THE IMPACT OF INVENTORY MANAGEMENT ON THE PROFITS OF RETAIL ENTERPRISES LISTED ON THE VIETNAMESE STOCK MARKETS

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Abstract

This study evaluated the impact of inventory management on the profitability of retail enterprises listed on the Vietnamese stock market. Grounded in the lean theory and the theory of constraints (TOC), and drawing on the research of Gołaś (2020) and Alnaim and Kouaib (2023), the study utilized financial data from these companies over a 10-year period, from 2014 to 2023, to analyze indicators related to inventory and profitability. The study results show that the high number of inventory days and the high inventory ratio to revenue make business profits low. In addition, the study also shows that retail businesses with high financial leverage and large scale will have higher profits than other businesses in the same industry. These findings provide vital information, empowering retail businesses to better understand the impact of inventory management on business profits and offer practical recommendations to improve inventory management efficiency and optimize profits. These practical recommendations are not just theoretical but are designed to be easily implementable, enabling businesses to make changes that can positively impact their bottom line and make the audience feel empowered and capable of implementing changes.

Keywords: Inventory Management, Inventory to Revenue Ratio, Profit, Storage Days, Vietnam

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1. INTRODUCTION

Inventory is a part of short-term assets and accounts for a large proportion of a business's assets. Therefore, inventory management plays a vital role in ensuring the business efficiency of a company (Alnaim & Kouaib, 2023). In the retail industry, goods can quickly become obsolete or lose value, requiring companies to pay special attention to inventory management to avoid financial losses (Kurdi et al., 2022). In addition, inventory management also helps retail businesses make accurate decisions about purchases, goods turnover, and promotions (Ajayi et al., 2021).

Many studies explore the impact of inventory management on the financial performance of businesses. The studies were carried out in various industries and geographies, from the food industry in Poland to the manufacturing industry in the US and Malaysia. Results from studies show that the relationship between inventory management and profitability is not always consistent. Many studies show the positive influence of effective inventory management on financial performance, such as Shahabuddin (2011), Sahari et al. (2012), Shin et al. (2015), Shin et al. (2016), Shardeo (2015), NdiranguKung'u (2016), Sunday and Joseph (2017), Atnafu and Balda (2018), Gołaś (2020), Aldubhani

et al. (2022), Binsaddig et al. (2023), Truong (2023), Adegbite and Ajagbe (2023), Rahayu and Ilham (2023), Gebisa (2023), and Alam et al. (2024). However, some other studies have given the opposite results or found no clear relationship, such as Koumanakos (2008), Sekeroglu and Altan (2014), and Kontuš (2014). Studies have also shown that industry structure influences the impact of inventory management on business performance; for example, Sekeroglu and Altan (2014) found a positive effect of inventory management on corporate profits in the food sector but did not find this effect in the textile or wholesale and retail sectors.

In this context, our study stands out. Therefore, this study aims to assess how inventory management affects the profitability of Vietnamese retail enterprises by utilizing the theory of constraints (TOC) and lean theory, a topic that has not been extensively explored. Our unique approach, using the table data method with survey data of retail enterprises listed on the Vietnamese stock market for 10 years from 2014 to 2023, is expected to shed new light on this topic and pique the audience's curiosity. The study results are anticipated to show the impact of inventory management through the number of days of storage and the ratio of inventory to revenue on the profits of retail enterprises listed on the Vietnamese stock market, which has not been of interest to many scholars before. The research results provide reliable information for managers of enterprises in Vietnam's retail industry regarding effective inventory management to improve profits.

The following sections of this study are designed to provide a comprehensive understanding. Section 2 delves into the theoretical framework and research overview. Section 3 outlines the research methodology. Section 4 reveals the key findings of the research. Section 5 articulates the overarching conclusions drawn from this work.

2. THEORETICAL BASIS AND RESEARCH OVERVIEW

2.1. Theoretical basis

Inventory management is organizing, storing, and replacing inventory to maintain an adequate supply of goods while minimizing costs (Atnafu & Balda, 2018). Inventory management involves controlling and optimizing the amount of goods in stock to meet customer needs while minimizing costs (Nam et al., 2022). The importance of inventory management was emphasized by Choi (2012) when he pointed out that effective inventory management is essential for the operation of any business. Inventory is an important strategy to meet customer demand, avoid shortages, and maintain high service levels. However, Axsäter (2006) notes that inventory comes with high costs, including bound capital and operating and management costs. Therefore, balancing good customer service with reasonable costs is the goal of inventory management, requiring careful consideration of the timing and quantity of inventory additions. In this study, the authors focus on two prominent theories in the field of inventory management, namely TOC and the lean theory. TOC focuses on identifying and resolving bottlenecks in the system to optimize performance, while lean theory aims to eliminate waste and maximize customer value.

2.1.1. Theory of constraints

TOC is a management philosophy that identifies and addresses a system's limiting points to achieve optimal efficiency. Eliyahu M. Goldratt developed TOC in the 1980s, and it is widely used in many fields, including inventory management. According to the TOC theory, an organization aims to increase throughput (output) while reducing inventory and operating costs (Goldratt, 1990). The system's performance is limited by the throughput rate at the system's constraint, and determining this bottleneck is a core factor in TOC. Therefore, this theory helps optimize inventory management by focusing on the system's bottlenecks to increase throughput without increasing inventory (Pacheco et al., 2019). According to Inman et al. (2009), TOC is a management philosophy focusing on continuous improvement to improve organizational efficiency. TOC has been widely applied in many fields, including manufacturing (Goldratt, 2009), marketing (Blackstone, 2001), and project management (Herroelen & Leus, 2001). According to Chou et al. (2012), binding theory can help businesses identify and handle backlog problems in material management, thereby improving organizational efficiency. In inventory management, TOC offers distinct benefits. It allows businesses to minimize unnecessary storage time for goods, avoid excess inventory and high storage costs, optimize resource use, and enhance the speed of goods turnover. Research by Chou et al. (2012) also shows that TOC helps balance different goals among departments in the organization, which is often the source of internal conflicts over inventory management.

2.1.2. Lean theory in inventory management

Lean theory is an integrated manufacturing model developed by the Massachusetts Institute of Technology (MIT)'s International Motor Vehicle Program. Lean was popularized through the book "The Machine That Changed the World" by Womack and colleagues in 1990. This theory focuses on eliminating buffer inventory and minimizing waste in the production process. Streamlining inventory management significantly impacts the productivity of businesses and is considered the best inventory control tool. According to Marques et al. (2022), lean theory, focusing on eliminating waste and optimizing processes, plays a vital role in explaining how to manage inventory effectively. Marques et al. (2022) affirmed that Lean explains that inventory management helps improve business efficiency through two main aspects: minimizing excess inventory, not necessarily minimizing waste. By applying the Kanban system, the study demonstrated how intuitive inventory control helps determine the exact timing and quantity of orders. This helps to avoid excess goods, reduce storage costs, and avoid waste due to damaged or expired goods. Second, the goods must be available to meet customer needs.

As such, inventory management plays a vital role in improving business performance. By applying the principles of lean theory and TOC, businesses can reduce costs, speed up production, improve flexibility, and improve product quality. According to lean theory, inventory is considered a waste, hiding potential problems in production. As a result, Lean focuses on minimizing inventory through

techniques such as just-in-time (JIT) in order to ensure that materials are used at the right time and as needed. This helps reduce storage costs and increase production speed. On the other hand, the binding theory sees inventory as a strategic tool to protect the system from fluctuations and uncertainties. According to the TOC theory, effective inventory management helps businesses always operate at total capacity, without interruption due to shortages of raw materials or inputs, thereby maximizing the productivity of the entire system. Help the production system adapt to unforeseen incidents such as machine failure, late delivery, or sudden changes in demand, ensuring a continuous and stable production flow and allowing businesses to react quickly to changes in market demand without disrupting the production process (Pacheco et al., 2019).

In summary, the lean theory and TOC are geared towards reducing inventory-related costs. Lean reduces costs by minimizing inventory levels, while TOC reduces costs by optimizing inventory locations and levels to ensure efficient production flows. Lean accounts for increasing production speed by eliminating excess inventory, which reduces waiting times and shipping, and improves flexibility by reducing production time and increasing responsiveness to market changes. TOC explains that increasing production speed by ensuring that the system continuously operates at total capacity at binding points and improving flexibility by using inventory buffers to protect the system from fluctuations and uncertainties allows the system to adapt more quickly to changes.

2.2. Literature review

Many scholars are interested in Inventory management, especially the studies on the close relationship between applying appropriate inventory management methods and the organization's operational efficiency. The assessment of the impact of inventory management effectiveness on the financial performance of enterprises is divided into two viewpoints:

1. Inventory management has a positive impact on the financial performance of enterprises.
2. Inventory management has no impact on the financial efficiency of the enterprise.

2.2.1. Inventory management has a positive impact on the financial performance of enterprises

Shahabuddin (2011) studied 11 companies with and 11 without supply chain processes (SCM). The author compared the financial indicators of companies that use SCM and companies that do not. The study results show that companies that adopt SCM have better financial performance than those that do not. Specifically, companies using SCM have fewer days of inventory, higher inventory turnover ratios, higher gross profit-to-revenue ratios, and better asset utilization performance.

Sahari et al. (2012) conducted a study to evaluate the relationship between inventory management and the financial performance of construction companies in Malaysia. Financial data of 82 construction companies were collected between 2006 and 2010 for analysis. The study results show a negative relationship between days of inventory and return on assets (ROA). This means that effective inventory management, expressed through a reduction in the number of days of inventory, will lead to higher operational efficiency (higher ROA). In addition, the study also points to a positive relationship between inventory management and capital intensity. This study provides substantial empirical evidence on the critical relationship between inventory management and financial performance in the Malaysian construction industry. The results suggest that construction companies should improve inventory management by reducing inventory days to improve operational efficiency and profitability.

Shin et al. (2015) point out that a lower inventory-to-revenue ratio is associated with higher corporate profit margins. In addition, small-sized companies may receive more significant benefits (as measured by profits) from enhanced inventory management efficiency compared to medium and large-sized companies. This study highlights the importance of effective inventory management in improving a company's bottom line. Effective inventory management helps reduce costs and enhances the company's overall financial performance.

Shin et al. (2016) used economic archive data from 1958 to 1999 for 14 manufacturing industries in the United States. The study results suggest that a lower level of inventory, namely a lower inventory ratio to sales, positively impacts the industry's bottom line. This study provides empirical evidence that effective inventory management can improve profitability in the long term. It also indicates that reducing finished goods inventories benefits the base and processed metals industries. In contrast, the petroleum and coal products industries are mainly affected by the decline in inventories of goods in production. This means that not all types of inventories have the same effect on profits. Therefore, the inventory management strategy needs to be customized according to each industry and specific type of inventory to achieve optimal efficiency.

NdiranguKung'u (2016) surveyed through a questionnaire with a sample of 71 industrial companies and alliances of 399 companies in Nairobi City and the surrounding areas of Kenya. The results of the study show that there is a positive relationship between inventory control practices and corporate profits. From these results, the study recommends that companies should adopt and maintain sound inventory control systems such as the economic order model (EOQ) and the JIT production model to maintain the ideal inventory level, thereby increasing profits. Effective inventory management helps reduce the cost of disruption or lost business opportunities due to product shortages and resists price fluctuations.

Sunday and Joseph (2017) surveyed 30 fast-food/food businesses, supermarkets, and furniture companies in Nigeria. The study results show a significantly positive relationship between inventory turnover and profitability, which means that businesses with higher inventory turnover rates tend to have better financial performance. In addition, this study also shows a negligible negative effect between inventory turnover time and profit, i.e., the longer it takes to convert raw materials into finished products and sell them to customers, the lower the profit of the enterprise. This study emphasizes the importance of inventory management for the financial performance of small

and medium-sized enterprises (SMEs) and recommends that businesses maintain high inventory turnover to improve financial performance while reducing inventory conversion time as an essential factor for increasing profitability.

Atnafu and Balda (2018) surveyed 188 micro and small enterprises. The results of this study show that the practice of inventory management positively affects the competitive advantage and organizational performance of SMEs in the manufacturing industry. Inventory management methods such as ABC analysis, economic order quantity (EOQ), demand forecasting, and JIT techniques, when applied, can improve the competitiveness of businesses through better price offerings, higher product quality, and on-time delivery. The study emphasizes that improving inventory management will increase competitive advantages and improve business performance. Businesses can improve competitiveness by offering better prices, quality, and delivery times. The study focused only on SMEs in the manufacturing industry in the selected few towns in Arsi Zone, Ethiopia, so the results may not apply to the entire country or other industries.

Karim et al. (2018) studied companies at three lubricant manufacturing companies in Malaysia using data from financial statements from 2008 to 2012. This study uses the internal control framework, COSO 2013, to evaluate the effectiveness of processes and procedures in inventory management. The authors applied document analysis as the primary research method to evaluate the effectiveness of inventory management. The results show that effective inventory management positively affects the company's financial performance, but this association is insignificant. However, reducing the number of days of inventory can improve business performance. The authors recommend that businesses increase awareness of fraud in inventory management and improve the culture of professional ethics to prevent fraudulent behaviors such as inventory theft, misalignment, and collusion with other parties.

Kolawole et al. (2019) studied the annual report of International Breweries Plc over 10 years. The study results show a positive and robust relationship between inventory turnover and gross profit, with a correlation coefficient of 85.3% and R^2 of 72.7%. From the study results, the author suggests that businesses should focus on improving the inventory management system to improve profits for businesses.

Gołaś (2020) uses unpublished data from the Polish Central Statistical Office (CSO) on the financial situation of the food industry and its subsectors, including 27 food subsectors between 2005 and 2017. The results of this study show that increasing the number of days of inventory hurts the return on assets. In addition, this study also shows that although the direction of impact of inventory types is the same, the group of unfinished products has the most significant negative impact on return on assets.

Similar to the above results, recent studies on inventory management have also shown positive effects of inventory management on business efficiency (Aldubhani et al., 2022; Gebisa, 2023; Rahayu & Ilham, 2023; Adegbite & Ajagbe, 2023; Truong, 2023; Binsaddig et al., 2023; Alnaim & Kouaib, 2023; Alam et al., 2024). Although these studies are currently conducted in different countries such as Saudi Arabia, Bahrain, Vietnam, Nigeria, Indonesia, and Qatar, they all focus on manufacturing enterprises listed on the stock market and using inventory turnover indices (ITRs). Inventory conversion time and inventory turnover period are used to measure inventory management efficiency.

2.2.2. Inventory management has no impact on the financial efficiency of enterprises

In addition to studies that have found a positive effect of inventory management on business performance, some studies have not seen the effect of this relationship. Koumanakos (2008) used financial data of all medium and large enterprises in Greece. The study sample included data from 1,358 enterprises between 2000 and 2002, with 3,727 observations. The selected enterprises belong to three representative industries: food, textiles, and chemicals. The study results show a robust linear relationship between lean inventory management and financial performance that existed only in the chemical industry for 2000 and 2001. However, this relationship was not found in the food or textile industries.

Similarly, Sekeroglu and Altan (2014) did not find a significant relationship between inventory management and profitability in the textile sector or wholesale and retail when conducting a study of three groups: the textile industry (16 enterprises), food (14 enterprises), and wholesale and retail (11 enterprises). There may be many reasons for not finding this relationship, including industry specificity, market structure, and various macroeconomic factors. In the textile industry, for example, there may be high competition, rapid changes in designs and trends, or other factors such as labor costs and input materials that can affect profitability rather than inventory management. In the retail industry, fluctuations in demand and product diversity can make inventory management more complicated, so the effectiveness of management can have little impact on business profits.

Based on these studies, Kontuš (2014) surveyed 101 Croatian enterprises, including 51 large and 50 SMEs. The study did not find a statistically significant relationship between inventory levels and business profitability.

A study conducted by Kalantonis et al. (2023) examined the relationship between corporate governance and the financial performance of listed companies in Greece from 2008 to 2016. The analysis included a sample of 113 companies, resulting in a total of 1,017 observations. The findings indicated that high inventory levels negatively affected corporate financial performance. This suggests that elevated inventories might signify increased management costs or inefficiencies, which in turn diminish financial performance.

In Vietnam, studies on the impact of inventory management on business results are lacking. Thang and Huong (2019) studied 19 textile and garment enterprises listed on the Vietnamese stock market from 2014 to 2017. The results show that inventory management positively impacts the profitability of Vietnamese textile and garment enterprises. Nam et al.'s (2022) research results in enterprises listed on the Vietnamese stock market in the period 2016–2020 show that the time of inventory turnover has a one-dimensional relationship with the ROA business results of enterprises.

Thus, the studies have provided insights into the importance of inventory management to the financial performance of enterprises and proposed strategies and methods to optimize inventory management, thereby improving enterprises' operational efficiency and profitability. However, studies on the impact of inventory management on business efficiency are focused on a specific country. They are mainly studied in manufacturing enterprises, which have not yet been studied in retail enterprises. The findings of the studies are inconsistent because business profits depend not only on the efficiency of inventory management but also on various other factors, such as the size of the business, its revenue growth rate, and its debt ratio (Nguyen et al., 2024; Kalantonis et al., 2023; Tulung et al., 2024).

In addition, the results of the studies are also inconsistent. In the context that the listed retail industry in Vietnam is developing strongly and plays a vital role in the economy, it is essential to study the impact of inventory management on the business performance of these enterprises. Listed retail businesses have supply chain and goods management characteristics and are under tremendous pressure from the stock market. Therefore, in-depth research is needed to understand the impact of inventory management in this context, thereby providing valuable information to business managers, investors, and policymakers. The study also adds to the overview of the impact of inventory management on the profitability of enterprises in the retail industry.

3. RESEARCH METHODOLOGY

3.1. Research hypothesis and model

Based on lean theory and limited point theory, along with the research results of Gołaś (2020), Koumanakos (2008), Sekeroglu and Altan (2014), Kolawole et al. (2019), Aldubhani et al. (2022), Rahayu and Ilham (2023), Binsaddig et al. (2023), and Alnaim and Kouaib (2023), the authors predict that inventory management has a positive effect on the profitability of enterprises. Therefore, the authors hypothesize:

H1: Effective inventory management has a positive effect on the profitability of the business.

The authors built the regression equation to test the above hypothesis.

Model 1

$$PRO_{i,t} = \beta_0 + \beta_1 NDI_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 LEV_{i,t} + \beta_4 GRW_{i,t} + u_{i,t} \quad (1)$$

Model 2

$$PRO_{i,t} = \beta_0 + \beta_1 ITR_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 LEV_{i,t} + \beta_4 GRW_{i,t} + u_{i,t} \quad (2)$$

Model 3

$$PRO_{i,t} = \beta_0 + \beta_1 ILE_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 LEV_{i,t} + \beta_4 GRW_{i,t} + u_{i,t} \quad (3)$$

Model 4

$$PRO_{i,t} = \beta_0 + \beta_1 ISR_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 LEV_{i,t} + \beta_4 GRW_{i,t} + u_{i,t} \quad (4)$$

PRO is the profit variable representing the enterprise's business result variable; the *NDI*, *ITR*, *ILE*, and *IRS* variables are the number of days of inventory, the inventory turnover rate, and the inventory leanness. The ratio of inventory to revenue represents the efficiency variable of inventory welding management. The *SIZE*, *LEV*, and *GRW* variables are the control variables of the model. A detailed interpretation of the variables is shown in Table 1.

Table 1. Explanation of variables in the research model

No.	Variable	Code	Measure	Reference
1	*Profit*	*PRO*	Total annual profit after tax	Kolawole et al. (2019), Koumanakos (2008), Shahabuddin (2011), Alnaim and Kouaib (2023), Binsaddig et al. (2023), Aldubhani et al. (2022)
2	*Number of days of inventory*	*NDI*	Average HTK Value x 365 / Cost of goods sold	Gołaś (2020), Shahabuddin (2011), Sunday and Joseph (2017)
3	*Inventory turnover rate*	*ITR*	Cost of goods sold / Average inventory value	Sekeroglu and Altan (2014), Srour and Azmy (2021), Koumanakos (2008), Rahayu and Ilham (2023), Alnaim and Kouaib (2023)
4	*Inventory-to-sales ratio*	*ISR*	Average inventory value / Sales revenue	Shin et al. (2015), Elsayed and Wahba (2016), Moedu et al. (2023)
5	*Inventory leanness*	*ILE*	Ending inventory value / Total assets	Sunday and Joseph (2017)
6	*Revenue growth rate*	*GRW*	Revenue growth rate compared to the previous year	Gołaś (2020), Aldubhani et al. (2022), Nguyen et al. (2024)
7	*Business size*	*SIZE*	LN (total assets)	Gołaś (2020), Alnaim and Kouaib (2023), Aldubhani et al. (2022), Kalantonis et al. (2023), Nguyen et al. (2024)
8	*Financial leverage*	*LEV*	The ratio of total debt to total assets	Gołaś (2020), Alnaim and Kouaib (2023), Aldubhani et al. (2022), Nguyen et al. (2024), Tulung et al. (2024)

Source: Authors' elaboration.

3.2. Research methods

According to data compiled from the financial statements of enterprises[1] as of June 2024, there are 55 retail enterprises on three official stock exchanges: the Retail exchanges on the three leading stock exchanges of enterprises, the Unlisted Public Company Market (UPCOM), and the Over the Counter (OTC) informal exchange. The authors used data from companies listed stably on the stock exchange from 2014 to 2023 to ensure the study's results. Businesses that have not had data for years are eliminated. The results obtained unbalanced table data with a sample of 33 retail enterprises with 236 observations over the 10 years from 2014 to 2023. The number of retail enterprises listed on stock exchanges in Vietnam is as follows: Ho Chi

[1] https://finance.vietstock.vn/

Minh Stock Exchange (HOSE) has 12 enterprises, which account for 36% of the total; Hanoi Stock Exchange (HNX) has three enterprises, accounting for 9%; OTC has three enterprises, also accounting for 9% of the total; and UPCOM has 15 enterprises, making up 45% of the total.

UPCOM is the exchange with the largest number of listed retail companies (45%), followed by HOSE (36%). HNX and OTC have the fewest number of listed companies, with only three companies each. The distribution of companies across stock exchanges shows a concentration on larger exchanges, such as HOSE and UPCOM. This may reflect the choice of companies when listing, based on factors such as size, liquidity, and reputation of the exchange. The data shows that the participation of many retail companies on different exchanges ensures diversity in the selection of the analysis sample.

The research method employs panel data regression techniques, including pooled ordinary least squares (OLS), fixed effects model (FEM), and random effects model (REM), to analyze the impact of inventory management on business profits. The study also examines potential model issues such as multicollinearity, autocorrelation, and heteroscedasticity. If the model is found to be free of defects, the results will be considered reliable; otherwise, necessary adjustments will be made.

4. RESEARCH RESULTS AND DISCUSSION

The authors performed FEM and REM and OLS to select the optimal model. The regression results are presented in Table 2.

Table 2. Impact of days of inventory, inventory turnover, inventory leanness, and inventory-to-sales ratio on profit

Variable	*OLS*	*FEM*	*REM*
Impact of the number of days of inventory on profit			
NDI	-0.001104	-0.011309***	-0.004002**
LEV	-0.11265***	0.0466025**	0.0830466***
GRW	0.0196936	-0.001207	0.0114855
SIZE	-0.903444***	0.3627029***	0.7508566***
_cons	-2.012975**	5.82495***	1.1438342
R-sq	0.6123	0.2538	0.5938
Prob > chi2 = 0.0001			
Prob > F = 0.0000			
Impact of inventory turnover on profit			
ITR	0.0007013	0.0007925	0.0006006
LEV	0.1116414***	0.0393969*	0.0834272***
GRW	0.0197819	0.0002774	0.0128416
SIZE	0.9110141***	0.300701**	0.7722269***
_cons	-2.200558**	6.026173**	-0.390171
R-sq	0.6113	0.6036	0.6105
Prob > chi2 = 0.0060			
Prob > F = 0.0000			
Impact of inventory leanness on profit			
ILE	0.8328248**	0.6832076	1.019294**
LEV	0.1018942***	0.042333*	0.0806137***
GRW	0.0164669	0.0000776	0.010601
SIZE	0.898197***	0.3421438**	0.7711419***
_cons	-2.099089**	5.332409**	-0.605856
R-sq	0.6202	0.6068	0.6185
Prob > chi2 = 0.0247			
Prob > F = 0.0000			
Impact of inventory-to-sales ratio on profit			
ISR	-0.873854	-6.860358***	-2.625009***
LEV	0.1142968***	0.0489798**	0.0844066***
GRW	0.0112018	-0.001223	0.0114496
SIZE	0.9064914***	0.3832451***	0.7575264***
_cons	-2.016737***	5.711557***	0.1386698
R-sq	0.6139	0.2361	0.5913
Prob > chi2 = 0.0000			
Prob > F = 0.0000			

*Note: * p < 0.1; ** p< 0.05; *** p < 0.01.*
Source: Authors' elaboration.

With all four models, the authors performed the FEM and the REM. From the results of FEM and REM, the authors went to Hausman to test to compare the choice of FEM or REM. The results presented in the tables above with the results of Prob > chi2 with *p*-value < α= 5% in all four models, the FEM is more suitable than the REM. After selecting FEM instead of REM selection, the authors performed the OLS, then passed the F-test to select the appropriate model between FEM and OLS. The test result F shows that Prob > F = 0.000 < α= 5% of all four models, so the FEM fixed impact estimation is chosen. Thus, with the data collected, FEM is the best choice. However, before analyzing the impact of inventory management on business profits, the authors examined the model's defects. The summary of disability results is shown in Table 3.

Table 3. Summary table of defects of models

Statistical tests	*Model 1*	*Model 2*	*Model 3*	*Model 4*
Multi-line	Not	Not	Not	Not
Variable variance	Yes	Yes	Yes	Yes
Self-correlation	Not	Yes	Yes	Not

Source: Authors' elaboration.

To overcome the phenomenon of variable variance and autocorrelation in the research model, the authors used estimates with robust standard errors. This method will adjust for both autocorrelation and variance variation in the model. The adjustment results of the four models are shown in Table 4.

Table 4. Regression adjustment results

Variable	*Model 1*	*Model 2*	*Model 3*	*Model 4*
NDI	-0.011309**			
ITR		0.0007925		
ILE			0.6832076	
ISR				-6.860358**
LEV	0.0466025***	0.0393969***	0.042333***	0.048798***
GRW	-0.001261	-0.000277	0.0000706*	-0.001223
SIZE	0.3627029***	0.300701**	0.342148**	0.3832451***
_cons	5.82495***	6.026173***	5.332409**	5.711557***

*Note: * p < 0.1; ** p < 0.05; *** p < 0.01.*
Source: Authors' elaboration.

Table 4 presents the regression results from four different models using a regression method with a robust standard error. This table shows:

Number of days of inventory (*NDI*): The number of days of inventory, representing the efficiency of inventory management. The negative coefficient (-0.0113094) and statistically significant *p*-value = 0.012 in Model 1 shows that a high number of days of storage reduces corporate profits. This result is consistent with the results of Shahabuddin (2011), Sunday and Joseph (2017), Alnaim and Kouaib (2023), Binsaddig et al. (2023), and Aldubhani et al. (2022). This result tells him that too long a storage time can increase storage costs in the retail industry. Obsolete goods cause businesses to reduce selling prices to dispose of goods, inevitably affecting profits. Effective inventory management is crucial in the retail industry. Businesses must maintain appropriate inventory levels to reduce storage costs and minimize the risk of having obsolete products. Additionally, leveraging technology can enhance the import process. Poor inventory control not only raises costs but also negatively impacts a business's competitiveness.

Inventory turnover ratio (*ITR*): The turnover rate of inventory. Model 2's coefficient (0.0007925) has no statistical significance (*p*-value = 0.536), indicating no effect on profitability. This result is consistent with the results of Koumanakos (2008) in the food industry, Shahabuddin (2011), Sekeroglu and Altan (2014), Sunday and Joseph (2017), Kolawole et al. (2019), Rahayu and Ilham (2023), and Alnaim and Kouaib (2023). This result shows that fast turnover of inventory can lead to a shortage of goods, causing loss of sales opportunities, so it cannot be affirmed that businesses with high inventory turnover have good profits, especially for retail businesses; inventory always needs to ensure availability to meet the essential needs of customers.

Inventory leanness (*ILE*): In Model 3, the coefficient (0.6832076) has no statistical significance (*p*-value = 0.474), indicating no effect on profitability. This result is consistent with the study by Sunday and Joseph (2017). This result may explain that for retail businesses, the availability of goods is a critical factor in maintaining revenue and profits. A low inventory ratio can affect the ability to meet customer demand, while streamlining inventory can help businesses save some inventory costs. However, these costs are often not large enough to significantly affect profits.

Inventory-to-sales ratio (*ISR*): In Model 4, the negative (-6.860358) and statistically significant (*p*-value = 0.017) coefficients indicate that a high inventory-to-sales ratio reduces profits. This result is consistent with research by Shin et al. (2015). This result shows that the high inventory-to-sales ratio in retail businesses may reflect inefficiencies in goods management and demand forecasting. When businesses cannot adjust their inventory to the market's needs, they may face high costs and low profits.

Financial leverage (*LEV*): All models have a positive and statistically significant coefficient, indicating that using high financial leverage increases corporate profits. The results are consistent with those of Aldubhani et al. (2022) but contrary to those of Alnaim and Kouaib (2023). Financial leverage can help retail businesses scale up and access more investment opportunities, thereby increasing profitability.

Revenue growth rate (*GRW*): The coefficient of this variable is not statistically significant in all models, indicating no effect on profitability. This result is consistent with Alnaim and Kouaib (2023), Aldubhani et al. (2022). This result shows that a high revenue growth rate does not mean that profits will increase accordingly. In the retail industry, revenue growth can come from expanding markets, discounting prices to increase purchasing power, or investing in advertising. However, if the costs associated with these activities are too high, they can reduce profits, regardless of how revenue grows.

Business size (*SIZE*): The coefficient is positive and statistically significant in all models, showing that the size of the enterprise is large and the corporate profit is high. This result is consistent with Alnaim and Kouaib (2023) but contrary to the results of Shin et al. (2015) and Gołaś (2020), and differs from the study of Aldubhani et al. (2022), where no effect of scale on profitability was found. This result shows that in the retail industry, the larger the size of the business, the more advantageous it is in terms of price, advertising, and market coverage, thereby helping to grow profits.

5. CONCLUSION

This study aims to evaluate the impact of inventory management on the profits of retail enterprises. The study was conducted by collecting the financial statements of retail businesses for the period from 2014 to 2023 to evaluate indicators related to the inventory and profitability of businesses. The study evaluated the impact of inventory management efficiency on the profitability of retail businesses. Accordingly, indicators related to inventory management, such as the number of days inventory

and the inventory-to-sales ratio, impact retail profits. This indicates that poor inventory management, with long inventory days, leads to increased storage costs and reduced capital efficiency, reducing corporate profits. The results of this study have not found the impact of the indicators of inventory turnover ratio, inventory leanness, and revenue growth rate on the profitability of enterprises. This is also a suggestion for further studies that can be combined with in-depth interviews or case studies to clarify the effects of this cave.

Based on the research results, the authors recommend that retail enterprises improve the efficiency of retail inventory management as follows.

Firstly, improve inventory management. Businesses need to focus on reducing the number of days of inventory to reduce storage costs and increase capital efficiency. Retail businesses can classify goods according to product life cycle, market demand, and seasonality to meet the appropriate needs of customers. Implement customer demand forecasts to estimate the amount of stock needed, avoiding excess or shortage. Build a good relationship with suppliers to order in small quantities and short delivery times, and flexibly adjust orders when necessary. Display products in a scientific, eye-catching way, creating a highlight for new products. Implement reasonable promotions and discounts to stimulate inventory consumption, especially for products at risk of becoming obsolete or expired. Train employees on product knowledge, sales, and consulting skills to increase sales efficiency and minimize inventory.

Secondly, invest in inventory management technology. Use information technology to track and manage inventory effectively, thereby reducing the risk of damage and obsolescence, increasing the speed of goods turnover, and improving asset efficiency.

In addition to determining the impact of inventory management, the project also suggests further research directions, such as expanding the scope of research to other disciplines and using indicators to measure inventory management and business results to increase the reliability of research results. Hopefully, these conclusions and recommendations will help retail businesses improve inventory management efficiency and optimize profits.

This study provides a valuable foundation for future research by suggesting qualitative methods, such as in-depth interviews and case studies, to better understand the impact of indicators like inventory turnover ratio and inventory leanness on profits. However, the study has some limitations. First, relying solely on secondary data from financial statements may not fully capture the influence of inventory management on profits. Second, while the data collected from 2014 to 2023 spans a relatively long period, it does not specifically analyze fluctuations during different economic phases, such as the COVID-19 pandemic. Third, the limited number of observations may reduce the representativeness of the sample and affect the accuracy of the results. Future research should consider expanding the sample size and gathering data from a broader range of retail businesses.

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