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The Challenges of Inventory Management in Medical Supply Chain

Salma Ali Khokhar[1*] [*1] *Faculty of Business Administration, Iqra University, Karachi, Pakistan*

**Corresponding email: salma.14294.ac@iqra.edu.pk*

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ABSTRACT

The study has determined the challenges of inventory management in the medical supply chain of Pakistan. The medical supply chain of Pakistan has been taken as the target industry. In addition, the conceptual framework is based on Control Theory and Resource Based View. The research approach is quantitative deductive, and the sample size is 200. The data was collected utilizing a five-point Likert scale in in-person and online questionnaire surveys, while it was analyzed using IBM SPSS version 22.0. The present study identified that inventory automation, distribution turnover and inventory control have a significant and positive relationship with inventory management. This evaluation of the literature advances the field of study by offering one of the first in-depth investigations of how to manage inventory items in the healthcare supply chains of Pakistan. The study advises SC managers that by implementing a real-time inventory management system in the company, consumers can locate items quickly and have more accurate information about their location and availability.

Keywords: *Inventory automation, Distribution turnover, Inventory control, Inventory management*

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1. Background of the Study

Elements and finished goods, including natural resources sold or used in production, make up a cash flow forecast. A company's inventory is thought of as a resource. Accountants use stock-level data to record amounts on the income statement appropriately. Hence, Field inventory administration is responsible for comprehending a company's share composition and the numerous requirements of that product, sometimes referred to as inventory management (Hashmi et al., 2021a). Both internal and external causes impact demands, and supply levels are maintained at a suitable or predetermined level via the establishment of purchase order requests. Every other company operation has to manage its inventory (Mubarak et al., 2021). Merchandise governance is crucial to any company's efficient operations since it guarantees a reasonable amount of or a lack of product on hand and reduces the risk of running out of stock and inaccurate records (Hashmi & Kisa, 2022).

Companies may decide which goods to order, when to purchase, and how much to command with inventory management's help. Inventory is monitored from product purchase through disposal. The method detects patterns and responds to them to ensure sufficient inventory to satisfy customer demands and proper notification of a lack. After being purchased, equipment becomes a source of income. Consequently, having less stock costs money and reduces cash flow. Poor inventory management may result in waste or abandoned stock (Nazuk et al., 2021).

The current study has taken three independent variables: Inventory Automation, Distribution Turnover and Inventory Control. Retailers and wholesalers may manage using an automated inventory system; companies may monitor their stock genuinely. Time is saved, and the systems simplify processes. If businesses design their retail automation using pre-built circumstances, companies can accomplish other critical tasks with confidence (Hashmi et al., 2021b). For a retailer and direct-to-consumer company, an automated inventory system may be used to carry out several crucial business tasks, such as; automating buy and replenishment orders, automated customer order delivery, Operation assignment for the fulfilment, monitoring inventory between warehouses, synchronizing orders and stock information from all sales channels and Multiple-channel inventory control (Siddiqi et al., 2022).

Moreover, Inventory turnover is the rate at which inventory stock is purchased, used, and replenished. The inventory turnover ratio is calculated by splitting the cost of the items by the inventories for the identical time period. One indicator of efficient inventory management is inventory turnover. A financial indicator called "inventory turnover" measures how quickly stock is traded throughout the period (Nazir, 2022). An organization should not hold greater products than it could sell. A higher proportion frequently indicates strong sales, while a lower number indicates weak sales. The process used to ensure that a business has the necessary quantity of supplies on hand is known as inventory control, sometimes known as stock control. The company can meet customer demand and maintain cash flow as long as organizational external manufacturing controls are in place.

Healthcare inventory management is a process in charge of monitoring the stock, purchases, orders, payments, and other activities of your healthcare system. An inventory management system is necessary for healthcare businesses that oversee essential care, purchase and dispense medications, or market health products to patients (Mor et al., 2021; Hashmi, 2023). By maintaining an up-to-date and accurate record of the items and supplies, inventory management solutions inside large hospitals may assist in shielding their healthcare system from financial and product losses. Studies have revealed that fundamental quality control practices, consumer satisfaction, and waste removal are chances for improvement in healthcare centres of developing nations (Soraya et al., 2022)

Utilizing inventory management software recently has helped the healthcare sector enhance the efficacy or efficiency within its distribution networks (Baloch & Rashid, 2022). The requirement for drugs and screening procedures tools is rising quickly in the healthcare sector. The biggest challenge for healthcare supply chains is keeping up a high level of service while properly controlling stocks. To meet the rising demand for healthcare products, supply chain specialists in the healthcare industry must develop efficient and effective techniques to improve and optimize stocks. In addition, the perishability and disposability of many medical items have been significant issues in managing the healthcare supply chain.

The primary problems with inventory management are having too much inventory and not being able to sell it, not having enough inventory to fill commitments, and not understanding what you have in inventory and where it is located. Additional difficulties include finding reliable securities (Lopes et al., 2022; Rashid, 2016). A business cannot decide when to refill or which stocks to sell even without reliable goods information. Ineffective management practices are another issue. When handling and maintaining inventory, employing antiquated or manual processes could slow operations and make work more susceptible to failure (Khan et al., 2023a, b).

Customer preferences, interests, but also expectations are constantly changing. Leveraging warehousing spaces effectively will help a company identify when and why choices change; if similar things are hard to find, workers will lose resources (Yohannes et al., 2022). This may be removed by hiring an expert in inventory management. Inventory management is strongly related to the present managerial techniques and disputes among many stakeholders in healthcare supply chains. Healthcare inventory in hospitals includes the management of stock items utilized in patient safety. This comprises high-priced implants, surgical supplies, and low-value items with heavy usages, such as swabs and syringes. Since these higher-value consumables represent a sizeable amount of the hospital's budget, tracking, controlling, and accounting for this medical inventory is crucial for efficient financial management (Ahmed et al., 2022).

1.2 Research Objective

The research question will explore the role of inventory automation, distribution turnover and inventory control toward inventory management in hospital of Karachi. Meanwhile, the following objective will ponder upon the problem statement:

1.3 Research Questions

- To determine the effect on inventory automation on inventory management.
- To determine the effect of distribution turnover on inventory management.
- To determine the effect of inventory control on inventory management.

1.4 Significance of the Study

The smooth operation of healthcare organizations depends on good medical inventory management. This literature review will introduce the different inventory management tools to reduce inventory costs and boost overall effectiveness in healthcare supply chains. The applications of simulation, new technology to track healthcare goods, new management practices, optimization, and information exchange strategies have been covered in-depth throughout this literature study. This literature evaluation advances the field of study by offering one of the first in-depth investigations of managing inventory items in healthcare SC.

1.5 Scope of the Study

The study has aimed to determine the challenges of inventory management in the medical

supply chain of Pakistan. Three independent variables are added to the conceptual framework: inventory automation, distribution turnover and inventory control, with inventory management as the dependent variable. The medical supply chain of Pakistan has been taken as the target industry. In addition, the conceptual framework is based on Control Theory and Resource Based View. The research approach is quantitative deductive and collected 153 responses from the sample population. The data will be analyzed using the PLS-SEM data analysis technique.

1.6 Organization of the Thesis

The current study has been divided into five chapters. Chapter 1, known as the introduction, will provide all the introductory information about the variables and identify major problems. The significance and scope of the study will also be included in this chapter. The second chapter, known as the literature review, will provide relevant data in the literature and introduce the theoretical concepts and hypotheses of the study. Chapter 2, known as research methodology, will include research approaches, designs, techniques, data-gathering approaches and tools for data analysis. Chapter 4, data analysis, will give results and discuss them in detail. Chapter 5 will be the last chapter of this study. It will include a conclusion, practical recommendations and future research directions based on the study's limitations provided in the first chapter.

2. Literature Review

2.1 Theoretical Background

2.1.1 Control theory

Wiener developed control theory (CT) in 1948 to assess self-regulating systems that may be mechanical, humanistic or both. According to CT, a person's inner and outward controls cooperate to counter eccentric tendencies (Hashmi et al., 2021b). This theory illustrates the significance of feedback and its dynamic effects, which are crucial for production and inventory management (Nya & Abouaïssa, 2022). The three components of this theory: nonlinear deterministic systems, linear stochastic systems, and linear deterministic systems—are categorized to help with inventory control (Papanagnou, 2022). Systematic, comprehensive internal control is essential to every organization's improved and effective operations since it provides accurate, long-term management, financial reporting, and objective attainment (Taboada et al., 2022). These systems also ensure compliance with procedures, internal guidelines, plans, policies, regulations, and laws, reducing risks to the organization's reputation while minimizing damages.

Furthermore, CT is useful for comprehending supply networks' dynamic behaviour. In order to perform dynamical operations such as state-to-state transfers, unitary gate synthesis, or the creation of a dispersion relation in closed and open systems, control optimum also permits the tailoring of externally applied control fields (Dalgaard & Motzoi, 2022). As per the theory, the control problem should be formulated to minimize a cost function concerning a group of control fields used to direct the system during a control procedure (Zemzam et al., 2017).

According to CT, the rules for assessing control system gains should be followed while designing the inventory system. Several guidelines are utilized to optimize controllers' performance. These guidelines are for an ideal response based on a minimal error squared standard. Also, effective IM takes disruptions and changes into account, which weakens its competitiveness and lowers its revenue. According to CT, various control methods should be used in the field of IM, including optimum control and robust control, which allow the system to stay stable in the presence of uncertainties while minimizing the worst-case fluctuation in a feedback environment (Zemzam et al., 2017).

2.1.2 Resource-based view (RBV) theory

RBV theory was developed by Barney in 1991, emphasizing the concept of challenging-to-imitate firm qualities that contribute to exceptional competitive advantage and performance (Taher, 2012). This theory states that a firm is best positioned for long-term success if it has access to valued resources, is rare, is challenging to replicate, and is non-substitutable. These strategic resources can serve as the foundation for developing firm capabilities that, over time, may result in improved performance. Not among a company's products, in RBV's opinion, will be decisive or, consequently, competitive advantage generators (Fakhreddin & Foroudi, 2022). Resource immobility, or inability to compete with companies to acquire sources from other companies, together with resource heterogeneity, are the only factors that lead to competitive advantage (Beamish & Chakravarty, 2021).

According to RBVT, organizations are mainly composed of a specific set of resources, and the management of an organization's ability to combine those resources allows it to take advantage of market opportunities that improve its performance. Theoretically, a valuable resource must enable an organization to act to increase the firm's financial value by achieving high sales, low expenses, high margins, and other outcomes. The theory also emphasizes that resources are important when they help a firm develop or implement strategies that increase its effectiveness and efficiency (Gupta et al., 2018).

According to RBVT, organizations are collections of capabilities and resources. Organizations control and employ resources, which are firm-specific assets and capabilities, to create and put into practice their strategies (Bromiley & Rau, 2016). Firms should employ modern management techniques, including routine equipment maintenance, documenting the causes of machine failures, maintaining an accurate inventory management inventory, and so on (Donnellan & Rutledge, 2019).

2.2 Inventory Management

Businesses may decide which goods to order, when, and in what amounts with the help of inventory management. Inventory management follows a product from procurement through a sale (Ho et al., 2021). The method detects patterns and responds to them to ensure sufficient inventory to satisfy customer demands and proper notification of a lack (Panigrahi et al., 2021). The correct management of various types of assets is a significant concern for the service and manufacturing industries. According to previous research, the best-employed IM is the primary criterion for monetary gain maximization and price minimization (Ho et al., 2021). The primary responsibility of the IM manager is to provide customer satisfaction at the lowest possible cost. The focus of the lean manufacturing concept is on the application of technology to lower the level of inventory (Panigrahi et al., 2021). The lean principle's applicability could be constrained by demand fluctuation. Any company's financial performance will suffer if it has a high inventory ratio or retains surplus inventory (Nirmala et al., 2022).

According to Perez et al. (2021), IMP significantly affects a firm's performance. When businesses have addressed IMP strategies connected to shifting consumer demand, industry norms, forecasted sales, and available production capacity, effective IMP should have an impact on operating performances. A paucity of resource assistance hampers the implementation or execution of advanced stock-level techniques for better business performance. Inventory turnovers and manufacturing company unit costs are useful indicators of how well a firm's supply chain systems are integrated (Panigrahi et al., 2021).

2.3 Inventory Automation

An inventory software system called an automated inventory management system (IMS) automates several steps in the inventory management procedure. Retailers widely use inventory automation to simplify supply chain management and fulfilment. An automated system can track inventory throughout all sales platforms, its many locations, including the warehouse and retail locations, and through different links in the supply chain (Panigrahi et al., 2021). The whole inventory

will be shown, and one can then sort it by location. Most trendy shops (both offline and online) track and arrange their inventory, supply, and sales using automated inventory management. Retailers may manage inventories in real-time and make time-sensitive business choices thanks to an automated system (Tamer & Koklu, 2021). For instance, if one of the company's goods is nearing the specified reorder threshold and is running low on stock, the inventory management software will alert immediately (Panigrahi et al., 2021). Automated inventory should be used with other retail management tools, such as order management and point-of-sale (POS) software. Businesses must keep track of all sales made across all channels to achieve real-time inventory management accuracy (Tamer & Koklu, 2021).

2.4 Distribution Turnover

A new notion is one of the key ideas utilized to speed up just-in-time (JIT) manufacturing systems in delivery and transportation infrastructure (Panigrahi et al., 2021). Production may be carried out quickly and in small quantities using this JIT concept approach. This idea makes it easier to distribute goods following market demand, provides less storage space, and lowers inventory investment costs. Distribution turns aid in tracking the business' JIT delivery process (Essel, 2021; Panigrahi et al., 2021). The most difficult activity to record is incoming inventory to the business.

Nevertheless, today, most big and medium-sized businesses, after receiving shipments, record all incoming merchandise from the shop or port. It will be possible to anticipate operational efficiency if the inventory turnover within the company or sector is tracked. Indicators of business performance employed in inventory turnover include sales volume, profitability ratio, and asset tangibility in the commerce sector (Essel, 2021; Panigrahi et al., 2021). The distribution channel's sustained competitive strength (CS) determines a company's success. DT focuses on how the organization may effectively manage the network impact among its forward and backward systems. The business may gain competitive advantages depending on the ideal and distinctive distribution facilities and channels (Essel, 2021). Normally, when they have a variety of goods in their production system, businesses prefer to use a fully systematic DT approach. Manufacturing companies benefit from the profitable channel's competitive advantages (Panigrahi et al., 2021).

2.5 Inventory Control

A technological solution, an inventory control system, monitors and tracks a company's products across the supply chain (Sharma, 2022). Purchasing, shipping, receiving, warehousing, and returns should all be integrated and managed in one system (Hashmi et al., 2021a). The finest inventory control system will automate many manual transactions. The four categories are raw materials, step in the right direction, final products, upkeep, and repair, including refurbishment of the most frequently utilized inventory (Panigrahi et al., 2021). Knowing the company's inventory type allows them to manage it more effectively and practice better inventory control. Stock control, commonly referred to as inventory control, is the process used to ensure that a business has the right number of supplies on hand (Hashmi et al., 2020a). The company can meet customer demand and maintain cash available as provided as corporate and production controls are in place (Sharma, 2022). Systematic, comprehensive internal control is essential to every organization's improved and effective operations since it provides accurate, long-term management, financial reporting, and objective attainment (Panigrahi et al., 2021). These systems also guarantee adherence to protocols, internal guidelines, plans, policies, regulations, and laws, limiting threats to the organization's reputation while minimizing harm. Applying control theory to inventory management might be successful (Hashmi et al., 2020b; Sharma, 2022).

2.5.1 Relationship between inventory automation and inventory management

Automation is a branch of technology that deals with computers and mechatronics in producing goods and services. Manufacturing and service automation are the two primary categories of automation (Panigrahi et al., 2021). The major reasons why so many businesses automate are to

address issues with a labour scarcity, high labour costs, the need to boost productivity, and the need to shorten lead times for production (Savla et al., 2022). All of this suggests that automation reduces operating expenses and enhances customer service. In the supply chain, inventory may take on many forms, including an inventory of raw materials, work-in-progress (WIP), and finished items. Developing an effective inventory management system for their businesses is the main difficulty that supply chain managers encounter (Panigrahi et al., 2021). Several methods have been created to efficiently automate inventory management, ensuring that businesses keep the proper quantities of products to strike a balance between expenses and consumer pleasure (Savla et al., 2022). Thus, inventory management is crucial if a business wishes to balance efficiency and responsiveness. Panigrahi et al. (2021) concluded that inventory automation substantially affects inventory management. Hence, it is hypothesized that:

H1: Inventory automation has a positive effect on inventory management.

2.5.2 Relationship between distribution turnover and inventory management

Business success depends on the distribution channel's sustained competitive strength (CS). DT focuses on how the business may better manage the network impact across its forward and backward systems (Panigrahi et al., 2021). The company can acquire competitive advantages if it has the ideal and special distribution channels and facilities. When their manufacturing system includes various products, businesses often follow a completely systematic DT approach (Essel, 2021). Manufacturing companies benefit from the profitable channel's advantages in the marketplace. The main area of worry for the sector is logistical challenges (Panigrahi et al., 2021). These days, transferring completed goods and raw materials by rail is not the most affordable method of transportation, which creates several problems that require solutions like frequent deliveries, encouraging the movement of inventory, and frequent order placing (Pfohl, 2022). If the manufacturing sector has strong incoming and outbound logistics/distribution channels, it may increase its business and participate in a growth trend (Panigrahi et al., 2021). Some researches indicate that DT positively affects IM (Essel, 2021; Pfohl, 2022). Hence, it is hypothesized that:

H2: Distribution turnover has a positive effect on inventory management.

2.5.3 Relationship between inventory control and inventory management

A company's items are tracked and monitored along the supply chain using a technology solution called an inventory control system (Hashmi et al., 2021a). This technology allows purchasing, shipping, receiving, warehousing, and returns to be coordinated and controlled through a single system (Panigrahi et al., 2021). Businesses must properly keep their inventory using centralized inventory control systems to run their operations smoothly (Hashmi et al., 2021a). Manufacturing companies thrive when processes like sourcing supplies, issuing purchase orders, and moving goods are automated (Hashmi et al., 2021a; Sharma, 2022). Inventory control systems must be maintained for smooth SC operations since businesses are already experiencing several concerns connected to inaccurate inventory data, stocking problems, and poor decision-making (Panigrahi et al., 2021). The fundamental objective of inventory control is to reduce the blocking of economic means. It improves the firm's financial strength and reduces the unnecessary tying up of capital in excess inventory, which positively impacts IM (Sharma, 2022). Hence, it is hypothesized that:

H3: Inventory control has a positive effect on inventory management.

2.6 Research Framework

Figure 1 illustrates the research model.

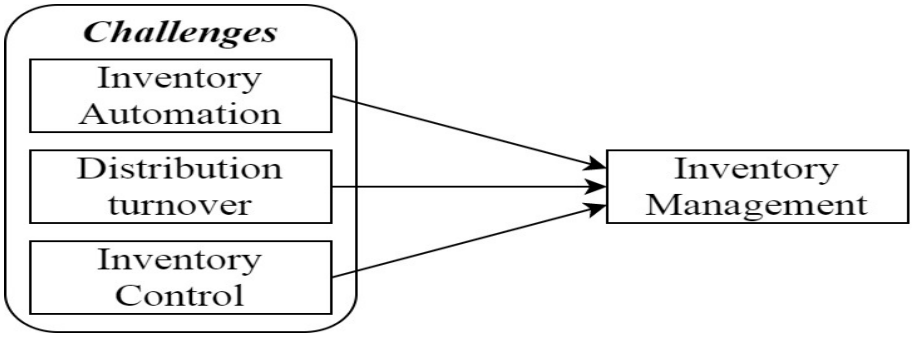

Figure 1: Research Model

Source: Literature

3. Research Methodology

3.1 Research Approach

Quantitative research aims to broaden knowledge and comprehension of the social environment. Using quantitative methods, researchers analyze human-affecting variables and events. Quantitative research yields objective facts that may be exhaustively explained using statistics and graphics (Rashid et al., 2021). In addition to receiving praise for producing a large sample size and conserving time and resources, the quantitative method has also been lauded for creating a significant sample. This approach may gather data through survey techniques or questionnaires. These discussions served as the foundation for the quantitative methodology used in this study. Another justification for this was that it made it simpler to generalize the study's findings to a bigger population.

3.2 Research Purpose

A goal of explanatory research has been created as a complete approach to doing research. For instance, explaining the study variables provides detailed and expanded information and better comprehension (Creswell, 2002). The ability to tackle previously unstudied problems that need special attention is a key advantage of using explanatory purposes (Sekaran & Bougie, 2010). Quantitative research has also extensively used the explanatory aim since it facilitates a thorough comprehension of the findings. Therefore, the explanatory purpose was used in this study since it helps to thoroughly and correctly describe the research aim.

3.3 Research Design

The non-experimental causal design examines study variables in light of a clear cause-and-effect connection. It examines, for instance, how numerous independent variables affect the dependent variables. In addition, this study design offers more thorough information on the connections than other study designs. The current study adopted a causal design, which improves the identification of cause-and-effect links and offers a stronger justification.

3.4 Target Population

In Pakistan, both public and private healthcare options are available. The private sector serves approximately 70% of the population. Healthcare facilities and private hospitals often surpass their public equivalents regarding patient satisfaction and overall healthcare quality. According to various sources, approximately 175,000 doctors are registered to serve the public. Over time, Pakistan's healthcare system now offers better care. Currently, 92% of people in rural areas and 100% of city dwellers have access to healthcare (Khan et al., 2022). Thus, the study's primary audience consists of CEOs and SC professionals working in Pakistani hospitals and healthcare facilities.

3.5 Sample Size

Krejcie and Morgan (1970); Memon et al. (2020) recommended a 50 + 8k formula for sample size estimation wherein k is the total variables in the model, i.e. four variables in the current study. Therefore, the study has estimated 82 minimum sample responses and, thus, collected 153responses from the sample population for data analysis.

3.6 Sampling Technique

Purposive sampling is a type of non-probability sampling in which researchers choose public members to participate in their surveys at their discretion. It is also referred to as judgmental, selective, or subjective sampling (Campbell et al., 2020). Using a non-probability sampling approach known as "purposive sampling," data was obtained from a population that may provide specific relevant information to guarantee that the information is as detailed as feasible (Rashid & Rasheed, 2023; Rasheed & Rashid, 2023). Data is gathered from those who fall inside this demographic because they are subject matter experts or industry leaders (Beck, 2013). To get the most accurate results, a considerable quantity of data is necessary for this study; hence non-probability purposive sampling was utilized.

3.7 Data Collection Procedure

The survey approach directly confronts the respondent's attitude, behaviour, and experiences based on the research components. Using a survey technique, a researcher may collect reliable data about the topic of interest. Moreover, the study subject under consideration affects the research procedure and provides some benefits to the researcher (Slattery et al., 2011). It enables the researcher, for instance, to get a huge dataset rapidly. Survey methodology may use various techniques, including questionnaires and interview processes (Christian et al., 2009). Hence, data was collected using a five-point Likert scale in in-person and online questionnaire surveys. This strategy was chosen since it made it simpler for the researcher to gather data.

3.8 Data Analysis Technique

A statistical method known as "multiple regression" can be used to calculate the connection between a dependent variable and two or more independent variables. The solution of ordinary least squares is used in multiple regression. In other words, it refers to a line where the (sum of squared) discrepancies between the predicted and actual values of the dependent variable are at a minimum (Sen & Srivastava, 1990). A multiple regression model shows which weighted combination of independent variables is optimal for predicting the dependent (or criterion) variable (Kelley & Bolin, 2013). Cronbach's alpha determines whether the additional variables measure the same notion. It assesses the items' level of internal reliability. It should be at least .70. The lower the alpha score, the more likely the variables are not measuring the same concept and should not be added together.

4. Results and Analysis

4.1 Descriptive Statistics of the Variables

Table 1 shows the descriptive statistics of the variables based on their mean and standard deviation/error. The table 1 shows that inventory automation has a total of 153 observations, with a minimum value of 2.8 and a maximum value of 5 with a mean value of 3.840 and a standard error of 0.052. Distribution turnover has 153 observations, a minimum value of 1.20 and a maximum value of 4.40, with a mean value of 3.5 and a standard error of 0.051. Inventory control has 153 observations, a minimum value of 1 and a maximum value of 5, with a mean value of 4.040 and a standard error of 0.077. Lastly, inventory management has a total of 153 observations, a minimum value of 1.40 and a maximum value of 5, with a mean value of 3.8 and a standard error of 0.050.

Table 1: Descriptive Statistics of the Variables

Variable Name	N	Min.	Max.	Mean	S. E.
Inventory Automation	153	2.80	5.00	3.840	0.052
Distribution Turnover	153	1.20	4.40	3.500	0.051
Inventory Control	153	1.00	5.00	4.040	0.077
Inventory Management	153	1.40	5.00	3.800	0.050

Source: SPSS output

4.2 Reliability Analysis

Table 2 shows the result of the reliability analysis using Cronbach's alpha test. Rashid et al. (2022a) suggested that the alpha coefficient should be higher than 0.70. The table 2 shows that distribution turnover has the least reliability of 72.7 percent, which is higher than the recommended threshold. Therefore, all variables have substantial internal consistency in the analysis.

Table 2: Reliability Analysis

Variable Name	N Items	Cronbach's Alpha
Inventory Automation	5	0.759
Distribution Turnover	5	0.727
Inventory Control	5	0.884
Inventor Management	5	0.881

Source: SPSS output

4.3 Regression Analysis

Table 3 shows the model summary of the regression equation. The table 3 showed 37.1 percent variability in the endogenous variable by all predictors in the model. This showed that inventory management had been substantially predicted in the regression model.

Table 3: Model Summary

Model	R	R2	Adjusted R2	SE of the Estimate
1	0.609	0.371	0.358	0.496

Predictors: (Constant), Inventory Control, Distribution Turnover, Inventory Automation

Source: SPSS output

Table 4 shows the outcome of ANOVA estimations in the regression model. The table 4 has shown that F-Statistics (21.570, 3) has been found as 29.248 and statistically significant at 5 percent; therefore, the regression line has acceptable model fitness.

Table 4: ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	21.570	3	7.190	29.248	0.000
Residual	36.628	149	0.246		
Total	58.198	152			

Dependent Variable: Inventory Management
Predictors: (Constant), Inventory Control, Distribution Turnover, Inventory Automation

Source: SPSS output

Table 5 shows the result of regression analysis for hypothesis testing. The table 5 shows that hypothesis 1 has been supported by the results that inventory automation ($\beta = 0.320$; $p < 0.05$) positively affects inventory management. Hypothesis 2 has been supported by the findings positing that distribution turnover ($\beta = 0.448$; $p < 0.05$) positively affects inventory management. Lastly, hypothesis 3 has not been supported by the results exhibiting that inventory control ($\beta = 0.063$; $p < 0.05$) has a positive but statistically insignificant effect on inventory management.

Table 5: Hypothesis-testing using regression analysis

	Beta	S. E.	t-Stats	Sig.	VIF
(Constant)	0.876	0.326	2.686	0.008	N/A
Inventory Automation	0.320	0.063	5.048	0.000	1.043
Distribution Turnover	0.448	0.065	6.938	0.000	1.030
Inventory Control	0.063	0.042	1.495	0.137	1.016

Source: SPSS output

5. Discussions, Conclusion and Recommendations

5.1 Discussions

The present study identified that inventory automation has a significant and positive relationship with inventory management. This result is also consistent with Panigrahi et al. (2021). The widespread use of automation in business is the need to solve difficulties with labour scarcity, high labour costs, increased productivity and shortened lead times (Savla et al., 2022). By employing the software, as per Panigrahi et al. (2021), computerized IMP utilized in organizations creates a methodical or sequential transcript of occurrences. Utilizing the "Malinvent" software offers efficient and effective inventory control inside production units. This shows that automation improves customer service and management while lowering operating costs. Inventory can exist in many forms along the supply chain, including the inventory of finished goods, work-in-progress (WIP), and raw materials.

Long-term survival and gaining competitive advantage to outperform rivals will be delivered by improved inventory management through effective stock management, inventory control methods, and inventory automation (Vaddadi et al., 2022). Many strategies have been developed to effectively automate inventory management, ensuring that firms maintain the right amounts of goods to strike a balance between the costs associated with doing business and customer satisfaction (Savla et al., 2022). Inventory management is, therefore, essential if a company wants to balance efficiency and responsiveness. The inventory software system known as an automated inventory management system (IMS) automates many steps in the inventory management process. Retailers widely use inventory automation to simplify supply chain management and fulfilment (Panigrahi et al., 2022a).

The study results showed that distribution turnover has a significant and positive relationship with inventory management. The results are in line with the study of Panigrahi et al. (2021). The reason might be that DT focuses on how the organization may effectively manage the network impact among its forward and backward systems. The business may gain competitive advantages depending on the ideal and distinctive distribution facilities and channels (Rashid et al., 2022b; Rashid et al., 2023). Normally, when they have a variety of goods in their production system, businesses prefer to use a fully systematic DT approach. All stock in a corporation is under the supervision of inventory management, as per Essel (2021).

From the supplier to the client, the entire process is under the control of supply chain management. Management of the items in a certain region is addressed by inventory control, which also covers warehousing and distribution management. The distribution channel's sustained competitive strength (CS) determines a company's success. SC businesses benefit from the profitable channel's competitive advantages (Panigrahi et al., 2022b). Backward integration poses several difficulties for businesses, including those related to raw material supply, delivery schedules, and the caliber of transportation services provided to businesses. There is the issue of bulk material transportation's forward integration area (Pfohl, 2022).

Additionally, all stock in a corporation is supervised by inventory management. From the supplier to the client, the existing system is under the control of supply chain management. Warehouse management, which is focused on the goods in a certain region, is a component of inventory control (Hashmi et al., 2021a). Organizations that manage their inventory well can supply the correct number

of items to meet customers' needs. There may be too much stock due to inadequate management, which increases the likelihood of decay, destruction, or a shift in the market (Essel, 2021).

Finally, the paper identified that inventory control has a significant and positive relationship with inventory management. This result is also consistent with previous researches. Inventory control has a very beneficial impact since better control will result in better organizational performance and management. The results concur with those of Hashmi et al. (2020a). Stock ordering and forecasting are handled through inventory management. Inventory management includes inventory control, usually referred to as stock control, which deals with the currently in stock. Effective inventory control requires information from acquisitions, reflows, transportation, warehousing, holding, receipt, service quality, asset protection, and attrition. Inbound logistics yields the greatest return from the least amount of inventory supplied while maintaining the satisfaction of the customers. Whenever done properly, it allows companies to assess the current status of their property, financial information, and account records (Panigrahi et al., 2021). Through inventory control, out-of-stock (stock out) issues can be prevented. To efficiently manage their operations, businesses must maintain their inventory by utilizing centralized inventory control systems (Hashmi et al., 2021a). Automated procedures for acquiring materials, sending purchase orders, and transferring items benefit large-scale businesses (Hashmi et al., 2021a; Sharma, 2022). Inventory control systems must be maintained for smooth SC operations, as per Panigrahi et al. (2021), since businesses are already experiencing several concerns connected to inaccurate inventory data, stocking problems, and poor decision-making (Panigrahi et al., 2021).

5.2 Conclusion

The study has determined the challenges of inventory management in the medical supply chain of Pakistan. Control theory and RBV have been taken as the two theories for the theoretical framework of the research. In addition, the conceptual framework is based on control theory and a resource-based view. The research approach is quantitative deductive, and 153 responses from the sample population. The data will be analyzed using the PLS-SEM technique. Data was collected using a five-point Likert scale in in-person and online questionnaire surveys. This strategy was chosen since it made it simpler for the researcher to gather data. This literature review has examined in-depth applications of simulation, new technologies to track healthcare commodities, new management methods, optimization, and information-sharing tactics. The present study identified that inventory automation, distribution turnover, and inventory control have a significant and positive relationship with inventory management.

According to the review and analysis, few articles highlight the significance of distribution turnover for inventory management. However, this study affirms that distribution turnover significantly impacts organizations' inventory management. DT has a good effect on the business and offers a variety of advantages, including reduced costs, high customer satisfaction, and increased sales volume. More operational efficiency of company operations is achieved by using inventory optimization strategies that place the goods in the proper area or location and deliver them at the proper time. Most businesses use automation techniques to handle three issues: lowering error, ensuring accuracy, and increasing productivity. Inventory control is necessary for a corporation to replace manual processes with rapid IM solutions that help simplify operations and prevent human mistakes.

It is clear from this study that IM presents significant challenges for large-scale industries like healthcare. For management and IM practitioners, determining the right inventory quantity in a company and, in turn, the best course of action is a challenging problem. The stock information must be kept systematically and obtained when needed to manage inventory properly. Every company must employ ICT-based or computer-based systems since performing these tasks manually is challenging.

5.3 Recommendations

Whether a firm is in manufacturing, the healthcare industry, construction, or retail, maintaining inventory is essential to its success. It is crucial to comprehend the general problems with inventory management. Business representatives have been searching for remedies to raise revenue and significantly boost customer satisfaction. Better inventory management is required for enhanced cash flow and decreased costs, regardless of where the inventory is kept: in a warehouse, across several sites, contracted with or drop-shipped from a supplier. Here, it is crucial to deal with trustworthy digital transformation services.

By installing a real-time inventory management system in business, customers can find goods promptly and have 100% accurate information about their position and availability. Also, the ability to serve customers more effectively will increase dramatically with such an accurate and full inventory. Additionally, an IoT-enabled inventory management system will assist warehouse employees in effectively managing merchandise and tracking it from when it enters until it leaves your facility. An inventory management system will speed up the procedure, provide the management with real-time data, and greatly increase inventory efficiency.

It differs from all goods or commodities that will be delivered; some will age over the period and be overlooked by inventory control. However, most chose new models instead of identifying and exploiting out-of-date resources when a new necessity arises. Expenses increase as a result, and more equipment is squandered. This problem can be effectively solved using a stock control system. The technique is highly useful for locating outdated or deceased equipment so that stocks can be recognized and used intelligently and correctly. The program will help inventory managers maintain stock control when such a system is in place. Because there are hundreds of things stocked, the personnel typically spend considerable time searching through the inventory for a specific item to sell. The wrong choice of materials reduces consumer pleasure and slows down sales. Each item will include laser-etched QR codes, RFID tags, or barcodes that will aid the workers in identifying it. The staff needs to have a scan. When the sensor touches the right goods, an indication lamp will illuminate. The employees can locate the item immediately and hand it to the sales team. As a result, transactions take less time to finish, and customers are satisfied. Purchasing resources only after selling the ones it already has will reduce the company's earnings. Poor management and stock control by managers are to blame for this problem. When done manually, a few materials will not be considered, and purchasing the same supplies once more would reduce the profit. The inventory managers may undertake routine stock audits to identify the utilized and unused supplies and increase inventory efficiency once a stock auditing system is in place. The business could generate profit and save time and money in this way.

Keeping a healthy inventory is essential to delivering the supplies on schedule. Non-standard techniques used by untrained employees lead to poor inventory and waste. Inventory errors and waste can cost much money and make customers unhappy. With the aid of reliable inventory management software, a business can easily manage its inventory. The staff's work will be made easier by streamlined procedures and processes, which will also aid the business in effectively managing its workforce. When commodities are dispersed among numerous sites, stocktaking may be rather challenging.

It is more challenging to ship packages when there is accurate information about the stocks from multiple locations, and distribution usually gets postponed. One of the ongoing problems that most businesses today are dealing with is setting up a centralized, digital single inventory hub system for stock holding and taking, which can greatly benefit a firm in terms of time and cost savings. Tracking and controlling the supplies coming into and going out of the enterprise premise is easy and effective since the company has total control over its inventory and data in a single location. A comprehensive solution with all the capabilities will help an organization avoid material loss and achieve greater efficiency through full inventory management rather than choosing distinct solutions for each step.

5.4 Future Research Suggestions

The current study has quite a few limitations, which lead to future research directions. Firstly, the data was only gathered from the healthcare sector of Karachi, Pakistan; hence the results cannot be generalized and extended to other industries. This research only looked at four factors, but many more may be used to discuss the results. This research did not use absolute values but instead depended on impressions. The research also had limitations, such as its geographic restriction to Karachi city so future researchers might use some other cities/countries for further investigations.

Further research may be done on the relationship between knowledge of inventory management (KIM) and the operational performances of the firm. A larger sample size should be taken into account in future research. This study paradigm can be duplicated for more definitive results in a cross-cultural and cross-national setting. The study has focused on the perspective and context of developing economies; therefore, generalizability to developed countries may not be undertaken. Moreover, there is no mediator/moderator, which could become another strand to work on by the potential researchers. Future research should also focus on mixed methodology for an in-depth understanding of the phenomenon. At the same time, the longitudinal design also helps to gauge the time effect on the horizon.

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