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The Effect of Vendor-Managed Inventory on Quality Performance: (An Empirical Study on The Egyptian Chemical Manufacturing Companies)

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ABSTRACT

This study investigates the effect of vendor-managed inventory on the quality performance of the top 10 Egyptian chemical manufacturing companies listed in the stock exchange index. The independent variable vendor-managed inventory dimensions were measured by forecasting, order tracking, and inventory control and its effect on the quality performance to enhance the supply chain process and improve quality performance.

The research utilized qualitative design investigation techniques for this study, where 346 questionnaires were distributed. Qualitative survey data and structural equation modeling analyses were employed to study relationships between different variables.

The results of the study indicated that the vendor-managed inventory measured by forecasting, the order tracking, and inventory control has a significant effect on quality performance.

It was recommended that, to improve the development of industry-specific best practices for VMI in the Egyptian chemical manufacturing sector, with a focus on quality assurance and performance improvement.

KEYWORDS

Vendor-Managed Inventory, Forecasting, Order Tracking, Inventory Control, Quality Performance, Egyptian Chemical Manufacturing Companies

1- INTRODUCTION

Vendor-Managed Inventory (VMI) is fundamentally a distribution channel management system in which the manufacturer/vendor oversees and regulates the inventory at the distributor/retailer (Robinson et al., 2015). In this scenario, VMI might be viewed as a modern variation or "evolution" of the traditional practice of committed inventory, now integrated into a corporate environment characterized by a higher level of contribution.

In essential, VMI is an operating system for distribution channels in which the manufacturer or vendor oversees and manages the inventory at the distributor or retailer (Robinson et al., 2015). Sekaran (2018) claims that VMI is a procedure in which the supplier is in charge of overseeing the customer's inventory, including the process of replenishment. In this way, VMI can be viewed as an improved or "evolution" of the traditional consigned inventory practice, but one that is currently implemented in a more highly contributing business setting.

VMI is an inventory management practice that is applied to manage both upstream and downstream supply processes by exchanging information between retailers and vendors. In this collaboration, the vendor takes control of inventory decisions for the retailers (Sadeghi et al., 2014; Liu et al., 2020). In the process of ordering in supply chains without VMI, retailers make their own decisions, while VMI shares their inventory information with a vendor (Giovanni et al., 2021). Therefore, the vendor determines the order quantity for both situations. Also, the vendor is responsible for the ordering, cost of retailers. VMI can prevent stocking inventories and thus can reduce the total cost of the supply chain (Poursoltan et al. 2021; Wettasinghe et al., 2020).

Vendor-Managed Inventory (VMI) is a supply chain management strategy where suppliers take responsibility for managing inventory levels at the customer's location based on real -time data sharing. VMI has gained prominence globally as a tool to improve supply chain efficiency, reduce costs, and enhance collaboration between suppliers and customers. However, its adoption in developing countries like Egypt remains limited due to technological, cultural, and logistical challenges. This literature review synthesizes existing research on VMI, explores its global applications, and identifies gaps in the context of Egypt.

2- LITERATURE REVIEW

Badi, I., Demir, G., Bouraima, M. B., & Maraka, A. K. (2025), they investigated a model for solving the problem of vendor-managed inventory, with a focus on supply chain cost reduction and inventory replacement optimization. They also looked at important aspects including cost reduction, routine scheduling, and delivery quantity optimization. Certain performance metrics, such fewer stock outs, higher service standards, and lower transportation expenses, show how effective the strategy is. The findings demonstrated that the proposed methodology can greatly improve supply chain effectiveness and give businesses a strong foundation for improving their vendor-managed inventory practices.

Emily R. Carter. (2025), this research illustrates how the implementation of Vendor-Managed Inventory (VMI) influences quality performance across manufacturing and distribution industries. The research methodology used a mixed-methods approach, the research combines quantitative surveys from 350 companies and qualitative interviews with 25 supply chain and quality managers. The finding showed that VMI significantly enhances quality performance through increased supplier accountability, real-time data sharing, and collaborative planning.

Laura M. Simmons. (2025), this study investigates the relationship between quality performance and vendor-managed inventory (VMI) across modern manufacturing and distribution sectors. The research methodology used a mixed-methods approach, the study integrates qualitative information from 30 supply chain executives' and quality managers' interviews with quantitative data from 400 companies. The result showed a statistically significant positive correlation between quality performance and VMI adoption, especially when accompanied by effective supplier cooperation, transparency of information, and digital integration via block chain and AI.

James T. Okafor. (2025), this study investigated the relationship between Vendor-Managed Inventory (VMI) and quality performance within manufacturing and distribution firms. The research methodology a mixed-methods approach, the research combines quantitative surveys from 300 companies and qualitative interviews with 20 supply chain executives and quality managers. The results demonstrated that when accompanied by robust supplier engagement, real-time data exchange, and technological integration—particularly through digital technologies like AI and ERP systems—VMI has a statistically significant positive impact on quality performance.

Omondi, R. N. (2025), this study investigates the relationship between Vendor-Managed Inventory (VMI) and quality performance within manufacturing firms. Using a mixed-methods approach, the study combines quantitative data from 400 manufacturing firms and qualitative insights from interviews with 30 supply chain executives and quality managers. The results demonstrated that when accompanied by robust supplier engagement, real-time data exchange, and technological integration.

Attia, A. M. (2024), the aim of this study was to create an optimization model that accounts for quality, inspection, collaboration, and possible misclassification costs. Furthermore, creating a process to find the best option optimizes advantages for both buyers and sellers while lowering overall expenses. Additionally, for concrete illustration, a numerical example is provided, providing useful insights into the advantages of partner collaboration in SCM. The results illustrated how effective it is to have buyers and sellers work together to reduce supply chain expenses. This cooperative approach requires both parties to be willing to give up their separate cost-minimization tactics in favor of working together to optimize the system cost as a whole. Synergistic advantages arise from this sacrifice, leading to increased productivity, lower costs, and better overall supply chain ecosystem performance.

John M. Smith. (2024), this study examines the effects of Vendor-Managed Inventory (VMI) deployment on quality performance, specifically in the pharmaceutical sector. Using a mixed-methods approach, this study combined qualitative interviews with 15 supply chain and quality managers with quantitative surveys from 200 pharmaceutical companies.

Muhammad Ali Khan. (2024), this study investigates the impact of Vendor-Managed Inventory (VMI) on quality performance within manufacturing firms across multiple industries. The researcher used a mixed-methods approach, the study includes qualitative interviews with 25 supply chain and quality managers in addition to quantitative surveys from 300 manufacturing organizations. The findings shown that through improved supplier accountability, real-time data exchange, and cooperative planning, VMI considerably improves quality performance. Technology integration, information transparency, and supplier cooperation are important mediating elements.

Odiwuor, J. D. & Muthoni, D. K. (2023), they investigated effect of vendor-managed inventory system on performance of retail outlets in Kenya. This study applied on 66 retail stores in Migori County through questionnaires. Results demonstrated that control activities significantly improve retail outlet performance, suggesting that, when all other variables remain constant, a unit increase in control activities results in a notable improvement in retail outlet performance.

Kwateng, K. O., Fokuoh, B., & Tetteh, F. K. (2022), they examined the relationship between vendor-managed inventory and operational performance and the moderation roles of digitization and leadership in the mining sector in Ghana. They used quantitative approach and data gathered was analyzed using SPSS. The results showed that the VMI has significant effect on OP. However, both digitization and leadership failed to moderate the relationship between VMI and OP.

2.1 The Study Gap

There is a gap in the current knowledge in the vendor-managed inventory; some of the literature review did not examine the vendor-managed inventory through forecasting. Moreover, this study was not applied in Egyptian chemical manufacturing companies.

3- PREVIOUS STUDIES

The effect of vendor-managed inventory on quality performance has been a topic of intense researcher concern and challenge. In this study, the researcher categorized and analyzed the literature according to two central themes: vendor-managed inventory and quality performance.

3.1 Forecasting

Forecasting is an important facet of an effective supply chain. Improved forecasting methods could lower safety stocks, which could reduce costs without sacrificing service quality (Romeijnders et al., 2012).

There are a number of standard forecasting methods, such as moving average and exponential smoothing, as well as specialized methods such as that by Croston (1972). Specifically, exponential smoothing is a very reliable forecasting technique that can quickly adjust to change in the demand process.

Chase et al. (2009) in their white paper have listed certain characteristics of industry leaders. The authors suggest that demand analytics and reporting (such as simulation, what-if analysis, and scenario planning tools) are more frequently used by leaders. In that study, they also emphasized that forecasters cannot rely just on past trends to make accurate predictions about the future. For this reason, there is now more emphasis on efficient, real-time access to consumption data in order to improve demand forecasting and planning. Leading businesses utilize integrated collaborative forecasting with customers. All industries unanimously agreed that "their biggest challenges to effective demand management were new product forecasting and access to timely consumer information." The necessity of advanced supply chain management techniques, like cooperative forecasting and planning with clients and suppliers, is emphasized by Lockamy and McCormack (2004).

Zhao (2002) demonstrated how the supplier's capacity limitations affect their ability to use the customer forecasting effectively. Through a simulation research, Aviv (2001) discovered that collaborative forecasting is less expensive than local forecasting.

Forecast exchange and supply chain performance are linked in certain modeling-based research on forecast sharing in supply systems. According to Lee et al. (1997) and a number of other studies, if suppliers are not given accurate estimates, demand unpredictability may increase upstream in the supply chain. Zhao et al. (2002) reached the conclusion that while the demand pattern, forecasting model, and supplier capacity tightness—that is, the ratio of the supplier's total production capacity to the total demand to be satisfied—have a significant impact on the value of information sharing, suppliers can typically significantly reduce their overall costs and improve customer service through information sharing in any situation.

3.2 Order Tracking and Warehousing

Uses of modern technologies such as bar coding and warehouse management systems (WMS) have eased the problems like product misplacement, inventory inaccuracies etc. Zhao et al., (2002) reached the conclusion that while the demand pattern, forecasting model, and supplier capacity tightness—that is, the ratio of the supplier's total production capacity to the total demand to be satisfied—have a significant impact on the value of information sharing, suppliers can typically significantly reduce their overall costs and improve customer service through information sharing in any situation.

Radio frequency identification (RFID) when combined with other systems are increasingly being used as the foundation for innovative solutions that enhance supply chain management by lowering costs and raising customer service standards (Sahin, 2004). Using RFID has several advantages, such as reducing labor expenses, streamlining company processes, and lowering inventory errors (Rekik et al., 2008). Purchase shelving and restocking procedures are one aspect contributing to the out-of-stock problem, where ordered products are present in the shop but not on the appropriate shelf. These elements could have to do with the distribution of shelf space, the frequency of shelf replenishments, the ability of store employees, mistakes made during in-store execution, etc.

An information system that facilitates stock management and administration in the warehouse is called a warehouse management system (WMS). By gradually supporting the management procedures, it is used to improve the warehouse's performance. Because the warehouse is more automated, there are less mechanical administrative activities, which lowers the possibility of human error and ensures precise inventory levels. (Tozan et al., 2016).

3.3 Inventory Control Limits

The control of inventory by suppliers is often defined by inventory control limits, as described by Elvander et al. (2007). In a vendor-managed inventory (VMI) model, the supplier is typically responsible for maintaining stock levels within a predetermined minimum and maximum range. According to Wild (2002), these limits are used to prevent inventory extremes. Setting a lower maximum level can decrease average inventory, which improves turnover and reduces carrying costs (Vigtil, 2007). A minimum level, conversely, guarantees product availability for customer use. Fry, Kapuscinski, and Olsen (2001) found that implementing effective minimum and maximum limits resulted in a 10-15% cost savings when transitioning from a retailer-managed inventory (RMI) system to VMI, with the benefits becoming more significant as demand variability increased. Furthermore, Yao and Dresner (2008) highlighted that imposing penalty costs for stockouts can lead to even greater inventory reduction.

3.4 Quality Performance

Quality is highly related with the extent of communication among parties of the supply chain. At this point quality of communication is expressed based on the level of accuracy, level of update, and completeness in the process of communication between partners of supply chain. Quality of communication is inferred based on the system of information; outsourcing and other related organizational relationships are considered as key variables in the relationship along partners of supply chain. In order to maintain and establish effective cooperation, the company should strive to create a meaningful and high-level communication with supply chain partners to improve the quality and involvement along the supply chain.

The quality performance method assists employees understand the organization's mission and improves their capacity to provide high-quality goods and services (Bathaei et al., 2021; Kurniawan et al., 2020; Ahmed et al., 2018).

Quality of communications plays necessary role in integrating activities related to organizational system in which quality of effective communications aids to integrate and achieve sustainable supply chain. The ultimate point is that, there is an acceptable relationship between quality of supply chain integration and communication in which the effect may be indirect or direct (Lin, 2013) (Patterson & Anders, 2013).

4- RESEARCH OBJECTIVE

The research aims to investigate the effect of vendor-managed inventory on quality performance in the Egyptian chemical manufacturing companies in Egypt that were mentioned in the stock market.

5- RESEARCH PROBLEM

The vendor-managed inventory has an important contribution to the supply chain. Thus, the vendor-managed inventory should be efficient because if there are any defects when reordering, there will be internal failure costs such as rework and reverse logistics. Thus, quality has essential roles in vendor-managed inventory to be more efficient.

6- RESEARCH METHODOLOGY

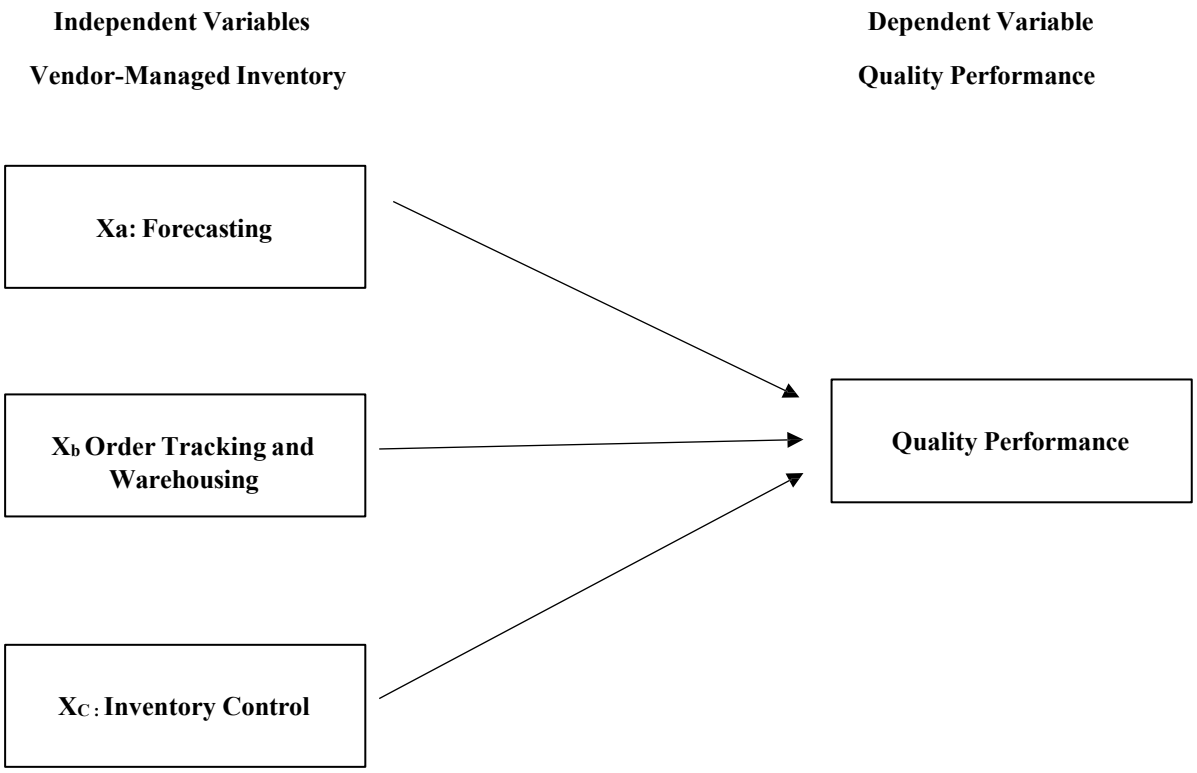
The purpose of this research is to measure the effect of the vendor-managed inventory on quality performance on the Egyptian chemical manufacture companies in Egypt. Accordingly, in this study, the researcher targeted top and middle managerial levels in the companies.

This study has been applied to the top 10 Egyptian chemical manufacturing companies in Egypt, which are mentioned in the stock market. Data was collected through a questionnaire using Google Forms. The data was tested using the SPSS version 26.

7- CONCEPTUAL FRAMEWORK AND THE HYPOTHESES

The researcher developed an analytical framework for this study, as illustrated in Figure 1 below, to explain the connection the relationship between vendor-managed inventory and quality performance in Egyptian chemical manufacturing companies. The relationship between vendor-managed inventory and quality performance has been the subject of numerous previous empirical study.

Figure 1: The Effect of Vendor-Managed Inventory on Quality Performance Study Model



Source: The Researcher

X_1: The vendor-managed inventory has a significant effect on quality performance.

Xa: The forecasting has a significant effect on quality performance.

Xb: The order trucking and warehousing has a significant effect on quality performance.

Xc : The inventory control has a significant effect on quality performance.

8- MEASUREMENT TEST AND DATA COLLECTION

8.1 Qualitative Approach

This study investigates the effects of vendor-managed inventory on quality performance at Egyptian chemical manufacturing companies that are mentioned in the Egyptian stock market.

To evaluate the effectiveness of vendor-managed inventory in enhancing quality performance, the research applies a qualitative approach, using a descriptive analysis framework. The primary objective is to analyze the degree to which vendor-managed inventory processes affect the quality performance of Egyptian chemical manufacturing companies.

The research utilizes survey data collected from employees in the warehouse, logistics, supply chain, and quality departments. Typical titles (such as CEO, president, director, supply chain manager, operations manager, and inventory manager) were identified as our key respondents because of their knowledge of the level of vendor-managed inventory (VMI) and quality performance practices in their firms.

Table 1: Likert Scale of Questionnaire

Number	Dimension and Statement	
Vendor-Managed Inventory		
Forecasting		
Forecasting 1	Accurate forecasting from the supplier helps reduce our inventory costs.	Chase, R. B., Jacobs, F. R., & Aquilano, N. J. (2006)
Forecasting 2	We regularly share sales data with our suppliers to improve the accuracy of their forecasts.	Mentzer, J. T., & Moon, M. A. (2005)
Forecasting 3	Better forecasting from our suppliers leads to improved customer service.	Hyndman, R. J., & Athanasopoulos, G. (2018)
Forecasting 4	We receive regular updates from our suppliers on changes in their forecasting models.	Chase, R. B., Jacobs, F. R., & Aquilano, N. J. (2006)
Forecasting 5	Our suppliers' forecasting accuracy has improved significantly in the past year.	Mentzer, J. T., & Moon, M. A. (2005)
Forecasting 6	We collaborate with our suppliers to develop joint forecasting plans.	Hyndman, R. J., & Athanasopoulos, G. (2018)
Order Tracking		
Order Tracking 1	Our order tracking system allows us to easily monitor shipment status from suppliers.	Rushton, A., Croucher, P., & Baker, P. (2017)
Order Tracking 2	Our order tracking system allows for real-time updates on shipment status from suppliers.	Rushton, A., Croucher, P., & Baker, P. (2017)
Order Tracking 3	Our warehouse management system helps us optimize inventory storage and reduce handling costs for supplier shipments.	Tompkins, J. A. (2017)
Order Tracking 4	Our order tracking system integrates seamlessly with our other business systems, including supplier portals.	Simchi-Levi, D., Kaminsky, P., & Simchi-Levi, E. (2008)
Inventory Control		
Inventory Control 1	Our current inventory control system ensures accurate inventory levels.	Chase, R. B., Jacobs, F. R., & Aquilano, N. J. (2006)
Inventory Control 2	Our inventory control system helps minimize inventory holding costs.	Rushton, A., Croucher, P., & Baker, P. (2017)
Inventory Control 3	I am satisfied with the level of inventory visibility provided by my current system.	Waters, D. (2003)

Inventory Control 4	My inventory control system allows for efficient tracking of inventory across multiple locations.	Axsäter, S. (2006)
Quality Performance		
Quality 1	The company is committed to provide the production according to local and international slandered like GPM.	al-Tamimi, Hamzah Salih Sultan (2015)
Quality 2	The company produces various forms of the products to suits customers' needs (provide several forms of the medication).	al-Tamimi, Hamzah Salih Sultan (2015)
Quality 3	The company uses transportation means that maintain the products quality (such as refrigerated cars to keep the temperature).	al-Tamimi, Hamzah Salih Sultan (2015)
Quality 4	The company is committed to proper storage conditions according to the specifications.	al-Tamimi, Hamzah Salih Sultan (2015)
Quality 5	The company has control tracking system to keep the inventory valid.	al-Tamimi, Hamzah Salih Sultan (2015)
Quality 6	The company choses their suppliers on the basis of high-quality.	al-Tamimi, Hamzah Salih Sultan (2015)

9- SAMPLING AND DATA COLLECTION

Data of 346 questionnaires were collected out of the 380 survey forms that were distributed representing around 91% of total surveys. 5 questionnaires after assessment were deemed and unsuitable for analysis were eliminated. The analyzed lists were thus (341). The researcher was eager to make sure the respondents understood the contents of the list, the data was gathered through in-person interviews between the researcher and the respondents, this well-known process, called Personal Delivery & Collection, makes it possible to reach insightful feedback data, one benefit of this approach is that it allows for a high degree of control and oversight over the responders. In relation to certain elements, such as the respondents' opinions and any justifications for their refusal to join (Lovelock, 1979).

10- DATA ANALYSIS AND TESTING HYPOTHESES

10.1 Statistical Methodology

Following the completion of data collection, the data was transcribed, assembled, and subjected to the necessary statistical analysis using the Statistical Package for the Social Sciences (SPSS, Version 26) application on a computer. This allowed for the analysis of the data and the testing of the hypotheses.

10.2 Data Analysis and Results

10.2.1 Reliability Assessment

Cronbach's alpha coefficient and composite reliability (CR) were used to examine the reliabilities among the items within each factor. As shown in Table (1), Cronbach's alpha and composite reliability of all the constructs exceed the widely recognized rule of thumb of 0.953, which indicate adequate reliability of the measurement scales (Fornell and Larcker, 1981; Nunnally, 1978; O'Leary-Kelly and Vokurka, 1998).

Table 2: Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.953	.953	20

Source: The researcher

10.2.2 Descriptive analysis

The One Sample (T) test was used to analyze the dimensions of the study tool, where it can be judged that the item is positive, meaning that the members of the study population agree with its content if the calculated T value is greater than the absolute value of the tabulated T value, which is equal to (2.01). or (a significance level of less than 0.05), and the paragraph is negative, meaning that the members of the study community do not agree with its content if the calculated t value is smaller than the absolute value of the tabulated t value, which is equal to (2.01), and the study community's opinions regarding the paragraph are neutral if the level of the significance is greater than (0.05).

Table 3: One-Sample Test Data Analysis (Dimensions of The Research)

	Test Value = 0					
	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Forecasting 1 Accurate forecasting from the supplier helps reduce our inventory costs.	60.750	340	.000	3.493	3.38	3.61
Forecasting 2 We regularly share sales data with our suppliers to improve the accuracy of their forecasts.	51.816	340	.000	3.428	3.30	3.56
Forecasting 3 Better forecasting from our suppliers leads to improved customer service.	57.931	340	.000	3.648	3.52	3.77
Forecasting 4 We receive regular updates from our suppliers on changes in their forecasting models.	55.100	340	.000	3.560	3.43	3.69
Forecasting 5 Our suppliers' forecasting accuracy has improved significantly in the past year.	59.372	340	.000	3.660	3.54	3.78
Forecasting 6 We collaborate with our suppliers to develop joint forecasting plans.	57.034	340	.000	3.733	3.60	3.86
Order Tracking 1 Our order tracking system allows us to easily monitor shipment status from suppliers.	47.817	340	.000	3.399	3.26	3.54
Order Tracking 2 Our order tracking system allows for real-time updates on shipment status from suppliers.	59.180	340	.000	3.481	3.37	3.60
Order Tracking 3 Our warehouse management system helps us optimize inventory storage and reduce handling costs for supplier shipments.	50.330	340	.000	3.449	3.31	3.58
Order Tracking 4 Our order tracking system integrates seamlessly with our other business systems, including supplier portals.	54.524	340	.000	3.601	3.47	3.73

Inventory Control 1 Our current inventory control system ensures accurate inventory levels.	59.848	340	.000	3.757	3.63	3.88
Inventory Control 2 Our inventory control system helps minimize inventory holding costs.	54.092	340	.000	3.584	3.45	3.71
Inventory Control 3 I am satisfied with the level of inventory visibility provided by my current system.	49.878	340	.000	3.343	3.21	3.47
Inventory Control 4 My inventory control system allows for efficient tracking of inventory across multiple locations.	42.097	340	.000	2.721	2.59	2.85
Quality 1 The company is committed to provide the production according to local and international slandered like GPM.	59.727	340	.000	3.413	3.30	3.53
Quality 2 The company produces various forms of the products to suits customers' needs (provide several forms of the medication).	55.757	340	.000	3.531	3.41	3.66
Quality 3 The company uses transportation means that maintain the products quality (such as refrigerated cars to keep the temperature).	57.101	340	.000	3.522	3.40	3.64
Quality 4 The company is committed to proper storage conditions according to the specifications.	56.738	340	.000	3.572	3.45	3.70
Quality 5 The company has control tracking system to keep the inventory valid (Expiry date).	59.372	340	.000	3.660	3.54	3.78
Quality 6 The company choses their suppliers on the basis of high-quality.	57.034	340	.000	3.733	3.60	3.86

Source: The researcher

It is clear from Table No. 3 that all the calculated T-values are greater than the tabulated T-value of 2.01. Which represents above the middle of the scale, and the value of the standard deviation of the scale was (0. 042). Which indicates the concentration of responses and their lack of dispersion. As they are less than the correct one, as shown.

There is a high degree of consensus. This indicates the direction according to the five-point Likert scale for the scale as a whole (Agree). This indicates the importance of studying the vendor-managed inventory (VMI) on the Quality performance in research.

10.2.3 Correlation Coefficient Pearson

In this part, a set of statistical analyses were conducted to test the study hypothesis.

Table 4: Correlation Matrix Between the Vendor-Managed Inventory (VMI) And Quality Performance Factors

		Forecasting	Order Tracking	Inventory Control	Quality
Forecasting	Pearson Correlation	1	.827**	.710**	.838**
	Sig. (2-tailed)		.000	.000	.000
	N	341	341	341	341
Order Tracking	Pearson Correlation	.827**	1	.775**	.804**
	Sig. (2-tailed)	.000		.000	.000
	N	341	341	341	341
Inventory Control	Pearson Correlation	.710**	.775**	1	.792**
	Sig. (2-tailed)	.000	.000		.000
	N	341	341	341	341
Quality	Pearson Correlation	.838**	.804**	.792**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	341	341	341	341

**. Correlation is significant at the 0.01 level (2-tailed).

There is a statistically significant correlation between the application of the vendor-managed inventory (VMI) factors and the Quality performance as the correlation coefficients between (the vendor-managed inventory (VMI) factors and the Quality performance) ranges from 0.710 to 0.838 (Strong Positive correlation) and the probability value is less than the value of the significance level α (p-value = 0.000 < α = 0.05). As a final result, we have an initial indication that the application of the vendor-managed inventory can have an effect on Quality performance. Therefore, simple linear regression analysis was applied to determine the validity of this effect.

10.2.4 Test of Hypothesis (Linear Regression)

Implementing the vendor-managed inventory (Forecasting – Order tracking – Inventory control) significantly affects quality performance in organizations.

Based on the vendor-managed inventory, will split the main hypothesis into the following sub-hypotheses:

10.2.5 Ha: The forecasting has a significant effect on quality performance

Table 5: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.838[a]	**.702**	**.702**	.48723

a. Predictors: (Constant), Forecasting

Table 6: ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	189.957	1	189.957	800.169	.000[b]
	Residual	80.477	339	.237		
	Total	270.434	340			

a. Dependent Variable: Quality

b. Predictors: (Constant), Forecasting

Table 7: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.722	.104		6.929	.000
	Forecasting	.795	.028	.838	28.287	.000

a. Dependent Variable: Quality Performance

From Tables (5), (6) and (7) it is clear that: Applying Forecasting is considered a statistically significant variable and affects Quality performance at a 5% level of significance, as the probability value of its t-test is less than the value of the level of significance (p). -value = 0.000 < α = 0.05). Moreover, it was found that the regression model that was built is considered a statistically significant model with a significance level of 5%, as the probability value of the F test is less than the value of the standard significance level α (F=800.17, p-value = 0.000 < α = 0.05). The coefficient of the determination R^2 is 0.702. It means that it can explain approximately 70.2% of the changes that occur in Quality performance, while the remaining part (29.8%) may be due to otherwise.

10.2.6 Hb: The order trucking and warehousing has a significant effect on quality performance.

Table 8: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.804[a]	.647	.645	.53103

a. Predictors: (Constant), Order Tracking

Table 9: ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	174.838	1	174.838	620.002	.000[b]
	Residual	95.596	339	.282		
	Total	270.434	340			

a. Dependent Variable: Quality Performance

b. Predictors: (Constant), Order Tracking

Table 10: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.112	.103		10.813	.000
	Order Tracking	.706	.028	.804	24.900	.000

a. Dependent Variable: Quality Performance

From Tables (8),(9) and (10) it is clear that: Applying Order tracking is considered a statistically significant variable and affects Quality performance at a 5% level of significance, as the probability value of its t-test is less than the value of the level of significance (p). -value = 0.000 < α = 0.05). Moreover, it was found that the regression model that was built is considered a statistically significant model with a significance level of 5%, as the probability value of the F test is less than the value of the standard significance level α (F= 620.002, p-value = 0.000 < α = 0.05).

The coefficient of the determination R^2 is 0.647. It means that it can explain approximately 64.70% of the changes that occur in Quality performance, while the remaining part (35.3%) may be due to otherwise.

10.2.7 Hc: The inventory control has a significant effect on quality performance

Table 11: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.792[a]	.627	.626	.54538

a. Predictors: (Constant), Inventory Control

Table 12: ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	169.601	1	169.601	570.193	.000[b]
	Residual	100.834	339	.297		
	Total	270.434	340			

a. Dependent Variable: Quality performance

b. Predictors: (Constant), Inventory Control

Table 13: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.931	.114		8.135	.000
	Inventory Control	.788	.033	.792	23.879	.000

a. Dependent Variable: Quality performance

From Tables (11), (12) and (13) it is clear that: Applying Inventory Control is considered a statistically significant variable and affects Quality performance at a 5% level of significance, as the probability value of its t-test is less than the value of the level of significance (p). -value = 0.000 < α = 0.05). Moreover, it was found that the regression model that was built is considered a statistically significant model with a significance level of 5%, as the probability value of the F test is less than the value of the standard significance level α (F=570.19, p-value = 0.000 < α = 0.05).

The coefficient of the determination R^2 is 0.627. It means that it can explain approximately 62.70% of the changes that occur in Quality performance, while the remaining part (37.3%) may be due to otherwise.

10.2.8 Test the Main Hypothesis

H1: The vendor-managed inventory (VMI) has a significant effect on quality performance

Table 14: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.881[a]	.776	.775	.42299

a. Predictors: (Constant), The vendor-managed inventory

Table 15: ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	209.779	1	209.779	1172.443	.000[b]
	Residual	60.655	339	.179		
	Total	270.434	340			

a. Dependent Variable: Quality performance

b. Predictors: (Constant), The vendor-managed inventory

Table 16: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.457	.094		4.874	.001
	The vendor-managed inventory	.897	.026	.881	34.241	.000

a. Dependent Variable: Quality performance

From Tables (14),(15), and (16), it is clear that: Applying The vendor-managed inventory (VMI) is considered a statistically significant variable and affects Quality performance at a 5% level of significance, as the probability value of its t-test is less than the value of the level of significance (p). -value = 0.000 < α = 0.05). Moreover, it was found that the regression model that was built is considered a statistically significant model with a significance level of 5%, as the probability value of the F test is less than the value of the standard significance level α (F= 1172.44, p-value = 0.000 < α = 0.05). There variable have a high correlation with Quality performance, as the correlation coefficient value reached (0.881) and the coefficient of the determination 0.776. It means that it can explain approximately 77.6% of the changes that occur in Quality performance, while the remaining part (22.4%) may be due to other wise that could have an impact on Quality performance and were not addressed in the current study.

10.2.9 Discussion

A key contribution of this study is the emphasis on the vendor-managed inventory, which has an important contribution to the supply chain process.

This research considers the vendor-managed inventory effect on quality performance at Egyptian chemical manufacturing companies. The vendor-managed inventory has an important role in avoiding stock out problems at companies and should use Technology integration, information transparency, and supplier cooperation are important to achieve efficient supply chain processes.

The research demonstrates how vendor-managed inventory systems enhance the quality performance through smooth operation between suppliers and organizations; thus, it is better to have a long-term relationship between suppliers and organizations because it is a very critical process and depends on forecasting methods, order tracking, and inventory control.

The study confirms results that match Laura M. Simmons (2025) yet adapts conclusions to the distinctive characteristics of the Egyptian chemical sector. Emily R. Carter (2025) results matched with this research results in a dependent and independent relation, but there are differences in the measurement dimension.

This study matched James T. Okafor (2025), but there are different dimensions for testing vendor-managed inventory. Rachel N. Omondi's (2025) results matched this study. Moreover, this study matched with results for John M. Smith (2024) and Muhammad Ali Khan (2024), but it did not match with results for Attia, A. M. (2024); Kwateng, K. O., Fokuoh, B., & Tetteh, F. K. (2022); and Odiwuor, J. D., & Muthoni, D. K. (2023).

11. CONCLUSION

This study investigates the effect of vendor-managed inventory on quality performance applied to Egyptian chemical manufacturing companies, which are mentioned on the Egyptian stock market. The results show the vendor-managed inventory (VMI) significantly influences all dimensions of quality performance and is significantly and positively related to all factors. In addition to this, there are significant relationships and consistency between the statements representing all dimensions of the vendor-managed inventory scale, and this relationship with quality performance is statistically significant (P value = 0.000 < 0.05).

The values of the variance coefficients explaining the dimensions of the vendor-managed inventory and quality performance ranged between (0.710) as a minimum and (0.838) as a maximum. There is an effect from the vendor-managed inventory and the quality performance that values of the F-test have a (1172.443 < F-tabled 2.31); the forecasting has a significant effect on the quality performance that values of the F-calculated have a (800.17 < F-tabled 2.31); the order tracking has a significant effect on the quality performance that values of the F-calculated have a (620.002 < F-tabled 2.31); and the inventory control has a significant effect on the quality performance that values of the F-calculated have a (570.193 < F-tabled 2.31).

12- RECOMMENDATIONS

There are some recommendations for future research on vendor-managed inventory and quality performance in Egyptian chemical manufacturing companies:

First, investigate the impact of different vendor-managed inventory models on quality performance within the Egyptian chemical manufacturing sector. This could involve comparing traditional VMI systems with more advanced, technology-driven approaches.

Second, explore the role of cultural factors in influencing the successful implementation of VMI and its effect on quality. This might include examining how communication styles and trust between manufacturers and vendors impact the overall process.

Finally, research the development of industry-specific best practices for VMI in the Egyptian chemical sector, with a focus on quality assurance and performance improvement.

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