



IMPLEMENTING AN AUTOMATED INVENTORY MANAGEMENT SYSTEM FOR SMALL AND MEDIUM-SIZED ENTERPRISES

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ABSTRACT

This research clarifies the potential benefits and implementation challenges of such a system for. Developed inventory tracking, less storage fees, and happier consumers resulted from applying this system. However, application was complex and time-consuming, requiring the expertise of outside IT experts and training of internal workforce.

This case study shows how useful it can be for small and medium-sized enterprises to work with external IT consultants and vendors to aid them assess the expenditures and benefits of installing an automated inventory management system. In sum, the case study is instructive for other SMEs thinking about investing in robotic inventory management systems to boost effectiveness and cut expenditures.

1. INTRODUCTION

The success of any establishment, no matter its size or industry, depends-on its capability to positively manage its inventory. Having sufficient stock on hand to satisfy client orders while keeping inventory expenses to a minimum is the goal of good inventory management. However, inventory management may be a hard and time-consuming endeavor, particularly for (SMEs) with fewer workers and fewer resources.

Automated system that makes use of AI technology to run stockpiles could be one answer to the problem of unproductive stockpiling. Inventory management solutions driven through AI can aid SMEs get their stock levels right, save money on storage, and restructure their supply chains.

The study's overarching objective is to shed light on the critical aspects that impact the efficiency of such a system's implementation in (SME). Furthermore, this research affords valuable data for (SMEs) thinking about implementing an AI-powered inventory management system to increase supply chain effectiveness and returns.

2. Objectives

- To explain potential benefits of automated inventory management System.
- To determine challenges of automated inventory management System.
- To assess benefits and drawbacks of installing an automated inventory management system for SMEs.
- To analyze the critical aspects that influence effectiveness of such a system's adoption in (SME).
- To recommend suitable approaches for automated inventory management System.

2. Literature Review:

Effective inventory management is an essential part of running a business and can have a substantial impact on a company's bottom line. Particularly for (SMEs) with limited resources, the manual processes often used for inventory management can be time-consuming, error-prone, and inefficient. But, automated inventory management systems can improve efficiency and accuracy of inventory management procedures

Time-consuming inventory counts, trouble keeping track of inventory levels, a higher risk of errors, and higher costs due to overstocking or stock outs are just a few of the problems that can arise from using a manual approach to inventory management. fewer productivity, fewer profits, and worse customer satisfaction are all possible outcomes of these difficulties. An Overview of AIS Artificial intelligence (AI), machine-learning (ML), and the internet of things (IoT) are just some of the cutting-edge technologies used in automated inventory management systems, which allow for constant monitoring and administration of stock. Furthermore, these programs can keep tabs on stock, make purchases, and plan restocking in the most efficient manner possible. Better inventory management decisions can be made with the help of demand forecasting and predictive analytics, which are provided by some systems.

Automated inventory management systems have both positive and negative aspects. Increased accuracy and efficiency, decreased expenses associated with overstocking and stock outs, enhanced inventory control, and improved decision-making via data analytics are just some of the benefits of deploying automated inventory management systems. High implementation costs, technological complexity, and the requirement for staff training are also possible downsides. However, businesses must weigh the costs and benefits of installing such systems to guarantee they are appropriate for their needs and will support them accomplish their objectives. The technical complexity and training requirements of employees should also be taken into account by businesses before using automated inventory management systems.

3. Methodology

The case study technique was used to assess the pros and cons of introducing an AI-powered inventory management system. The purpose of this case study is to investigate the system's deployment and assess its effects on inventory management procedures such as stock levels, holding costs, and supply chain productivity. Interviews with key people, observations of inventory management techniques, and statistical analyses of sales and stock levels were all applied to compile the study's results.

Data Collection Methods

Inventory managers, supply chain managers, and purchasing managers were interviewed using semi-structured questions to better understand their roles in the inventory management procedures. Information regarding company's inventory management procedures both before and after the introduction of the AI-powered system was gathered through these interviews. Issues with inventory management, the company's decision to use an automated system, the rollout process, and the technology's benefits and drawbacks were all topics of discussion throughout the interviews.

The day-to-day operations inventory management were also observed to collect further data. This entailed keeping an eye on the storage, tracking, and handling of items from the moment of purchase until the moment of delivery. Finally, sales and inventory information were collected and evaluated to measure the effectiveness of the AI-driven inventory management system in reducing stock outs, lowering holding costs, and improving the company's supply chain efficiency. This information was gathered for a total of 12 months, six months before and after the system became live. Statistical methods were then used to the information in order to spot any noteworthy shifts in stock and associated costs.

Data Analysis Techniques

Interviews, field notes, and sales and stock records were examined using both qualitative and quantitative methods. To better understand the company's struggles, the reasoning behind the choice to deploy an automated system, and cons of

that decision, content analysis was applied to the qualitative data gathered through interviews and observations. Statistical methods, such as t-tests and ANOVA, were implemented to the numerical data gleaned from sales and inventory records in order to determine whether or not there had been any appreciable shifts in stock levels or holding costs before and after the system went live. The efficacy and precision of the system's proposed changes to the stockpile were also assessed.

Limitations and Challenges

A number of restrictions and complications were experienced throughout the course of the case study. It was impossible to adequately analyze the system's influence on supply chain efficiency due, in part, to the lack of available historical sales and inventory data. Workers' resistance to change and skepticism of the system's benefits posed another obstacle. Addressing these constraints and difficulties required further in-depth interviews with key persons, additional training and support for staff, and follow-up assessments to gauge the system's long-term effectiveness.

Using a case study approach, we were capable to thoroughly weigh the pros and cons of introducing an AI-powered inventory management system. Using a variety of data collection and analysis tools, we were able to gain insight into the rollout process and the system's effect on inventory management at the organization.

5. Results and Discussion:

The technology empowered constant observing of stock levels, which helped management stay on top of inventories and head off any potential shortages or surpluses. The approach also assisted the business in minimizing the sum of money held in inventory and exploiting profits. The system's data analytics and demand forecasting capabilities allow for the possibility of better inventory management choices being made.

The purpose interviews were to gain a better understanding of the inventory management issues faced by the organization, the motivations behind deploying the automated inventory management system, and the overall effects of implementing the system. The interviewees' experiences with inventory management difficulties, the pros and cons of the new automated system, and the overall effect on the business are all summarized in the following table. It features key findings that explain why the method is so helpful and how it may be implemented to boost inventory accuracy, save holding costs, and afford better customer service.

The results of the interviews are consistent with the literature research, which indicates that automated inventory management systems can improve the control of inventory, the reduction of costs, and the efficiency of the supply chain for SMEs. (SMEs) must provide serious thought to the technical complexity and training needs of such systems before implementing them. The key results table is a helpful resource since it summarizes the most significant information gleaned from the interviews and provides evidence for the pros and cons of switching to an automated inventory management system.

Conclusion

Benefits and disadvantages of installing an automated inventory management system for SMEs are explored in depth in the case study. The process of implementation, however, was intricate and time-consuming, calling both the services of external IT consultants and the education of internal personnel. The case study shows how crucial it is for small and medium-sized enterprises to weigh the pros and cons of using an automated inventory management system. Before beginning such initiatives, SMEs should evaluate the technical difficulty of the implementation process, the need to train people, and the potential return on investment. Small and medium-sized businesses should hire outside IT experts and vendors for support throughout the deployment phase. The case study also demonstrates the potential benefits of an automated inventory management system for small and medium-sized businesses. The system can aid SMEs increase productivity, decrease costs, and improve service to their clientele. The method can aid SMEs in becoming market leaders by facilitating easier payment and delivery options for their customers.

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References

- [1] A. Abbasi, & H. M. Nezhad, "Developing a Decision Support System for Inventory Management in Small and Medium-sized Enterprises: A Case Study of an Auto Parts Manufacturer," *Journal of Manufacturing Systems*, vol. 52, pp. 259-269, 2019.
- [2] M. Abdel-Basset, R. Mohamed, & F. Smarandache, "New Approach for Inventory Management using Fuzzy Analytical Hierarchy Process and Grey Relational Analysis," *Expert Systems with Applications*, vol. 152, pp. 113424, 2020.
- [3] R. Agrawal, & R. Srikant, "Fast algorithms for mining association rules in large databases," *Proceedings of the 20th International Conference on Very Large Data Bases*, pp. 1215-1225, 1994.
- [4] N. F. Al-Mutairi, & M. Al-Jazzaf, "An Automated Inventory Management System: A Case Study of Al-Watania Plastics in Kuwait," *Journal of Management and Strategy*, vol. 6, no. 1, pp. 1-14, 2015.
- [5] A. C. Cagliano, & R. Mangiaracina, "An analytical framework for inventory management with time-sensitive demand," *International Journal of Production Economics*, vol. 132, no. 2, pp. 223-231, 2011.
- [6] J. Chen, Z. Chen, & W. Chen, "Inventory management in distribution systems with demand forecast updates," *European Journal of Operational Research*, vol. 244, no. 3, pp. 838-849, 2015.
- [7] V. Gaur, & S. Kesavan, "Supply Chain Inventory Management and the Value of Shared Information," *Management Science*, vol. 59, no. 3, pp. 681-695, 2013. [8] G. Ghiani, G. Laporte, and R. Musmanno, "Introduction to Logistics Systems Planning and Control," John Wiley & Sons, 2013.
- [9] Hugos, M, (2021), "Essentials of Supply Chain-Management," 4th ed, John-Wiley & Sons.
- [10] G. P. Kiesmüller, & L. Monostori, "Optimal inventory policies in supply chains with multiple demand classes," *International Journal of Production Economics*, vol. 151, pp. 62-72, 2014.
- [11] H. L. Lee, V. Padmanabhan, & S. Whang, "The Bullwhip Effect in Supply Chains," *Sloan Management Review*, vol. 38, no. 3, pp. 93-102, 1997.
- [12] Y. Li, L. Liang, & M. Liang, "Research on the Inventory Management Optimization of Small, & Medium-sized Enterprises under the E-commerce Environment," *Journal of Applied Sciences*, vol. 14, no. 15, pp. 1672-1680, 2014.
- [13] J. Lian, & Y. S. Choi, "Analysis of Inventory Management System Based on Process Mining," *Journal of Industrial Engineering and Management*, vol. 10, no. 3, pp. 447-462, 2017.
- [14] J. B. Mazzola, "RFID Technology, & its Influence on Inventory Management," *Journal of Business & Economics Research*, vol. 13, no. 3, pp. 149-156, 2015.
- [15] I. Moon, S. M. Choi, & K. Lee, "An inventory management model using RFID technology for supply chain systems," *Expert Systems with Applications*, vol. 40, no. 13, pp. 5274-5282, 2013.
- [16] M. Yaseen, Hayder Sabah Salih, Mohammad Aljanabi, Ahmed Hussein Ali, & Saad Abas Abed, "Improving Process Efficiency in Iraqi universities: a proposed management information system", *Iraqi Journal for Computer Science & Mathematics*, vol. 4, no. 1, pp. 211–219, Jan. 2023. Hayder Sabah Salih et al., *Iraqi Journal for Computer Science, & Mathematics* Vol. 4 No. 2 (2023) p. 238-244