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The Role of Inventory Management Techniques and Technology-Driven Systems in Enhancing Organizational Performance

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ABSTRACT
In today's competitive and technology-driven environment firms are facing several challenges like high competition, low price, high cost of labor, new technologies effective inventory management has become essential for organizational sustainability and performance. Among all the above modern organizations facing severe problems with its inventory management aligned with modern technologies. This study examines the effect of inventory management techniques and technology-driven systems on organizational performance in selected universities in the Amhara region of Ethiopia. This current study aimed to assess the effect of inventory management practices on the performance of some of the selected universities as separate strata in Amhara region of Ethiopia. A quantitative research design was employed using stratified random sampling. Data was collected from 304 employees across multiple departments of selected universities. Statistical analysis included Pearson's correlation, coefficient of determination (R^2), and multiple regression analysis. The collected data was analyzed with the help of descriptive analysis like Pearson's correlation, R, R^2, and Multiple Regression regressions techniques. The findings indicate a strong positive and statistically significant relationship between inventory management techniques and organizational performance ($r = .784$, $p < .01$). Regression results further confirm that inventory management techniques significantly influence performance ($\beta = .139$, $p < .01$). The study concludes that structured inventory models, supported by digital technologies, enhance operational efficiency and institutional effectiveness. Since inventory accounts for a huge capital of an organization, those universities need to have good management in the overall flow of their resources from initial purchase through final usage. Those universities should have a prompt and accurate recording of every inventory in the university. Those universities should hold as little inventory." The research recommends the adoption of modern inventory control systems and improved documentation practices to strengthen university performance.

Keywords: ***Inventory, Inventory Cost, Inventory Management, Proper documentation, Recording, Policies & Procedures, Stock, Storage***

1. Introduction

Inventory management plays a crucial role in ensuring operational continuity and service quality across organizations. Managing stock effectively is important for any organizations and it is not an exception to an educational institute like university. Educational institutions depend on teaching materials, laboratory equipment, technological infrastructure, office supplies, and maintenance resources to function effectively. Historically, organizations focused primarily on avoiding stockouts. However, modern inventory management emphasizes cost optimization, efficiency, and strategic resource utilization. Inventory often represents a substantial proportion of organizational assets sometimes up to 60% of invested capital. Poor inventory control can lead to overstocking, obsolescence, tied-up capital, and increased holding costs. Conversely, insufficient inventory results in service disruption and operational inefficiencies. These technologies enhance visibility, reduce human error, and improve forecasting accuracy. Despite these advancements, many institutions in developing economies continue to rely on manual or semi-automated inventory systems. Running university without required stock for providing quality services to students and other stakeholders will come to a halt. **Holm et al. (2015)** many organizations have been under pressure to reduce large and bear-sized product to cut down the cost of holding inventories. Within few decades ago, managing inventories has centered mainly on not running out of stock items. These triggered organizations to accumulate a huge quantity of raw materials, work-in-process, and finished goods. Within logistics, inventory includes goods ready for distribution as well as materials transported from suppliers to firms **(Atnafu & Balda, 2018).** "The excess inventory helps them to protect themselves from the problem of stock outs" **(Lee & Kleiner, 2001).** Inventory represents one of the major part and most important components of resources management in an organization engaging in supply, manufacture, distribution of goods & services. It is also said that inventory constitute more than half, even up to 60% of the organizations capital. **Muchaendepi et al. (2019)** described inventory as the stock retained by organizations for future use, encompassing raw materials, work-in-progress, and finished goods. Hence, a major type of management system should apply by every organization for management of inventory **(Oballah et al, 2015).** Organizational performance is typically assessed by using both financial and non-financial indicators. Business owners evaluate their businesses by percentage of achieving their goals, investors focus on profitability and productivity, managers review past performance to improve future strategies, and employees track productivity to meet bonus or recognition thresholds **(Lee et al., 2015). Chase et al. (2001)** managing inventory is an activity that manages and organizes the accessibility of stocks to their users of those inventories. Inventory management systems always coordinates different departments in an organization like purchasing, manufacturing, sales, distribution and provide best services to meet the organizational objectives. Managing inventory is a critical and essential problem faced almost by all sectors of the economy. It may be product oriented or services oriented. Problems of inventory management encourage modern business to adopt new technologies that helps to attain the customer satisfaction, improves operational performance of the organization. Sometimes enforcing software for stock control is not always a silver bullet for overcoming these challenges **(Atkinson, 2005). Lyson (1996)** states that managing inventory enhances the performance of an organization which in turn brings productivity by avoiding those costs incurred associated with the movement and storage of materials. **Mercado (2007)** observed that there are certain reasons why organizations keeping of huge inventory. On the other hand, **Bowersox (2002)** states that the existence of too much stock in an organization can results in the tied down of funds on the items, increment of cost of holding, obsolescence, pilferage, and deterioration of materials. Inadequate management of materials also leads to scarcity of stocks can lead to bad services inside the universities. Based on the literature's reviewed above, the following gaps were identified. The previous researchers assumed only bureaucratic procurement practice and inventory carrying cost with less focus on other variables like inventory management techniques, employee skills and organization performance. Based on the previous research works it is identified that there is a huge gap between inventory theory and its management practice. This makes the researcher to see the original practices followed by these selected universities in Amhara region. Many researches on inventory management in manufacturing sectors **Kariuki and Mburu (2013)** suggested that inventory management techniques aligned with technology not only good for manufacturing organizations but also for service providing institutions. This encourages the researcher to select this topuc as the current research study. **Nahmias and Cheng (2005)** states that the two commonly or mostly used inventory management techniques adopted by the present organizations are Just in time (JIT) and Material Resource Planning (MRP) MRP with less attention on Economic Order Quantity (EOQ). Evidence from Industry 4.0 is reshaping sustainable inventory practices through the integration of technologies and AI-driven analytics, which enhance efficiency, reduce costs, and support the formulation of sustainability strategies across different management domains. Furthermore, circular econ omyprinciples, Lean Six Sigma methodologies, and digitalization foster waste reduction and resource optimization, reinforcing the transition toward more adaptive and resilient supply chains. By integrating these strategies, organizations can enhance operational resilience, re duce costs, and align inventory management with economic and environmental goals, ultimately minimizing economic losses. In Ethiopia, some of the organizations are still using spreadsheets, or pen & paper to track inventory & even others do not track inventory. So, this intends the researcher to undertake this study. Limited research has examined inventory management practices within higher education institutions in Ethiopia. This study addresses this gap by investigating the relationship between inventory management techniques and organizational performance in selected universities in the Amhara region.

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2. Review of Literature

Toomey (2000) be it medium-sized or small businesses, stock management are a nitpicking management issues for most organizations. **Heikkilä (2002)** stated that "the aim of proper inventory management is to increase operation efficiency of an organization." An effective inventory management usually begins early before going to procure. **Mentzer (2007)** confirmed that "the special intention of stock management is to better serve customers and this will be accomplished through safety against stock out due to need variability inside the market place. **Sasikumar and Kannan (2008)** defined management of inventory as "the subdivision of management which deals with the planning and controlling of inventories." **Vaidyanathan and Devaraj (2008)** "procuring, forecasting, ordering, and receiving make sure that the proper and right goods in the perfect amount are received just in time as a method of service providing. Storage practices maintain item with minimizes waste. **Koumanakos (2008)** asserts that most reliable stock managing uses standards of cost minimization or profit maximization. Effective, powerful and right menu planning and recipe improvement is the primary and for maximum steps in stock management practice. Menu planning and recipe development should use minimum even as imparting enough variety to maximize customer satisfaction. **Kazare (2009)** inventories consists of goods held for sale to customers or items which can be kept within the organization for normally running the organizations, partially completed goods, materials and supplies to be used in the organization for normal operations. Proper inventory management has a great importance for the organizations in an inventory intense and service providing organizations because efficient &impressive managing practices of inventory will permit the organization to minimize the entire costs of inventory and hence, it avoids critical outcomes that come as a result of shortfall of resources **(Simchi-Levi, 2009).** The primary target of managing inventories is to assure organizations hold inventories at the lowest cost & this helps them attain the goal of securing the organizations & has sufficient enough and uninterrupted stocks to beautify and enhance continuity of operations. Managing inventory has a vast and important financial implication on both the financial and customer satisfaction as well as overall performance of the organizations **(Bhausaheb & Routroy, 2010)**. Efficient and effective service practices make sure that clients continuously acquire desired items, served in accurate quantities from secure surroundings **(Ellram et al., (2004); Grönroos (2011).** Within logistics, inventory includes goods ready for distribution as well as materials transported from suppliers to firms **(Atnafu & Balda, 2018). Petersson and Nellgard (2020)** demonstrated that proactive inventory planning minimizes idle time, accelerates production throughput, and reduces operational costs. Such efficiency translates into improved organizational outcomes, as observed in manufacturing and service settings. **Song, Van Houtum, and Van Mieghem (2020)** argue that inventory strategies such as demand forecasting, just-in-time replenishment, and vendor collaboration improve reliability and reduce costs, thereby enhancing market position.

2.1 Role of human resource management in inventory management: Paperwork expects conformity in behaviors as opposed to overall performance considering employees are dealt with impartiality and they are predicted to rely upon rules and regulations, they are unwilling to enjoy character judgment and keep away from risks **(Kenneth & Keneth, 2008)**. According to the review, bureaucratic procurement procedures, Proper documentation, employee skill, funding etc are some of the factors that limit inventory management thus influencing the organizational performance. But managing stocks are described as complicated structures to expand **(Jones &Riley, 2009).** For inventory managing functions to gain an advanced overall performance, **Bailey and Farmer (2012)** imply that it is far important to recruit, educate and broaden personnel with the capability and motivation to do better process. It is consequently very essential for the inventory characteristics in those universities to effectively manipulate their inventory and use all strategies that match for his or her purpose. This is attributed to the reality that inventory spans through maximum of the departments inside the institution each having its own unique features. Education of staff is vital if full use is to be made from their abilities and talents. For an organization to be victorious, qualification is therefore a prerequisite and need to be matched with process requirement, for this reason the need to rent and develop skilled employees. If workforce worried in inventory management is not always qualified and able, then there can be ineffectiveness in inventory management. In addition, profit maximization is also a key objective, ensuring that ordering and inventory management decisions not only optimize operating costs but also contribute to the company's profit margin increasing. This outcome is due to the balance between logistics efficiency and profitability.

2.2 Technology enabled Inventory Management Practice :Consistent with **Power (2005)**, developing incorporated inventory is one of the challenges that organizations face as they develop stock systems. **Lyson (2006)** states that inventory serves as an insurance policy against the unexpected breakthrough, delays and other disturbance that could disrupt ongoing activities. A sound inventory management is therefore, vital for decision machining in the overall function and the organization as a whole. **Burt (2008),** finances can be a constraining element for effective stock manages when price allotted cannot cater absolutely for the organizations requirement's in the price range length. It is for that reason that it actually becomes imperative to manage inventories efficiently and to avoid the unnecessary price and make sure high-quality service to clients **(Dobler &Burt, 2008).** Sufficient resources additionally results in organizations success and achievement of the esteem of managements funds allocated inside the organization can affect adversely its effectiveness & in finance useful resource software in various spots. Due to the relative largeness of inventories maintained by the organizations, substantial sum of an organizations fund is being committed to them. **Chalotra (2013)** argued that inventory management is identified as an essential tool in enhancing performance, to concentrate on customers, improving intra and inter-organizational networks, enriching technological abilities to provide quality service and thereby presenting effectiveness. Right inventory management even affects in enhancing aggressive capacity. Powerful inventory management practice is crucial inside the operation of an organization **(Bassin, 2014).** Accuracy of inventory information is essential to provide good customer service, ensure that material availability meets the undertaking demand, analyze stock levels and take away extra inventory as indicated with the aid of. Inventory information also provides the management with the facts that is used to make certain responsibility through stocktaking and inventory audit workout. Automatic Replenishment, ABC inventory model, Just-In-Time (JIT) inventory, Economic Order Quantity (EOQ) and inventory management practices are important to an organization which expects to operate efficiently & effectively and offer quality service. **Soh et al., (2015)** in the logistics sector, balancing cost efficiency with high-quality service delivery is a major challenge. High logistics costs remain a barrier to competitiveness, especially in developing economies. **Singh and Verma (2018)** noted that strategies originally pioneered by global manufacturers such as Toyota and Ford have since been adopted across industries worldwide. These practices, when supported by effective planning, significantly improve efficiency and reduce costs. Logical inventory wishes to be assessed and managed in a manner wherein the records is real and correct so that there is no overstocking and stated minimal shortages are found out. In most organizations, inventories constitute up to 50 % of the fund, the money entrusted on stock, thereby affecting the performance of the inventory characteristics and the overall performance of the organization. Strategic inventory also strengthens supplier-buyer relationships. Suppliers that maintain accurate stock visibility and timely deliveries avoid costly disruptions and improve client retention, while those lacking efficient systems risk losing business due to unreliability **(Luoma, 2021).** The implementation of VMI has been shown to provide significant benefits, including reduced stock outs, lower inventory levels, and dampened demand variability, which helps mitigate the bullwhip effect. Challenges in the implementation of inventory management practice in keeping with Dobler and Inventory management is advanced with the goal of decreasing charges associated with inventory management. **Atnafu & Balda, (2018) Chukwu et al., (2022) Jacobs et al., (2022)** contemporary approaches include demand forecasting, perpetual inventory systems, consignment stock, Six Sigma practices, batch tracking, lean manufacturing, ABC classification, reorder point methods, just-in-time delivery, and minimum order quality models. **Muchaendepi et al. (2019)** described inventory as the stock retained by organizations for future use, encompassing raw materials, work-in-progress, and finished goods. **Roy, Gilbert, & Lai, (2019) Wahedi et al., (2023)** the literature establishes that SIM not only reduces holding costs and idle resources but also creates a competitive advantage, operational efficiency, and customer satisfaction. These outcomes validate the argument that SIM is a cornerstone of organizational success across industries and regions. **Petersson and Nellgard (2020)** demonstrated that proactive inventory planning minimizes idle time, accelerates production through and reduces operational costs. Such efficiency translates into improved organizational outcomes, as observed in manufacturing and service settings. **Song, Van Houtum, and Van Mieghem (2020)** argue that inventory strategies such as demand forecasting, just-in-time replenishment, and vendor collaboration improve reliability and reduce costs, thereby enhancing market position. **Yunusa (2021)** for logistics providers, efficient inventory systems not only ensure timely deliveries but also strengthen customer trust and loyalty, thereby reinforcing organizational reputation and long-term performance. Strategic inventory also strengthens supplier-buyer relationships. Suppliers that maintain accurate stock visibility and timely deliveries avoid costly disruptions and improve client retention, while those lacking efficient systems risk losing business due to unreliability **(Luoma, 2021).** Hence, both manufacturers and logistics providers benefit from well-structured inventory strategies, as they enhance supply chain continuity and organizational resilience **(Cesarelli et al., 2021)**. Suppliers gain visibility into the buyer's real-time inventory and sales data, enabling them to make informed replenishment decisions that reduce uncertainty and improve supply chain responsiveness **(Mukucha & Chari, 2023; Stolze, Brusco, & Smith, 2021).** Studies have shown that RFID-enabled IoT systems help improve inventory accuracy and optimize stock levels, leading to enhanced operational efficiency **(Saillaja, et. al., 2023).**

Automation reduces human error, accelerates decision-making, and enhances responsiveness to customer demands **(Chukwu, Afolayan, and Yusuf, 2022).** Moreover, the integration of digital systems – ERP, IoT/RFID, supplier portals, and demand-sensing algorithms supports safer and more effective JIT implementation by improving real-time inventory accuracy, automating replenishment triggers, and reducing supply-risk exposure, which has been shown globally to increase inventory turnover and operational resilience **(Marinagi et al., 2023).** Furthermore, advanced VMI models address complex realities such as probabilistic demand, deteriorating goods, and multi-echelon supply chains, optimizing replenishment cycles and minimizing costs across different stages of the supply chain **(Guchhait et al., 2023; Rani et al., 2023)**. With advancements in Industry 4.0, digital tools such as IoT, ERP, RFID, and blockchain have further enhanced VMI

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effectiveness by enabling real-time visibility, automated demand sensing, and transparent transaction records **(Li et al., 2023).** Moreover, technological integration has amplified the role of inventory systems. With digital tools and automation, firms are able to monitor stock levels inreal time, anticipate demand fluctuations, and optimize replenishment decisions **(Badr & Ahmed, 2023).** Furthermore, digitalization and "smart" practices – including predictive analytics, IoT, and AI have been shown to boost productivity, customer satisfaction, safety, and sustainability outcomes **(Ali et al., 2023).** Challenges remain in terms of implementation costs, organizational resistance, and vendor exposure to higher risks, particularly when demand forecasting is uncertain **(Guchhait et al., 2023; Springer, 2023).** Resilient inventory systems are also seen as essential to maintain delivery dependability, cost efficiency, quality, and flexibility in the face of global supply disruptions **(Shah et al., 2024).**

One of the issues facing by the researchers is real-time monitoring and stock visibility. There is difficulty in ensuring the stock is sufficient or insufficient where manual tracking needs to be done by the workers to ensure a smooth operation. Therefore, many studies aimed to improve real-time tracking of inventory using IoT sensors, RFID technology, and AI **(Anozie et. al., 2024; Rejab et. al. 2019).** These studies focused on addressing stock visibility issues, preventing stockouts, and managing overstocking. Technologies such as the Internet of Things (IoT), artificial intelligence (AI), and blockchain have provided companies with unprecedented visibility and control over their inventory **(Wang et al., 2023).** Digital technologies have addressed this challenge by providing end-to-end visibility, enabling companies to monitor their inventory in real-time. This enhanced visibility allows for better coordination between different stakeholders, reducing lead times and improving overall supply chain efficiency **(Ivanov & Dolgui, 2024).** These changes are essential for maximizing the benefits of digital transformation and ensuring that inventory management strategies are aligned with overall business objectives **(Liu et al., 2024).**

The following Table 1, represents the "Technologies that helps to Improve Inventory Visibility and Accuracy,". It also explains various technologies used to improve inventory management practices by their application, benefits and challenges.

Table 1. Technologies for Improving Inventory Visibility and Accuracy

Technology	Application	Benefits	Challenges
IoT Sensors	Real-time tracking of inventory levels	Improved visibility, reduced stock discrepancies	Integration with existing systems
RFID Tags	Automated identification and tracking	Enhanced accuracy, reduced manual errors	Cost of implementation, compatibility
Barcode Scanning	Inventory data entry GPS Tracking and verification	Faster data capture, reduced human error	Requires physical scanning, limited range
GPS Tracking	Monitoring of inventory movement	Real-time location data, improved logistics	Dependency on connectivity
Cloud Computing	Centralized data management	Accessible data, improved collaboration	Data security, internet dependency

From the above table Table 1 it is observed that

IoT sensors and RFID tags are predominantly efficient in providing real-time visibility into inventory levels and movements. This helps the businesses to maintain accurate records of inventory and identify discrepancies if any. These technologies also help the organizations to minimize human errors while manual inventory checks. Some companies are not able to effort to implement these technologies due to it high cost. Integrating these technologies with existing operations of the organization results in high confrontation both from employees and technocrats. Still the benefits of these digital technologies benefited the organizations to enhance visibility and accuracy of the inventory management.

2.3 Inventory Management Practices and Organizations Performance: The goals of stock management are mainly to enhance organizational performance, reduce inventory and cycle time. It is as consequence of the management of stock-holding, this is accurately being refers to as inventory management. A nicely planned & powerful inventory managing can make contributions significantly. Hence, it should be correctly looked after as it has to do with the performance of the organizations. Overall, the reviewed literatures showed that there was a great influence of inventory management practices on the organizations performance. Therefore, it is important to have a good inventory management as it helps in preventing stock-outs, overstocking, deterioration, obsolescence and high carrying cost. Organizations performance is related to how nicely it achieves its dreams and its desires **(Holmberg, 2009).** Any organizational initiative, consisting of stock management, need to ultimately result in more suitable organizations performance **(Holmberg, 2009).** Managing of inventory consistent with **Anichebe and Agu (2013)** is also fundamental to the success and boom of an organization because the entire performance of an organization is tied to the proper usage and management of its inventory. Inventory troubles of too splendid or too small quantities available can result in the organizations disasters. Moreover, technological integration has amplified the role of inventory systems. With digital tools and automation, firms are able to monitor stock levels in real time, anticipate demand fluctuations, and optimize replenishment decisions **(Badr & Ahmed, 2023)**. Vendor Managed Inventory (VMI) is a collaborative supply chain strategy in which the supplier assumes responsibility for planning, monitoring, and replenishing the buyer's inventory based on agreed principles and shared information. Unlike traditional inventory management, where buyers place orders and suppliers fulfill them, VMI enables the vendor to generate purchase orders and deliver replenishments according to jointly defined stock levels, demand forecasts, and consumption data **(Smaros et al., 2003; Dong, Dresner, & Yao, 2014; Sarkar & Guchhait, 2023).** Because organizational performance is inherently multidimensional, researchers advocate for composite measures that integrate financial, operational, and innovation-related metrics rather than relying on a single indicator **(Hassan et al., 2023).** In practice, JIT reduces holding costs, obsolescence and pilferage and frees working capital, which translates directly into healthier operating cash flows and higher return on assets in contexts where lead times and storage costs are significant **(Garcia-Cutrin, 2024; Marinagi et al., 2023).** However, recent evidence suggests that effective risk management, supply chain integration, and demand adaptation improve performance in the automotive logistics sector **(Ahmed et al., 2024)**. Resilient inventory systems are also seen as essential to maintain delivery dependability, cost efficiency, quality, and flexibility in the face of global supply disruptions **(Shah et al., 2024).** Recent studies continue to highlight the strong relationship between supply chain practices, particularly inventory management, and organizational effectiveness. Research in Ghana demonstrates that inventory management techniques directly improve supply chain efficiency, with technology readiness strengthening this effect **(Singh et al., 2025; Opoku et al., 2024)**. Minimizing excess inventory through precise order timing and quantities, MRP reduces carrying costs, depreciation, and obsolescence, which in turn frees working capital and supports healthier operating cash flows and profitability metrics **(Taylor & Francis, 2023; TechTarget, 2024).**

Recent evidence also highlights the broader benefits of SIM, including shorter delivery lead times, improved supply chain collaboration, and stronger financial performance **(Silaen, Nasution, & Mutiah, 2024).** Digital technologies, on the other hand, enable the collection and analysis of vast amounts of data from various sources, providing valuable insights into inventory performance and trends **(Li et al., 2024).** Recent studies continue to highlight the strong relationship between supply chain practices, particularly inventory management, and organizational effectiveness. Research in Ghana demonstrates that inventory management techniques directly improve supply chain efficiency, with technology readiness strengthening this effect **(Singh et al., 2025; Opoku et al., 2024).** Recent studies also emphasized that flexibility in particular strengthen innovation and mediates performance outcomes in dynamic business environments **(Zhang et al., 2025).** Overall, organizational performance is shaped by a combination of individual contributions, effective supply chain and inventory management, leadership, culture, and resource utilization. Organizations that integrate these elements, while leveraging digital tools and flexibility, are more likely to achieve sustainable competitive advantage in today's complex logistics environment. The following table explains the challenges faced by the organization with proper description, strategies to overcome these challenges with suitable examples in adopting the digital technologies for growth and expansions.

Table 2: Challenges in Adopting Digital Inventory Management Solutions

Challenge	Description	Strategies to Overcome	Examples
System Integration	Compatibility with legacy systems	Use of middleware phased implementation	Integrating IoT with existing ERP systems
Cost of Implementation	High upfront costs for new technologies	ROI analysis, phased investments	Budgeting for RFID technology
Data Quality and Management	Ensuring accurate and consistent data	Data governance frameworks, regular audits	Implementing data validation protocols
Workforce Adaptation	Resistance to change among employees	Training programs change management	Educating staff on new inventory systems
Cyber security Risks	Protecting data from cyber threats	Robust security measures, regular audits	Implementing encryption and authentication
Regulatory Compliance	Adhering to industry regulations	Compliance management systems, regular reviews	Ensuring GDPR compliance for inventory data

The above table-2 focuses on the integration of various technologies with inventory management and implementation costs are significant barriers for adopting digital technologies. Particularly for small and medium organizations adopting these technologies is very difficult due to their high cost. To overcome these limitations companies need to calculate return on investment (ROI) analysis to recover capital expenditure to share the costs over time in implementing these technologies. The effectiveness of data quality and accuracy is another critical concern. Employee's adoption, familiarity with the new technologies is another limitation of digital technologies. Companies need to provide training programmes and workshops to adopt these technologies by the workforce. Cyber security risks are another

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important concern for inventory management due to it s inter connectivity among so many functions of the organizations. Sometimes compliance with regulatory authority like General Data Protection Regulation (GDPR) is also crucial for inventory management to strictly follow the rules and regulations. It is observed that companies which are transformative with the help of technologies increases visibility, accuracy, forecasting, collaborations and overall performance of the organization.

3. Objectives of the study

- To assess the impact of inventory management techniques on operational efficiency
- To examine how inventory management techniques and technology-driven systems collectively influence organizational performance
- To evaluate the effectiveness of different inventory control models in minimizing stock-outs and excess inventory

4. Hypothesis

H_{a1}: Inventory management technique has significant effect on organizations performance.

5. Scope and limitations of the study

The general objective of the study is to investigate the effect of inventory management techniques on organizations performance of some selected universities like Wollo University, Woldia University and Bahirdar University of Amhara region, Ethiopia. The study also has certain limitations of inexact and biased information given by respondents, lack of awareness towards inventory management techniques by the selected respondents and data confidentiality.

6. Methodology

The research methods and statistical tools used to conduct this research work are described in the following paragraph. The role of methodology in a research work is to conduct the research in are liable and a scientific way **(Singh, 2006).** The research methodology provides details about research design, research technique, sampling design, sampling technique, collection of data, sources of data, development of study instrument, reliability and validity tests of research instrument, and data analysis techniques. This study adopts a quantitative research design, supported by an experimental or survey-based approach. The current study used a mixed-method research design that combined descriptive and explanatory elements of the research with quantitative research approach. The probabilistic sampling designed was used to collect the data with stratified random sampling for selecting respondents from various departments of universities. Each university and departments are treated as strata. The data required for the research was collected mainly through two different sources they are primary and secondary source. Primary data was collected by using a structured questionnaire from the selected sample within the population. The primary data for this study collects through structured questionnaire that consists of both open-ended and closed-ended questions. Open ended questions (purely optional) are used to know the name and other Demographic questions like gender, education, age and occupation are formatted in close-ended questions. Related to the inventory management questions are in close-ended format. To support primary data researcher also used secondary data. It collects information from academic journals, university reports, previous research studies, industry publications, and related websites. These sources provide insights into existing theories, past research findings, trends in market and Role of Inventory Management Techniques and Technology-Driven systems in Enhancing Organizational Performance. Data related to the current title of the research that was published is extracted from academic journals such as Scopus, Elsevier, Francis & Taylor, MDPI, Springer, Research Gate, and Science Direct. This secondary data helps in validating primary research findings, identifying research gaps, and supporting hypothesis development. The population selected for the study consists of employees working in various universities directly or indirectly related to the inventory management from the selected universities. The sample size of 304 recommended by Cochran's formula and Krejcie and Morgan's (1970) table at a 95% confidence level and 5% margin of error, and is adequate for regression and SEM analyses requiring higher statistical power. The collected data was analyzed with the help of descriptive analysis like Pearson's correlation, R, R^2, and Multiple Regression regressions techniques.

7. Results and discussions

Table 3 Correlation between inventory management techniques & organizations performance

		Inventory management techniques	Organizations Performance
Inventory Management Techniques	Pearson Correlation	1	.784**
	Sig. (2-tailed)		.000
	N	304	304
Organizational Performance	Pearson Correlation	.784**	1
	Sig. (2-tailed)	.000	
	N	304	304
**. Correlation is significant at the 0.01 level (2-tailed).			

(Source: Primary Source, 2025)

Table 3 demonstrates the correlation between inventory management techniques and organizational performance. Accordingly, as it is depicted in the table, there is strong positive correlation between inventory management techniques of those study areas and organizational performance ($r = .784$, $p = .000$). The main objective of inventory management is identifying the effect of cost which is having items in stock and not having items in stock and computing the cost of ordering and carrying the inventory. In order to attain the balance between inventory availability and cost must be addressed the main target of inventory management volume that how much to order and when to order **(Porter, 2011).** Therefore, since inventories are key to organizations success, inventory management must be given high attentions when decision making. There are different techniques and models which can help inventory management practice of an organizations like Just-in-time, economic order quantity, always best control analysis etc. Economic order quantity is technique of determining the optimum amount of order which can minimize the total cost of ordering and carrying inventory **(Jose & Jayakumar, 2013).** As per **Canel et al. (2000)** just in time (JIT) aims so at to reduce the time waiting during working process. Hence, not only the cost of inventory is going to be minimized but also the time for undertaking the work be minimized or shortened. Just in time (JIT) isn't implying about way of managing or standardization but it truly specializes in zero inventories and this system builds a good relationship and trust suppliers & based on willing of suppliers. Excess inventories of an organization have a cost of holding an inventory and it will negatively affect each cash flow of the organization. In any organization, the excess inventories and the decline in price is part of holding excess inventory. In addition to this, the cost of providing price protection and product return is increase in case of excess inventories **(Jijm, 1999).** Organizations purchase different stocks or inventory items from different suppliers. So that all those inventories do not have the same value as a result they can apply always best control techniques (ABC). The concept of ABC is a version that can be used to shape a rational inventory policy which assist to decrease inventory costing consisting of wage and storage expenses. The purpose of ABC analysis is to organize the inventory materials according to their usage and annual dollar. The amount can be calculated by multiplying the amount per unit by annual rate and this analysis mostly follow a simple rule of thumb **(Kumar, 2017).** Hence, from this study, it is concluded as techniques of inventory management have strong positive correlation with the performance of those universities. Hence, reject the null hypothesis which implies that there is positive and significant relationship between prompt determination of inventory management techniques and organizations performance.

Correlation Analysis: The correlation analysis revealed a strong positive relationship between inventory management techniques and organizational performance. $r = .784$, $p < .01$. This indicates that improved inventory management practices are associated with higher organizational performance.

Table 4. Model summery of the effect of inventory management Techniques on organizations performance

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.598[a]	.358	.356	.624
a. Predictors: (Constant), Inventory management Techniques				

(Source: Primary Source, 2025)

R^2, coefficient of determination, states degree to which changes in the dependent variable may be defined by means of changes in the independent variables I.e. the percentage of variant within the structured variable that is organizational overall performance that is explained by means of the independent variable that is inventory management Techniques. Therefore, as it is revealed in table 4.15 above, an R^2 of .358 which indicates that the independent variable studied explains only 35.8 percent of the variation in the organizational performance of those selected universities. Hence, this implies that there are other factors which are not studied are going to explain the remaining 64.2 % of the variation in organizational performance of those universities. Therefore, it needs further research or investigation to be made to investigate the remaining or other factors which affect the performance of those universities.

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Table 5: Multiple Regression Coefficients

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.426	.087		4.916	.000**
	Inventory management techniques	.139	.032	.186	4.292	.000**
a. Dependent Variable: Organizational Performance						

Note: ** *P*< 0.01, * *p*< 0.05,

Multiple regression analysis become undertaken to determine the effect of inventory Management Practice on organizational performance of those selected universities and the independent variables inventory management techniques. The regression equation, as per the SPSS result generated in the above table is:

$Y = \beta 0 + \beta_1 X_1 + \varepsilon$, which becomes: $Y = 0.426 + .139X1 + \varepsilon$

As per to the regression equations established above, a unit increase in inventory management techniques like proper use and determination of JIT, EOQ, ABC analysis will leads to an increases in the organizational performance by 0.139.

Regression Analysis

Regression results showed:

$R^2 = .358$

$\beta = .139$

$p < .01$

The model explains 35.8% of the variance in organizational performance. Inventory management techniques significantly predict performance improvements.

The regression equation is:

$Y = 0.426 + 0.139X + \varepsilon$

This indicates that a one-unit increase in effective inventory management techniques leads to a 0.139 increase in organizational performance

8. **Conclusions and Recommendations:** The finding of the correlation analysis shows that techniques of managing inventory has a positive correlation with organizations performance at significance level < 0.05 (r= .784, p= 0.000). The results of regression analysis indicate that inventory management techniques were significantly influencing factors of organizational performance with a unit increase of inventory management techniques, it leads to an increase of .139 in organizational performance. The regression coefficient of inventory management techniques and organizational performance is positive (β=0.139) and significant (p value 0.000). This indicates that inventory management techniques were statistically significant and has positive effect on organizations performance. The result further reveals that in figuring out or finding out the most fulfilling stock levels, management strive to maintain a balance among minimal cost of ordering and keeping stock and uses computerized gadget in handling inventories (such as EDI). "Hence, the investigation shows that there is positive relationship between inventory management techniques and organizational performance implying that when the universities are applying good inventory management techniques to their inventory management, organizational performance goes to increase and when the universities are not applying good inventory management techniques to their inventory management, organizational performance goes to decrease."

Concerning inventory management techniques, the researcher forwarded the following suggestions:

Since just in time inventory is a strategy to increase efficiency and decrease wastage by receiving goods only as they are needed, thereby reducing inventory costs, there should be good operation of Just-in-Time (JIT) in the university, where no safety stock is kept too much.

Those universities need to go through the idea of economic order quantity which is an attempt to balance between inventory holding and carrying cost with the costs incurred from ordering. Therefore, the universities should properly determine optimum stock levels in which they strive to maintain a balance between minimum cost of ordering and holding stock. In organizations, it is always suggested that there is selective inventory control which is an inventory categorization technique like ABC technique of inventory management and it suggest that inventories of an organizations are not equally important and do not have equal value. Thus, it groups inventory in to A, B and C class items according to their importance. Hence, since all the inventory items in the university stores are not having equal economic values, those university items should be classified according to their economic value and importance.

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