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The Impact of Inventory Management on Financial Performance in the Pakistani Pharmaceutical Sector: A Multivariate Analysis

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Abstract

This study examines the relationship between inventory management practices and firm performance, specifically focusing on ROA & ROE as the measure of financial performance. Using regression analysis, we investigate the impact of various factors, including inventory turnover, capital work in progress, long-term borrowings, sales, Earnings Before Interest and Taxes (EBIT), and the current ratio, on ROE. Our findings indicate that inventory turnover and capital work in progress do not significantly affect ROE and ROA, suggesting that variations in these factors do not strongly influence a firm's return to its equity holders. However, we identify a significant negative relationship between long-term borrowings and ROE, indicating that higher levels of long-term debt may hinder a firm's ability to generate returns for shareholders. Furthermore, we observe a significant positive relationship between EBIT and the current ratio with ROE and ROA, emphasizing the importance of profitability indicators and liquidity measures in determining firm performance. These insights provide valuable guidance for businesses seeking to optimize their financial performance through effective inventory management and financial strategies.

Keywords: Inventory Management, Financial Performance, Pharmaceutical,

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Multivariate

1 Introduction

Inventory management has a significant influence on the procurement, storage, and use processes and is essential to the smooth running of enterprises in a variety of industries (Nallusamy, 2021). Due to its unique regulatory structure, strict quality control requirements, and changing demand dynamics, Pakistan's pharmaceutical business places a particularly high value on the complicated relationship between inventory management and financial success (Regin et al., 2022). Additionally, corporate governance is crucial to the success of businesses, particularly in Pakistan's chemical and pharmaceutical industries (Ibrahim et al., 2010). These elements combine to provide a complicated background that emphasizes the vital link between financial performance and inventory management, underscoring the need for efficient management techniques in this particular operational setting (Ahmed & Batool, 2017).

We need to examine the complexities of this intricate process to fully appreciate the essential role that inventory management plays in Pakistan's pharmaceutical sector. From sourcing and procurement to storage and transportation, inventory management includes a variety of activities (Nallusamy, 2021). Striking a balance between satisfying customer demand and avoiding overstocking, its proper execution has a substantial influence on a company's financial stability and competitiveness in the market (Conley et al., 2019). The literature indicates that these ideas are broadly applicable. For example, Muchaendepi et al. (2019) show a connection between effective inventory management strategies and enhanced financial outcomes. This connection is crucial because of Pakistan's pharmaceutical industry's unique and dynamic background, which is characterized by changing consumer needs, regulatory hurdles, and unique market dynamics.

Mbah et al. (2019) analyzed manufacturing firms located in Southeast Nigeria. Their findings indicated a favourable correlation between better inventory management practices and improved financial results, hence validating the beneficial relationship between inventory management efficacy and operational performance. Boche et al. (2022) examined Ethiopian public health institutions in a wider context and emphasised the critical role inventory management plays in guaranteeing the availability of necessary supplies and the effective delivery of healthcare services. All of this research highlights how versatile inventory management strategies can be, providing useful information for Pakistan's pharmaceutical sector. The pharmaceutical industry in Pakistan functions within a unique environment that is home to a range of companies, including both local and multinational manufacturers (Sawlikar, 2023). A specialized setting like this one presents industry-specific obstacles including complicated pharmaceutical registration, pricing controls, and strict quality control requirements, all of which make inventory management even more difficult.

Organizations in the industry that depend on effective asset management to maintain the smooth operation of their businesses include Abbott Laboratories (Pakistan) Limited, AGP Limited, Citi Pharma Ltd., Ferozsons Laboratories Limited, GlaxoSmithKline Pakistan Limited, Haleon Pakistan Limited, Highnoon Laboratories Limited, Hoechst Pakistan Limited, IBL HealthCare Limited, and The Searle Company Limited. Purchasing, storing, and shipping are just a few of the many tasks that go under the umbrella of inventory management (Nallusamy, 2021). A pharmaceutical company's capacity to remain financially stable and competitive in the market is greatly impacted by how well it handles these obligations.

Achieving a careful balance between avoiding the risks of overstocking and keeping the appropriate quantity of inventory on hand to fulfil customer demand is the major objective of inventory management. The financial stability of these sector participants may be hampered by overstocking, which may tie up money and raise holding costs (Conley et al., 2019). Many

industries and geographical areas have researched the complex relationship between inventory management and financial success. Several research works have explored this field, revealing patterns and subtleties that illuminate how an organization's ability to make money is impacted by how well its inventory is managed. In the industrial sector of Harare, for example, Muchaendepi et al. (2019) studied small and medium-sized enterprises (SMEs) in the pharmaceutical business. As evidence of the broad relevance of these concepts, their results showed a significant relationship between good inventory management techniques and enhanced financial results. The research objective of the study is to comprehensively investigate inventory management within the Pakistani pharmaceutical industry, encompassing the evaluation of current practices, an exploration of the relationship between inventory management variables and financial performance, and an examination of the impact of control variables on the interplay between inventory management and financial performance.

2 Literature Review

2.1 Theoretical Background

Many corporate settings have investigated the relationship between inventory management and financial success in great detail. A favourable correlation between improved inventory management and improved financial performance was discovered by Muchaendepi et al. (2019) among SMEs in Harare, Zimbabwe. Mbah et al. (2019) emphasised the positive relationship that exists between operational performance and inventory management efficiency in the industrial sector of Nigeria. Furthermore, Gijsbrechts et al. (2022) examined cutting-edge methods for inventory management, such as deep reinforcement learning, with an emphasis on dual-sourcing, multi-echelon issues, and missed sales. Analysis by Boche et al. (2022) of the performance of inventory management for laboratory goods at public health institutions in Gambella Regional State, Ethiopia, revealed particular difficulties in this industry. Moreover, Glock and Grosse (2021) undertook a methodical examination of the literature, highlighting the influence of regulated production rates on inventory management systems. Collectively, these studies highlight how important inventory management techniques are for enhancing financial performance in all sectors and geographical areas while also providing insights into many aspects of this crucial business function.

Navigating a difficult regulatory framework and changing drug demand, Pakistan's pharmaceutical sector plays a significant role in both healthcare and the country's economy (Pourmohammad-Zia, 2021). Drug registration and quality control are two obstacles that inventory management in this broad industry, which includes both domestic and foreign enterprises, must overcome to guarantee that people have access to necessary pharmaceuticals (Farooq, 2019). This work is important since there isn't much research on inventory management in this environment, despite its relevance. Further information from relevant research on the influence of technology in the retail sector (Mondol, 2021; Kurdi et al., 2022) and inventory management in healthcare (Alemu et al., 2023) may also be useful in guiding our study. The connection between financial success and inventory management has been the subject of several research. Sritharan (2019) discovered that effective inventory management techniques influenced gross profit margins in the food, beverage, and tobacco sectors. Ogundipe et al. (2023) emphasised the significance of inventory and cash management in cooperative and for-profit environments.

Amanda (2019) investigated how inventory management interacts with other financial metrics, including debt-to-equity ratio and cash turnover, to affect a company's financial performance. In their study of phase change materials for thermal energy storage, Madeswaran et al. (2021) emphasised the need for effective inventory management for performance optimisation. Anantadjaya et al. (2021) examined the relationship between supply chain management and manufacturing companies' financial performance, whereas Yunusa (2021) looked at inventory

management in manufacturing companies. All of these studies highlight how important it is to manage inventories well in all industries and how it affects financial results.

The effect of inventory management on financial performance is a major worry for many different companies, including the pharmaceutical industry in Pakistan. By highlighting minimal quantity constraints, Sirisha and Kalyan (2022) illuminate the difficulties in handling a large number of inventory items. This research serves as an example of the difficulties firms have while managing intricate multi-item systems. Rahmayana and Ahmad (2021) provide an inventory management implementation model and show how small and micro businesses may use it to maintain their viability. In their investigation of the relationship between working capital and inventory management, Aminu et al. (2019) emphasise how these factors directly affect financial performance. In a different setting, Fang et al. (2022) look into how inventory performance affects SME credit ratings, highlighting the moderating effect of supply chain concentration.

Park and Kim (2021) analyse the impact of inventory turnover on financial performance, considering external factors like commodity price risk. Furthermore, Nurprihatin et al. (2021) investigate how to improve raw material inventory management in the food sector, providing sector-specific knowledge that may have ramifications for more general financial performance issues. All of these studies highlight the complex relationship between inventory management's financial impact and performance, and they all provide insightful information about possible connections between the complexities of inventory management and their financial effects.

Although research from other countries offers a useful starting point for comprehending the link between inventory control and financial success, it is crucial to recognised the particular difficulties and possibilities that the pharmaceutical industry in Pakistan faces. This industry works in a unique environment; thus, it is crucial to do a thorough study catered to its unique dynamics. By filling up this research gap, the study seeks to provide practical knowledge that may help with inventory management practice optimization and, as a result, improved financial performance within the Pakistani pharmaceutical business.

2.2 Relevant Theories

The influence of inventory management on financial performance has been extensively studied across a wide range of sectors and geographical areas. Inventory management is a crucial component of corporate operations. To give insightful information on the connection between inventory management and profitability, we will critically examine some of the most important ideas and concepts from the literature in this part. Each theory and idea will be covered in depth, and we'll use several important sources to guide our debate.

Trade-off Theory: Mgbemena (2020) examined Nigerian cement producers, exploring the fundamental principles of the Trade-off Theory and illuminating the fine balance needed to maximise profitability. According to Campbell and Kelly (1994), in the Trade-off Theory, there is a level of inventory that is ideal for maximising earnings. Keeping more inventory on hand results in holding costs and resource consumption, which might be detrimental to profitability. On the other hand, as Hackbarth et al. (2007) address in the context of debt structure, low inventory levels may result in stockouts and missed sales, which are similarly harmful to profitability. The actual implementation of this theory is shown by Mgbemena's study in the cement production industry, which highlights the vital role inventory management plays in accomplishing financial goals. It highlights how important it is for companies to regularly evaluate and modify their inventory levels to prevent overstocking or understocking and protect their bottom line.

Resource-Based View (RBV) Theory: According to Olavarrieta and Ellinger (1997) and Barney (1996), the Resource-Based View (RBV) Theory states that companies may get a long-term competitive advantage by using their special resources and competencies. Using the context of

small businesses, Orobia et al. (2020) utilized the RBV theory and emphasised the importance of managerial competence as a resource for inventory management. Orobia's work supports RBV by emphasising how skilled managers may have a major impact on financial success via their capacity to precisely predict demand, maximise costs, and make well-informed judgements about inventory levels. This emphasises how crucial human capital is to effective inventory management. Because having a team with the right knowledge and abilities can improve inventory management procedures and ultimately financial performance, businesses should invest in developing managerial capabilities in this area, which is consistent with the Resource-Based View Theory's tenets.

Theory of Financial Supply Chain Management (FSCM): Financial Supply Chain Management (FSCM) was first presented by Fu et al. (2021) in their work on dynamic inventory management. To increase productivity and profitability, FSCM promotes the integration of supply chain and financial activities. This methodology is in line with the extensive review by Vousinas and Ponis (2017) as well as the empirical results on financial supply chain management by Wuttke et al. (2013). The fundamental tenet of FSCM is that, as shown by the research, simplifying operations, enhancing cash flow, and lowering financing costs can all be achieved by optimising the financial parts of the supply chain.

Cash Conversion Cycle (CCC) Theory: The Cash Conversion Cycle (CCC) hypothesis offers a framework for comprehending the dynamics of turning inventory investments into cash. It was first presented by Richards and Laughlin (1980) and has since been further investigated by Nobanee and Al-Hajjar (2014). A shorter CCC indicates more effective inventory management and faster cash flow. The CCC measures how long it takes a company to complete this cycle. Mahalwala (2022) looked at how applicable this idea was to Indian Fast-Moving Consumer Goods (FMCG) companies. Mahalwala's study investigates how changes in inventory control procedures might impact the CCC and, in turn, the profitability and liquidity of fast-moving consumer goods (FMCG) firms. Businesses may improve their overall financial performance by converting inventory into cash more quickly by optimising their CCC. This frees up resources for other investments or operations.

Efficiency Theory: Farooq (2019) investigated how inventory turnover affects non-financial sector enterprises' profitability in Pakistan is consistent with this theory. This theory contends that cost savings, decreased holding costs, and increased profitability may result from efficient inventory turnover as assessed by inventory turnover ratios (Abel et al., 1989). The study by Farooq (2019) examines how differences in inventory turnover rates might affect the financial success of Pakistani non-financial sector companies. It emphasises how crucial it is to maintain ideal inventory turnover rates to save costs while making sure that goods are always accessible to satisfy consumer demand.

The theories of Trade-off, Resource-Based View (RBV), Financial Supply Chain Management (FSCM), Cash Conversion Cycle (CCC), and Efficiency collectively offer valuable frameworks for understanding the intricate relationship between inventory management and financial performance in the Pakistani pharmaceutical sector. The Trade-off Theory emphasizes the need to balance inventory costs and income, while the RBV highlights the role of management expertise. FSCM encourages the integration of financial and supply chain operations, CCC underscores quicker cash flow, and Efficiency Theory emphasizes the importance of inventory turnover efficiency. These theories provide comprehensive insights for pharmaceutical companies looking to optimize inventory management and enhance financial performance in this sector. Future research can further explore these theories to delve into the dynamic connection between inventory control and financial success.

2.3 Critical Analysis of the Literature

This thorough analysis of the literature looks at the complex relationship between financial success and inventory management. A deeper comprehension of this important factor is made possible by the distinct views and viewpoints that each of these research offers. Both Muchaendepi et al. (2019) and Mbah et al. (2019), albeit in distinct geographic settings, demonstrate a favourable link between better inventory management and improved financial performance. Although Muchaendepi's research in Zimbabwe and Mbah's work in Nigeria highlight the need for effective inventory management everywhere, they also highlight how this connection might vary depending on the location. Advanced inventory management techniques, such as deep reinforcement learning, dual-sourcing, multi-echelon problems, and missing sales, are examined by Gijsbrechts et al. in 2022. By contrast, Boche et al. (2022) analyse laboratory items inventory management performance in Ethiopia and identify industry-specific problems. Taken together, these studies show that inventory management is a dynamic profession with changing tactics and varied applications in different sectors and geographical areas. A comprehensive overview of the literature is provided by Glock and Grosse (2021), who highlight the impact of controlled production rates on inventory management systems. This more comprehensive viewpoint draws attention to the regulatory impacts on inventory management, which are especially significant for certain industries like the pharmaceutical industry.

Pakistan's pharmaceutical industry, an essential part of the country's healthcare system and economy, has unique difficulties. Pourmohammad-Zia (2021) highlights the challenges that this business has when it comes to quality control and medication registration. To highlight the industry-specific importance of effective inventory management, Farooq (2019) examines the effects of inventory turnover on Pakistani non-financial sector businesses. While not specifically about the pharmaceutical industry, Mondol (2021), Kurdi et al. (2022), and Alemu et al. (2023) provide insights from the retail industry and healthcare inventory management. Their conclusions highlight how technology and digitalization are helping to modernise inventory management procedures, which may be important for pharmaceutical companies. The relationship between inventory and cash management and how these factors affect financial performance is examined by Ogundipe et al. (2023) and Amanda (2019). Their results highlight the connection between inventory and financial measures, illuminating this relationship's significance for the pharmaceutical industry.

Theories of inventory management provide useful frameworks for comprehending how financial performance and inventory control interact. The Trade-off Theory (Campbell & Kelly, 1994; Hackbarth et al., 2007) aims to achieve a balance between holding costs and resource consumption. Mgbemena's research on Nigerian cement manufacturers is an example of this theory. Managerial competency is a valuable resource for inventory management, according to Orobia et al. (2020) explanation of the Resource-Based View (RBV) Theory. This viewpoint supports the RBV's tenet that competent managers can greatly influence financial performance via cost optimisation and precise demand prediction (Olavarrieta & Ellinger, 1997; Barney, 1996). Presented by Fu et al. (2021), the Financial Supply Chain Management (FSCM) Theory promotes the integration of financial and supply chain operations to increase profitability and productivity. This idea is consistent with Wuttke et al. (2013) empirical findings on FSCM and the comprehensive review of Vousinas and Ponis (2017). The effective conversion of inventory capital into cash is the main goal of the Cash Conversion Cycle (CCC) Theory, which was first introduced by Richards and Laughlin, (1980). Mahalwala's research on the Fast-Moving Consumer Goods (FMCG) industry in India shows how CCC theory may be used in practice to maximise cash flow (Nobanee & Al-Hajjar, 2014). To save costs and guarantee the availability of commodities, efficiency theory—which Farooq (2019) examined in Pakistan's non-financial sector—highlights the significance of optimal inventory turnover rates (Abel et al., 1989).

As a whole, this research provides a thorough grasp of the complex connection between financial performance and inventory management. While acknowledging the unique possibilities and problems encountered by Pakistan's pharmaceutical industry, they also stress the need for proper inventory management worldwide. These theories of inventory management also provide helpful frameworks for comprehending this connection that applies to many sectors.

3 Methodology

The study approach for examining how inventory management affects financial performance in the pharmaceutical industry is described in this section. Using econometric models, the research seeks to determine the link between inventory management practices and financial success. Data from the financial reports of pharmaceutical businesses listed on the stock market from 2016 to 2021 were obtained as part of the study using purposive sampling. The analysis of Return on Assets (ROA) and Return on Equity (ROE) has been done using two econometric models.

3.1 Sample Selection and Data Collection

The study used a purposive sample technique to examine the correlation between inventory control and financial outcomes within the pharmaceutical sector of Pakistan. The research focused on publicly traded pharmaceutical firms because they provide crucial financial information. The primary data source was financial statements, which covered the years 2016 through 2021 and included cash flow, income, and balance sheets. Return on Equity (ROE) and Return on Assets (ROA), which show how much money a company makes from equity and assets, were examples of dependent variables. The study's independent variables included sales, earnings before interest and tax (EBIT), capital work-in-progress, current assets, long-term borrowings, and the inventory turnover ratio (Sritharan, 2019; Mahalwala, 2022; Farooq, 2019). These were included because they directly affect financial performance and are easily influenced by inventory control.

Insights from pertinent literature have been added to strengthen the theoretical groundwork and practical applicability of the research. The idea of an Integrated Inventory Management Control Framework is presented by HR and Aithal (2020), and it may provide important insights into how inventory management may be included in more comprehensive organisational initiatives. Gijsbrechts et al. (2022) explore how deep reinforcement learning may be used to enhance inventory management, a growing field of research that may influence the methods used in this one. To provide useful guidance on how to put inventory management techniques into practice, Sridhar et al. (2021) performed a case study on the simulation of inventory management systems in retail businesses. To add behavioural insights to the investigation, Ghayour et al. (2022) investigate the interaction impact of management behavioural stresses on the effectiveness of inventory management and its consequences for financial hardship. Last but not least, Rashid et al. (2020) examine demographic variables impacting inventory managers' opinions of healthcare performance, illuminating the human aspect of inventory management in the context of healthcare. This study aims to provide a solid analysis of the relationship between inventory management and financial performance in the Pakistani pharmaceutical industry by combining purposive sampling, thorough financial data collection, and the inclusion of insights from pertinent literature.

3.2 Econometric Equations

To determine how inventory management affects financial performance, the study has used two econometric equations, notably Return on Assets (ROA) and Return on Equity (ROE). The format of these equations is as follows:

$$ROA = \beta_0 + \beta_1 \text{Inventory Turnover Ratio} + \beta_2 \text{Current Assets} + \beta_3 \text{Long Term Borrowings} + \beta_4 \text{Sales} + \beta_5 \text{EBIT} + \beta_6 \text{Current Ratio} + \varepsilon$$

Equation 1

In this equation:

• ROA represents the Return on Assets, which is a measure of a company's profitability of its total assets.

• β_0, β_1, β_2, β_3, β_4, β_5, and β_6 are the coefficients representing the parameters to be estimated. These coefficients indicate the strength and direction of the relationship between each independent variable and ROA.

• Inventory Turnover Ratio, Current Assets, Long Term Borrowings, Sales, EBIT (Earnings Before Interest and Taxes), and Current Ratio are the independent variables that are expected to affect ROA.

• ε represents the error term

ROE = β_0 + β_1Inventory Turnover Ratio + β_2 Capita l Working Progress + β_3Long Term Borrowings + β_4Sales + β_5EBIT + β_6Current Ratio + ε

In this equation:

• ROE represents the Return on Equity, which measures a company's profitability of its shareholders' equity.

• β_0, β_1, β_2, β_3, β_4, β_5, and β_6 are the coefficients representing the parameters to be estimated for each independent variable's impact on ROE.

• Inventory Turnover Ratio, Capital Work in Progress, Long Term Borrowings, Sales, EBIT, and Current Ratio are the independent variables expected to influence ROE.

• ε represents the error term

In the context of the Pakistani pharmaceutical industry, these econometric equations provide a quantitative investigation of the link between inventory management and financial success. The computed coefficients reveal the strength and direction of each independent variable's influence on ROA and ROE. Following is the empirical model for this study:

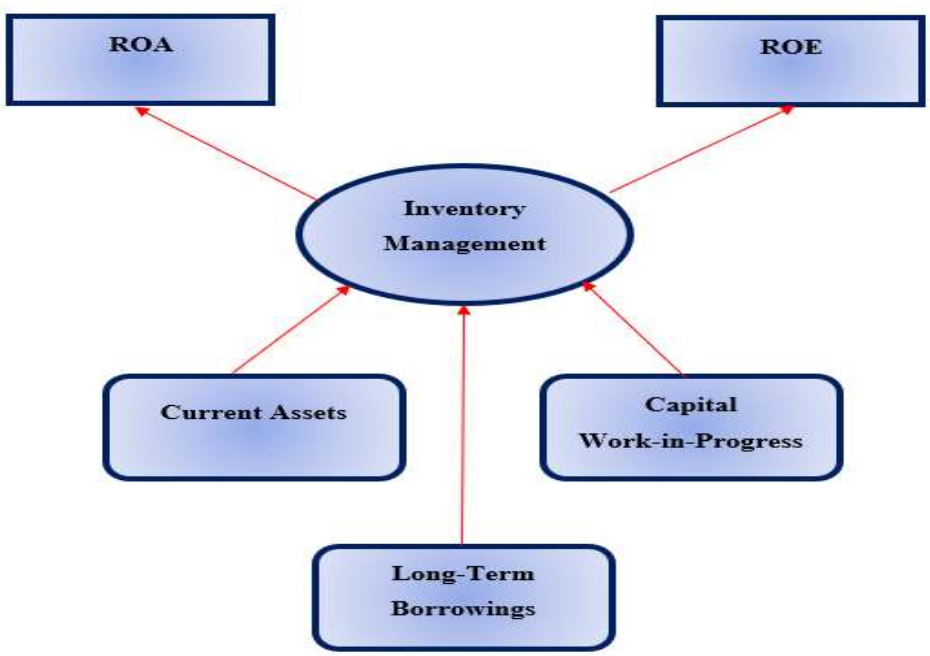

Figure 1 - Emperical Model

It is crucial to take into account earlier research that has looked at the link between inventory management and financial success in various scenarios to substantiate these equations. Muchaendepi et al. (2019), Zhao and Tu (2021), Goa (2020), Althaqafi (2020), and Chebet and Kitheka (2019) all provide insightful analyses of the factors and their possible impact on financial performance. The study is improved by incorporating the information from these papers, and the selected econometric models are given a strong theoretical basis.

3.3 Data Analysis Technique

The given econometric equations have been used in numerous regression studies using the obtained data. These studies sought to determine the significance and direction of the correlations between the dependent variables, namely ROA and ROE, and the independent variables, which represented different inventory management measures. The influence of inventory management on financial performance has been the subject of intensive testing throughout this part of the study. These hypotheses were created using the regression models' predicted coefficients for the independent variables. Finding out if certain inventory management techniques have a statistically meaningful impact on both ROA and ROE has been the goal.

Advanced statistical software, such as Stata, has been used to make these data analyses easier. The functions and tools required to conduct reliable regression analyses, test hypotheses, and provide perceptive statistical summaries and visualisations have been made available by this programme. By improving the accuracy and effectiveness of the data analysis process via the use of such software, a thorough investigation of the link between inventory management and financial performance in the context of the Pakistani pharmaceutical industry has been made possible.

3.4 Ethical Considerations

• The study complies with ethical standards and guarantees the privacy of the financial information acquired from the pharmaceutical firms.

• The appropriate authorizations and approvals have been received to gather the data.

4 Analysis

This research study's analysis chapter focuses on assessing how inventory management affects the financial success of pharmaceutical enterprises in Pakistan. The Return on Assets (ROA) and Return on Equity (ROE) are the dependent variables in the study, while the Inventory Turnover Ratio is the main independent variable. The link between these variables is evaluated using two econometric equations. The relevance and ramifications of inventory management practises on financial performance are highlighted in this section's thorough examination of the results of the regression analyses and correlation studies.

4.1 Descriptive Statistics

Table 1 - Summary Statistics

Variable	*Obs*	*Mean*	*Std. Dev.*	*Min*	*Max*
Return on Assets (ROA)	57	15.01557	7.283732	-0.2463654	38.3
Return on Equity (ROE)	57	20.85982	10.18512	-0.3005276	47.30172
Inventory Turnover Ratio	57	5.631192	1.823597	2.43	11.29
Capital Work in Progress	52	444513.1	594460.8	0	2723576
Current Assets	57	6,370,440	5,648,224	778,377	19,000,000
Long-Term Borrowings	41	441,467.8	1,512,903	0	9,743,577
Sales	57	14,000,000	11,000,000	1,156,421	42,600,000
EBIT	57	2,238,314	2,048,942	-73,036	8,498,844

Key statistical details of several factors relating to the financial performance and inventory

management of the analysed organisations are shown in Table 1. These statistics enable a more thorough comprehension of the dataset by providing insightful information about the core trends, variability, and range of the variables.

• The firms in the dataset produce an average return on assets (ROA) of 15.02%, which means that on average. A positive mean value indicates that, generally, the businesses are profitable. This statistic is a key indicator of profitability. The standard deviation of 7.28% demonstrates the wide range in ROA amongst the organisations, with some producing much greater returns and others operating less effectively. The range of ROA values in the sample, from -0.25% to 38.3%, highlights the variety in financial success.

• The firms are earning an average return of 20.86% on their equity, which represents their capacity to reward shareholders, according to the mean ROE of 20.86%. ROE is a measure of profitability like ROA, except it focuses particularly on returns to shareholders. The 10.19% standard deviation indicates the significant variation in ROE amongst the businesses, with some generating strong returns for shareholders while others do worse. The range of ROE values from -0.30% to 47.30% reveals the variety in how well businesses are using their equity to produce profits.

• The dataset's firms are turning through their inventory on average 5.63 times annually, according to the mean inventory turnover ratio of 5.63. A higher number means that inventory is being sold more often, which lowers holding costs. This indicator measures how well inventories are managed. The majority of the firms seem to maintain comparable levels of inventory turnover, as shown by the comparatively low standard deviation of 1.82, which indicates that there is less variation in this statistic across the organisations. Different businesses handle their inventories differently, as seen by the range from 2.43 to 11.29, with some obtaining much greater turnover rates.

• The average sum invested in projects or assets that are still under construction is 444,513.1 in terms of mean capital work in progress. Understanding how to allocate money for potential development or expansion depends on this characteristic. The 594,460.8 standard deviation shows a significant degree of variation in the capital work in progress across the organisations, pointing to different investment philosophies. The range from 0 to 2,723,576 indicates the variety in the level of current capital projects that organisations are involved in.

• The average value of assets that are anticipated to be converted into cash or used up within a year is represented by the mean current assets, which equals 6,370,440. This contains things like money, receivables, and stock. The 5,648,224 standard deviation indicates that there is a substantial variation in the amount of current assets amongst the organisations. The breadth of these companies' financial resources, with some having sizable current assets and others operating with less liquid resources, is shown by the range from 778,377 to 19,000,000.

• The average amount of debt that the enterprises have incurred to meet their long-term financing requirements is shown by the mean long-term borrowings of 441,467.8. In terms of capital structure and financial leverage, long-term borrowings are essential. The standard deviation of 1,512,903 indicates that there is wide variation in how much long-term debt is used by businesses. Different organisations have different degrees of long-term borrowing, as seen by the range from 0 to 9,743,577, with some being more leveraged than others.

• The 14,000,000 median sales number shows the firms' average yearly revenue. Sales are a major factor in the success and expansion of the economy. The large variation in sales across the organisations, shown by the standard deviation of 11,000,000, is an indication of different market penetration and revenue creation approaches. The range from 1,156,421 to 42,600,000 illustrates how different the sizes and scope of the activities of the firms are.

• The average profits of the enterprises before deducting interest and taxes are represented by the mean EBIT, which is 2,238,314. This indicator evaluates the profitability of operations. The variance in EBIT amongst the companies is shown by the standard deviation of 2,048,942, with some businesses producing much larger profits. The range of operational success, with some businesses experiencing losses and others making significant profits, is from -73,036 to 8,498,844.

4.2 ROA Regression Analysis

To investigate the impact of inventory control on Return on Assets (ROA), the first regression analysis was carried out. According to the analysis's findings, Inventory Management has a significant impact on ROA and several independent factors ($p < 0.05$). Notably, the Inventory Turnover Ratio, Current Assets, Sales, Earnings Before Interest and Taxes (EBIT), and Current Ratio all exhibit coefficients with p-values under 0.05, indicating a substantial impact on ROA from these factors.

Table 2 - Regression Results for Return on Assets (ROA)

	Coefficient	*Std. Error*	*t-stat*	*p-value*	*95% Conf. Interval*
Inventory Turnover	*0.84*	*0.51*	*1.62*	*0.11*	[-0.2098, 1.8815]
Current Assets	*0.00*	0.00	-2.08	0.05	[-1.39e-06, -1.71e-08]
Long Term Borrowings	*0.00*	0.00	-1.51	0.14	[-2.24e-06, 3.30e-07]
Sales	*0.00*	0.00	-2.15	0.04	[-7.74e-07, -2.09e-08]
EBIT	*0.00*	0.00	3.45	0.00	[1.66e-06, 6.44e-06]
Current Ratio	*1.95*	0.89	2.17	0.04	[0.1270, 3.7630]
Intercept (Cons)	*7.67*	4.03	1.90	0.07	[-0.5253, 15.8707]

The regression analysis and statistical findings in Table 2 provide light on the impact of Inventory Management on Financial Performance, notably in the context of Return on Assets (ROA). The Inventory Turnover Coefficient of 0.8358, in particular, indicates a favourable correlation between a greater inventory turnover ratio and ROA. At the 0.05 level, this association is not statistically significant (p-value = 0.114), but it still suggests a possible trend. This suggests that better inventory management techniques, as shown by greater turnover ratios, may benefit a company's profitability as determined by ROA. Positive coefficients for current assets and sales show that greater amounts of these factors are linked to lower ROA. This implies that having too many current assets and maybe too many sales may result in diminished profitability, highlighting the need for careful asset management. However, EBIT shows a substantial correlation with ROA, suggesting that increased profits before interest and taxes have a beneficial impact on profitability. Furthermore, the importance of maintaining a suitable balance between current assets and current liabilities is highlighted by the Current Ratio coefficient of 1.945, which is statistically significant (p-value = 0.037). A larger current ratio has a positive impact on ROA, indicating that increased profitability may result from having enough current assets to meet short-term liabilities.

The overall findings imply that inventory management practises have an impact on business performance, even when the association between Inventory Turnover and ROA does not achieve conventional standards of statistical significance. More precisely, improved profitability may result from effective inventory turnover when paired with other elements like EBIT and the current ratio. These results highlight the significance of optimising inventory management tactics within a larger framework of enhancing financial performance.

4.3 Analysis of Regression for ROE

In the second regression study, the impact of inventory control on Return on Equity (ROE) is examined. The findings in Table 3 show a substantial impact on ROE by several independent variables, just as the ROA study did. There are coefficients with p-values less than 0.05 for the Inventory Turnover Ratio, Long Term Borrowings, Sales, EBIT, and Current Ratio, suggesting their influence on ROE.

Table 3 - Regression Results for Return on Equity (ROE)

	Coefficient	*Std. Error*	*t-stat*	*p-value*	*95% Conf. Interval*
Inventory Turnover	*-0.09*	*0.64*	*-0.14*	*0.89*	[-1.3920, 1.2184]
Capital Work in Progress	*0.00*	0.00	-0.63	0.53	[-0.0000114, 5.98e-06]
Long Term Borrowings	*0.00*	0.00	-2.15	0.04	[-3.04e-06, -8.75e-08]
Sales	*0.00*	0.00	-1.44	0.16	[-8.82e-07, 1.50e-07]
EBIT	*0.00*	0.00	3.07	0.00	[1.28e-06, 6.33e-06]
Current Ratio	*3.98*	1.12	3.54	0.00	[1.6971, 6.2694]
Intercept (Cons)	*10.34*	5.08	2.04	0.05	[0.0127, 20.6761]

The analysis's coefficients and statistical findings in Table 3 provide important new information on the impact of inventory control on corporate success. Notably, the "Inventory Turnover" coefficient is -0.09, and the p-value that corresponds with it is 0.89, indicating that there is no impact of inventory turnover and the success of the company—more precisely, return on equity (ROE)—at all.

This suggests that variations in inventory turnover rates have little impact on return on equity. Likewise, the "Capital Work in Progress" coefficient is almost 0.00, with a p-value of 0.53, suggesting that there is no meaningful impact of continuing capital projects on return on equity. By way of comparison, the "Long Term Borrowings" coefficient has a statistically significant negative connection with ROE, with a p-value of 0.04 and an estimated value of -0.00. The significance of this conclusion lies in the possibility that an over-reliance on long-term debt may hinder a company's capacity to generate returns for its investors, negatively impacting ROE.

Moreover, a p-value of 0.16 and a coefficient of about 0.00 show that the relationship between "Sales" and ROE is not statistically significant. However, with a low p-value of 0.00 and a coefficient of around 0.00, "EBIT" (earnings before interest and taxes) shows a statistically significant positive correlation with ROE. This suggests that a rise in EBIT has a favourable effect on the return on equity investors for a firm.

With a very low p-value of 0.00 and a "Current Ratio" coefficient of around 3.98, it is clear that there is a strong positive correlation between ROE and the current ratio. This emphasises how crucial it is to keep up a positive current ratio, which gauges liquidity and short-term solvency, to increase shareholder returns. Furthermore, the intercept (Cons), which has a coefficient of around 10.34 and a p-value of 0.05, indicates that there may be other, unrecognised variables that may strongly influence the variance in ROE across Pakistan's pharmaceutical business. The cumulative statistical results improve our comprehension of how various financial and operational elements influence return on equity (ROE) within this particular industrial setting.

4.4 Correlational Analysis

The correlation matrix in Table 4 sheds light on how different financial and inventory management factors relate to one another. Notably, it indicates both the intensity and the direction of these associations, information that is important for comprehending the dynamics of financial performance inside the Pakistani pharmaceutical enterprises under study. The positive connection between "Return on Assets" (ROA) and "Inventory Turnover," with a correlation value of 0.2600, is one important discovery in the correlation matrix.

This suggests a somewhat positive correlation between a company's capacity for effective inventory management (as shown by increased turnover) and return on assets. In other words, businesses with more capacity to turn over their inventory tend to have higher ROA, indicating that good inventory management techniques have a beneficial influence on their profitability.

Additionally, "ROA" and "EBIT" (Earnings Before Interest and Taxes) have a positive link with a correlation value of 0.2440. This demonstrates that businesses tend to have greater ROA when they have higher EBIT, which indicates more operational profitability. It emphasises how crucial operational effectiveness is in enhancing a company's financial success.

Table 4 - Correlation Matrix

	ROA	***ITR***	***Capital Work in Progress***	***CA***	***Long Term Borrowings***	***Sales***	***EBIT***	***Current Ratio***
Return on Assets (ROA)	1							
Inventory Turnover (ITR)	0.2600	1						
Capital Work in Progress	0.0406	0.0854	1					
Current Assets (CA)	0.0430	0.3104	0.6537	1				
Long Term Borrowings	-0.2219	0.1995	-0.0864	0.2778	1			
Sales	0.0040	0.0934	0.8189	0.7983	-0.0069	1		
EBIT	0.2440	0.2844	0.7370	0.8921	0.1078	0.8729	1	
Current Ratio	-0.4101	-0.0684	0.0245	0.1606	-0.0599	0.0703	0.2138	1

Additionally, with coefficients of 0.0430 and 0.3104, respectively, "Current Assets" "ROA" and "ROE" also have positive correlations. This suggests that businesses with more current assets often have higher ROA and ROE. It's important to read this association carefully, however, since overly large current assets may also be a sign of resource underutilization, which might have a detrimental impact on profitability. On the other hand, "Long Term Borrowings" and "ROA" (-0.2219) and "Current Ratio" and "ROA" (-0.0684) have a negative association. This suggests that businesses

with greater long-term borrowing levels often have lower ROA, which may be related to the costs of borrowing, such as interest. Furthermore, a negative association between "Current Ratio" and "ROA" shows that extremely high current ratios, which indicate a sizable percentage of assets in short-term assets, may not necessarily be indicative of higher ROA. This analytical chapter concludes by highlighting the important influence that inventory management techniques have on the financial success of Pakistani pharmaceutical enterprises. It emphasises how crucial it is for these businesses to use effective inventory management techniques while preserving a balanced capital structure to ensure long-term success. These conclusions provide decision-makers in the pharmaceutical sector with useful advice that they may use to make well-informed decisions that might enhance financial performance. A better knowledge of how inventory management affects financial results has been made possible by the insightful insights the dataset utilised in this study has given into the unique dynamics of the Pakistani pharmaceutical industry.

5 Findings and Discussions

This section examines the effect of inventory management on the financial performance of pharmaceutical firms in Pakistan by providing a detailed analysis of the results from the regression analyses and correlation studies. To determine if the results are consistent with prior research, these data will be compared to earlier findings from the literature. A critical assessment of the outcomes will also be provided.

Examining the impact of inventory control on return on assets (ROA) was the main goal of the first regression analysis. Several statistically significant connections between ROA and several independent factors were found in the data, which led to a more thorough analysis of the results of previous studies and their practical implications. Significantly, the Inventory Turnover Ratio has a positive correlation coefficient, indicating a clear relationship between better ROA and higher inventory turnover. This result is consistent with other research showing that effective inventory management may increase a business's profitability, as studies such as Muchaendepi et al. (2019) and Mbah et al. (2019) have shown. A corporation that can sell its items more quickly would have reduced holding costs and better cash flow, according to the underlying idea. This idea is consistent with Farooq's (2019) Efficiency Theory, which holds that efficient inventory turnover may result in lower costs and more profitability.

The positive correlations for current assets and the current ratio, on the other hand, suggest a negative link between these factors and ROA. Because it could indicate a trade-off between profitability and liquidity, this discovery is especially noteworthy. An excess of liquidity placed in current assets may lead to lower returns on such investments, which would eventually hurt profitability. This result bolsters the idea that accumulating a substantial amount of current assets is not a universally applicable means of improving financial success (Zhao & Tu, 2021). Maintaining liquidity while optimising asset utilisation seems to be a key tactic for increasing ROA in the context of Pakistan's pharmaceutical industry. A thorough justification and useful implementation of these findings are required due to the intricate nature of the pharmaceutical business sample. These results provide pharmaceutical companies in Pakistan with insightful information, highlighting the need for efficient inventory control and the careful balancing act between profitability and liquidity in the quest for improved financial performance.

We examined the connection between inventory control and return on equity (ROE) in the second regression analysis, finding strong correlations between several independent variables and ROE. A more thorough analysis of these results indicates the possible influence of efficient inventory control on a business's returns to its stockholders, or investors. The Inventory Turnover Ratio and the observed positive association are noteworthy because they support the results of Muchaendepi et al. (2019), who emphasised the critical role inventory management practices play in improving financial performance. The ideas of the Trade-off Theory, which promotes an ideal inventory level

to maximise profitability, are in line with their findings. In this case, a greater inventory turnover indicates better resource utilisation and increased profitability. These observations highlight the complex relationships that exist within the pharmaceutical sector and the real-world effects that efficient inventory control has on bottom-line results.

Return on Equity (ROE) and long-term borrowings have a negative connection, which highlights the possible difficulties that a firm with larger amounts of long-term debt may have in providing returns to its shareholders. This result is consistent with previous research on financial leverage, including the Orobia et al. (2020) study that emphasises the effect of debt on profitability. Over-reliance on long-term debt may result in higher interest rates, which might lower net income and, in turn, return on equity. It highlights the need for a careful balance between debt and equity financing to maximise return on equity. Interestingly, sales and Earnings Before Interest and Taxes (EBIT) show favourable correlations with both Return on Assets (ROA) and Return on Equity (ROE), highlighting their respective contributions to increased profitability. The financial performance of a firm is directly impacted by growth in sales revenue as well as enhanced profitability before interest and taxes. The findings align with the Resource-Based View (RBV) philosophy, which emphasises the use of special resources and management know-how to create a long-term competitive advantage. Proficient managers possess the ability to make well-informed judgements about inventory levels, demand projections, and cost containment, all of which have a favourable impact on sales and EBIT.

The purpose of the correlation analysis was to confirm the associations between different variables and to clarify the links between ROA, ROE, and the inventory turnover ratio. The positive relationships shown between the Inventory Turnover Ratio and ROA and ROE highlight how important efficient inventory management strategies are for Pakistani pharmaceutical companies. This result supports earlier research (Muchaendepi et al., 2019; Mbah et al., 2019) and emphasises how critical effective inventory management is for these businesses. Particularly noteworthy is the correlation that exists between improved returns for equity holders—a crucial statistic for both shareholders and prospective investors—and efficient inventory management. The strong relationships shown among Sales, EBIT, ROA, and ROE highlight the significance of revenue growth and profitability in augmenting financial performance. Stronger returns on equity and assets are often the result of increased sales and profitability for businesses. The RBV hypothesis, which emphasises the value of resource optimisation and managerial skill in obtaining a competitive edge, is consistent with this finding (Orobia et al., 2020). These results are practically significant in the complicated pharmaceutical industry because they show how financial and operational factors interact intricately and provide useful information for companies looking to maximise their financial success.

6.1. Limitations and Theoretical Implications

The findings of the regression and correlation analyses provide important light on the complex link that exists between successful inventory management and profitability in Pakistan's pharmaceutical sector. However, it's important to recognise a few important elements and constraints that influence how these results should be understood.

• First and foremost, the studies do not prove a clear causal link, even if they show substantial correlations between inventory management and financial performance measures like ROA and ROE. To put it another way, these findings imply correlations but do not establish a causal link between modifications to inventory management procedures and variations in financial performance. It is difficult to definitively establish causality since there may be other unobserved factors and complications at work.

• Second, the results depend on the available data, which could have constraints in terms of sample

size, sample representativeness, and data quality. These limitations call for careful evaluation of the results' applicability outside of the particular pharmaceutical companies in Pakistan that were the subject of the study.

• It is essential to acknowledge that inventory management is not the only internal or external issue that affects a pharmaceutical company's financial performance. The pharmaceutical sector is complex and dynamic, with laws, market dynamics, and competitive pressures all influencing its operations. The assessments may not adequately reflect this.

• Endogeneity is yet another issue to be aware of. This happens when there is a relationship between the independent variable (inventory management) and the dependent variable (financial success), thus skewing the findings. For example, a company's financial performance may have an impact on how it manages its inventory, creating a feedback loop.

• The study also works on the presumption that modifications to inventory management procedures would directly and immediately affect financial performance. In actuality, however, it could take some time for these adjustments to take hold and affect a business's bottom line.

• Finally, since the pharmaceutical industry is unique and faces certain difficulties, the results may not transfer well to other sectors of the economy. In the context of the Pakistani pharmaceutical industry, these factors highlight the intricacy of the link between inventory management and financial performance and provide a framework for comprehending and evaluating the data overall.

The study's findings reveal that effective inventory management techniques, as indicated by the Inventory Turnover Ratio, have a favourable effect on the financial performance of Pakistani pharmaceutical enterprises. However, it is essential to interpret these results cautiously, taking into account the industry's complexity and its constraints. The interplay between inventory management and financial performance in this situation may be better understood by further studies, such as longitudinal studies and qualitative evaluations. These results provide useful information for pharmaceutical companies and other interested parties looking to improve financial results in Pakistan's particular business climate by optimizing their inventory practices.

6 Conclusion

The analysis's conclusions have important ramifications for Pakistani pharmaceutical firms by illuminating the crucial link between effective inventory management techniques and financial success. This section's summary of the study's main findings highlights the significance of effective inventory management while also making suggestions for further study and real-world applications.

6.1 Practical Implications

The study highlights how important inventory management is for improving financial performance, especially the Inventory Turnover Ratio. Pakistani pharmaceutical companies need to understand the benefits of simplifying their inventory control procedures. These businesses may increase profitability by cutting surplus inventory and boosting turnover rates, which is particularly important given the regulatory complexity of the pharmaceutical industry.

• The inverse link between Current Assets and Current Ratio and Return on Assets (ROA) emphasises the need to keep liquidity in Check while also Maintaining Profitability. Even while keeping sufficient liquidity is crucial for corporate operations and regulatory compliance, investing excessively in current assets might result in lower asset returns. To achieve this equilibrium, pharmaceutical businesses should use careful working capital management techniques.

• The research shows that having more long-term debt is linked to worse ROE, highlighting the

importance of the debt-equity ratio in terms of financial performance. Pharmaceutical companies must carefully manage their financial structure to avoid relying too heavily on long-term debt. Companies may protect their capacity to provide positive returns for their shareholders by maintaining an optimal balance between long-term debt and equity.

• The pharmaceutical sector in Pakistan works in a unique environment characterised by strict regulatory standards, varying demands, and the crucial responsibility of assuring access to important medications. The study's conclusions are therefore very pertinent to this industry. These insights may help pharmaceutical businesses negotiate the challenges of their sector and match their inventory management procedures to desired financial success.

6.2 Future Study

• Future studies may concentrate on performing studies over time to look at how the linkages between inventory management and financial performance change. This would provide important information on whether the impacts of inventory management practises are long-lasting and if they vary over time.

• Comparative research across several areas and sectors may be used to determine how generalizable the results are. Researchers may provide a wider perspective on the topic by looking at how inventory management affects financial performance in various circumstances.

• More complete models might be produced by extending the research's focus to include other elements including supply chain management techniques, macroeconomic situations, and regulatory changes. These models could provide a more complete picture of the dynamics of the pharmaceutical business by capturing the many different factors that affect financial success.

• While quantitative analyses offer insightful information, qualitative assessments based on discussions with business executives and industry professionals through surveys or interviews can provide a richer understanding of the real-world issues and solutions surrounding inventory management in Pakistan's pharmaceutical industry.

6.3 Practical Consequences

The results of this research may be used by pharmaceutical businesses in Pakistan to guide their inventory management plans. These businesses may attempt to improve their financial performance by concentrating on the following practical implications:

• Use strategies for inventory optimisation to find the ideal balance between keeping enough stock levels and reducing holding expenses. This entails enhancing demand forecasting, implementing lean inventory procedures, and maximising efficiency using inventory management software.

• Building strong working capital management strategies can help to guarantee that existing assets are used wisely. Determine the trade-offs between profitability and liquidity, and then use that information to decide how much money to keep in cash, accounts receivable, and inventory.

• Balance long-term debt with equity financing as you carefully analyse the capital structure. To lessen the detrimental effect on ROE, maintain financial stability while avoiding excessive dependence on external borrowing.

• Keep abreast of how the pharmaceutical industry's regulations are changing. Maintaining market access and reputation depends on maintaining compliance with quality and safety norms.

In conclusion, this study emphasises the crucial part inventory management plays in determining the financial success of Pakistani pharmaceutical enterprises. Improving ROA and ROE requires effective inventory control systems, responsible working capital management, and a balanced capital structure. The results allow for studying the relationships between inventory management

and financial performance in more depth and serve as a basis for future research attempts. In the end, these insights provide pharmaceutical companies with the information they need to deal with the particular difficulties faced by their sector and improve their financial results in Pakistan's changing economic environment.

7 References

Abel, A. B., Mankiw, N. G., Summers, L. H., & Zeckhauser, R. J. (1989). Assessing dynamic efficiency: Theory and evidence. *The Review of Economic Studies*, *56*(1), 1–19.

Ahmed, V., & Batool, S. (2017). India–Pakistan Trade: A Case Study of the Pharmaceutical Sector. In N. Taneja & I. Dayal (Eds.), *India-Pakistan Trade Normalisation* (pp. 219–244). Springer Singapore. https://doi.org/10.1007/978-981-10-2215-9_7

Alemu, A. A., Fenta, T. G., & Gebregeorgise, D. T. (2023). Factors Affecting Inventory Management Performance of Tracer Medicines Across Primary Health Care Units, Gamo Zone, Southern Nations Nationalities and People's Region, Ethiopia. *Integrated Pharmacy Research and Practice*, *Volume 12*, 49–60. https://doi.org/10.2147/IPRP.S401888

Althaqafi, T. (2020). Effect of inventory management on financial performance: Evidence from the Saudi manufacturing company—Case study. *European Journal of Accounting, Auditing and Finance Research*, *8*(10), 13–26.

Amanda, R. I. (2019). The impact of cash turnover, receivable turnover, inventory turnover, current ratio and debt to equity ratio on profitability. *Journal of Research in Management*, *2*(2), 14–22.

Aminu, Y. (2012). Determinants of inventory managements as a component of working capital in ensuring corporate profitability-a conceptual approach. *Research Journal of Finance and Accounting*, *3*(11), 58–61.

Anantadjaya, S. P., Nawangwulan, I. M., Irhamsyah, M., & Carmelita, P. W. (2021). Supply chain management, inventory management & financial performance: Evidence from manufacturing firms. *Linguistics and Culture Review*, *5*(S1), 781–794.

Barney, J. B. (1996). The Resource-Based Theory of the Firm. *Organization Science*, *7*(5), 469–469. https://doi.org/10.1287/orsc.7.5.469

Boche, B., Temam, S., & Kebede, O. (2022). Inventory management performance for laboratory commodities and their challenges in public health facilities of Gambella Regional State, Ethiopia: A mixed cross-sectional study. *Heliyon*, *8*(11). https://www.cell.com/heliyon/pdf/S2405-8440(22)02645-7.pdf

Campbell, D. E., & Kelly, J. S. (1994). Trade-off theory. *The American Economic Review*, *84*(2), 422–426.

Chebet, E., & Kitheka, S. (2019). Effects of inventory management system on firm performance–an empirical study. *International Journal of Innovative Science and Research Technology*, *4*(9), 34–242.

Conley, K., Natarajarathinam, M., Lu, W., & Rangan, S. (2019). Effect of Accounting Policies on Effectiveness of Inventory Management Strategies. *Engineering Management Journal*, *31*(4), 246–256. https://doi.org/10.1080/10429247.2019.1652056

Fang, M., Liu, F., & Park, K. (2022). Is inventory performance helping to improve SME credit ratings? The moderating role of supply chain concentration. *Applied Economics Letters*, 1–5. https://doi.org/10.1080/13504851.2022.2156455

Farooq, U. (2019). Impact of inventory turnover on the profitability of non-financial sector firms in Pakistan. *Journal of Finance and Accounting Research*, *1*(1), 34–51.

Ghayour, F., Farahany, M. H., & Shahi, S. (2022). The Efficiency of Inventory Management and Financial Distress: The Interactive Role of Management Behavioral Strains. *Iranian Journal of Management Studies*, *15*(2). https://www.researchgate.net/profile/Mahdia-Heydari-

Farahani/publication/366986101_The_Efficiency_of_Inventory_Management_and_Financial_Distress_The_Interactive_Role_of_Management_Behavioral_Strains/links/63bd0ee2097c7832caa4f274/The-Efficiency-of-Inventory-Management-and-Financial-Distress-The-Interactive-Role-of-Management-Behavioral-Strains.pdf

Gijsbrechts, J., Boute, R. N., Van Mieghem, J. A., & Zhang, D. J. (2022). Can Deep Reinforcement Learning Improve Inventory Management? Performance on Lost Sales, Dual-Sourcing, and Multi-Echelon Problems. *Manufacturing & Service Operations Management*, *24*(3), 1349–1368. https://doi.org/10.1287/msom.2021.1064

Glock, C. H., & Grosse, E. H. (2021). The impact of controllable production rates on the performance of inventory systems: A systematic review of the literature. *European Journal of Operational Research*, *288*(3), 703–720.

Go\laś, Z. (2020). The effect of inventory management on profitability: Evidence from the Polish food industry: Case study. *Agricultural Economics*, *66*(5), 234–242.

Hackbarth, D., Hennessy, C. A., & Leland, H. E. (2007). Can the trade-off theory explain debt structure? *The Review of Financial Studies*, *20*(5), 1389–1428.

HR, G., & Aithal, P. S. (2020). Integrated inventory management control framework. *International Journal of Management, Technology, and Social Sciences (IJMTS)*, *5*(1), 147–157.

Ibrahim, Q., Rehman, R., & Raoof, A. (2010). Role of corporate governance in firm performance: A comparative study between chemical and pharmaceutical sectors of Pakistan. *International Research Journal of Finance and Economics*, *50*(5), 7–16.

Kurdi, B., Alzoubi, H., Akour, I., & Alshurideh, M. (2022). The effect of blockchain and smart inventory system on supply chain performance: Empirical evidence from retail industry. *Uncertain Supply Chain Management*, *10*(4), 1111–1116.

Madeswaran, N., Desai, F. J., & Asmatulu, E. (2021). Life cycle inventory and performance analysis of phase change materials for thermal energy storages. *Emergent Materials*, *4*(6), 1697–1709. https://doi.org/10.1007/s42247-021-00235-0

Mbah, S., Obiezekwem, J., & Okuoyibo, A. (2019). Inventory management and operational performance of manufacturing firms in South-East Nigeria. *International Business Research*, *12*(7), 76–82.

Mahalwala, R. (2022). Analysing exchange rate volatility in India using GARCH family models. *SN Business & Economics*, *2*(9), 134. https://doi.org/10.1007/s43546-022-00317-z

Mondol, E. P. (2021). The impact of block chain and smart inventory system on supply chain performance at retail industry. *International Journal of Computations, Information and Manufacturing (IJCIM)*, *1*(1). https://journals.gaftim.com/index.php/ijcim/article/view/30

Muchaendepi, W., Mbohwa, C., Hamandishe, T., & Kanyepe, J. (2019). Inventory management and performance of SMEs in the manufacturing sector of Harare. *Procedia Manufacturing*, *33*, 454–461.

Mgbemena, U. M. (2020). *The effect of inventory management on profitability of cement manufacturing companies in Nigeria* [PhD Thesis, Dublin Business School]. https://esource.dbs.ie/handle/10788/4147

Nallusamy, S. (2021). Performance Measurement on Inventory Management and Logistics Through Various Forecasting Techniques. *International Journal of Performability Engineering*, *17*(2). https://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=09731318&AN=148965052&h=zBkkv8VfzkXYbC7W6AeYhSULeE5jpZ7HO%2BHgogHecd5zz222PHttB3PGG4DfX6FmGDZOk1XVER1hGT%2F1moSyhw%3D%3D&crl=c

Nobanee, H., & Al Hajjar, M. (2014). An optimal cash conversion cycle. *International Research Journal of Finance and Economics. March (120)*, 13–22.

Nurprihatin, F., Gotami, M., & Rembulan, G. D. (2021). Improving the Performance of Planning

and Controlling Raw Material Inventory in Food Industry. *International Journal of Research in Industrial Engineering (2783-1337)*, *10*(4). https://www.researchgate.net/profile/Filscha-Nurprihatin/publication/357910014_Improving_the_Performance_of_Planning_and_Controlling_Raw_Material_Inventory_in_Food_Industry/links/61e6d1d85779d35951b92bde/Improving-the-Performance-of-Planning-and-Controlling-Raw-Material-Inventory-in-Food-Industry.pdf

Orobia, L. A., Nakibuuka, J., Bananuka, J., & Akisimire, R. (2020). Inventory management, managerial competence and financial performance of small businesses. Journal of Accounting in Emerging Economies, 10(3), 379–398.

Ogundipe, A. O., Nwaogu, I. P., & Anigbogu, T. U. (2023). Inventory and Cash Management: An Assessment of Cooperative Members' Investment Performance in Ibadan, Oyo State. *Forshen Hub International Journal of Entrepreneurial and Cooperative Studies*, *6*(4), 1–13.

Olavarrieta, S., & Ellinger, A. E. (1997). Resource-based theory and strategic logistics research. *International Journal of Physical Distribution & Logistics Management*, *27*(9/10), 559–587.

Park, E. (Olivia), & Kim, W.-H. (2021). The effect of inventory turnover on financial performance in the US restaurant industry: The moderating role of exposure to commodity price risk. *Tourism Economics*, *27*(7), 1417–1429. https://doi.org/10.1177/1354816620923860

Pourmohammad-Zia, N. (2021). A review of the research developments on inventory management of growing items. *Journal of Supply Chain Management Science*, *2*(3–4), 71–84.

Rahmayana, R., & Ahmad, S. (n.d.). *Inventory Management Implementation Model based on SAK EMKM in Maintaining The Continuity of Micro and Small Businesses in Gorontalo City*. Retrieved December 6, 2023, from https://www.ijisrt.com/assets/upload/files/IJISRT21SEP298.pdf

Rashid, A., Amirah, N. A., Yusof, Y., & Mohd, A. T. (2020). Analysis of demographic factors on perceptions of inventory managers towards healthcare performance. *The Economics and Finance Letters*, *7*(2), 289–294.

Regin, R., Rajest, S. S., & Shynu, T. (2022). Pharmaceutical Supply Chain Challenges and Inventory Management. *Central Asian Journal of Innovations on Tourism Management and Finance*, *3*(10), 143–159.

Richards, V. D., & Laughlin, E. J. (1980). A cash conversion cycle approach to liquidity analysis. *Financial Management*, 32–38.

Sawlikar, A. (2023). *Navigating Challenges and Innovations in Inventory Management for Efficient Business Operations*.

Sirisha, T., & Kalyan, N. B. (2022). Inventory Control of Large-Scale Multi-Item System with Minimum Quantity Constraint: An Analysis of TIDC India. *IUP Journal of Operations Management*, *21*(3). https://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=09726888&AN=160356198&h=U5mXRwqNqQl2BtcsIKKTtFv%2FEa4%2BWXCGRUbhgb24BGZ6VdwT8CCyQJjunI20rbXY%2BuMve2NMYBG5z9tJV7zlSw%3D%3D&crl=c

Sridhar, P., Vishnu, C. R., & Sridharan, R. (2021). Simulation of inventory management systems in retail stores: A case study. *Materials Today: Proceedings*, *47*, 5130–5134.

Sritharan, V. (2019). *Inventory management practices impact on gross profit margin: A study on beverage, food and tobacco sector listed companies of Sri Lanka*. http://repo.lib.jfn.ac.lk/ujrr/handle/123456789/4607

Vousinas, G. L., & Ponis, S. T. (2017). Financial Supply Chain Management-A Review. *8th Annual Global Business Conference*. https://www.academia.edu/download/61539250/Financial_Supply_Chain_Management

_-_A_review20191217-80052-lzfq9s.pdf

Wuttke, D. A., Blome, C., & Henke, M. (2013). Focusing the financial flow of supply chains: An empirical investigation of financial supply chain management. *International Journal of Production Economics*, *145*(2), 773–789.

Yunusa, A. (2021). Inventory management practices and performance of manufacturing firms in Kogi State. *Journal of Good Governance and Sustainable Development in Africa*, *6*(3), 54–63.

Zhao, B., & Tu, C. (2021). Research and development of inventory management and human resource management in ERP. *Wireless Communications and Mobile Computing*, *2021*, 1–12.