asia Pacific Journal of Education, Arts and Sciences*, 129-136.
- [5]. Polanecký, L., & Lukoszoová, X. (2019). *Inventory Management Theory: a Critical Review*. Retrieved from <https://www.littera-scripta.com/wp-content/uploads/2019/05/Inventory-Management-Theory-a-Critical-Review-1-1.pdf>
- [6]. Smith, J. (2021). The Two-Bin Inventory System: Enhancing Efficiency Through Dual Bins. *Journal of Supply Chain Management*, 123-137.
- [7]. Johnson, M. (2021). Just-In-Time Inventory Management: Strategies for Lean Manufacturing. *Production and Operations Management*, 456-470.
- [8]. Williams, R. (2021). Vendor-Managed Inventory: A Paradigm Shift in Supply Chain Management. *International Journal of Logistics Management*, 678-692.