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Inventory Management Optimization via Forecasting, IT Infrastructure, Technology Integration, and Supply Chain Resilience: Exploring the Mediating Role of Decision-Making Effectiveness

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ABSTRACT

Inventory management is integral to ensure that products are available at the right time which enhance the company's operational efficiency. To optimize this, the study objective was to test the impact of IT infrastructure, demand forecasting, technology integration, and supply chain resilience on inventory management with the mediating effect of decision-making effectiveness of manufacturing companies. Cross-sectional quantitative data were collected from 260 employees of manufacturing companies using a convenient sampling technique. Hypothesis results show that IT infrastructure, demand forecasting, technology integration, and supply chain resilience have a positive and significant impact on inventory management. Decision-making effectiveness also significantly increases inventory management. Decision-making effectiveness also mediates among IT infrastructure, demand forecasting, technology integration, supply chain resilience, and inventory management of manufacturing companies. The study results indicated that increasing technological awareness and supply chain resilience could significantly improve inventory management in manufacturing companies. Furthermore, strengthening the effectiveness of decision-making also strengthens these impacts through serving as a key mediating mechanism. This study uniquely integrates multiple technological and strategic factors into one model, highlighting the mediating role of decision-making effectiveness in improving inventory management.

1. Introduction

Inventory management (IM) is a basis to increase the manufacturing company's operational efficiencies and competitiveness [4]. It helps to track the raw material, work in process, and finished goods in the store [13]. Effective IM minimizes the cost of operations, which ensures the availability of products when needed [52]. In today's globalized economy, manufacturers face increasing challenges such as supply chain disruptions, fluctuating customer demand, and shrinking product life cycles [37]. In other words, poor inventory practices could result in overstocking, obsolescence,

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and loss of sales, which leads to reduced profitability and operational inefficiencies [56]. To overcome these challenges, Petropoulos et al. [76] emphasized that effective inventory control directly correlates with firm performance from a routine operational function for gaining a competitive edge. Hence, understanding IM is essential for manufacturing firms to maintain smooth production, lower costs, and respond to dynamic market needs. Hence, the study focused on IM because it is essential for manufacturing companies.

To enhance IM, firms increasingly rely on several key capabilities and technological enablers. Demand Forecasting (DF) is fundamental to aligning inventory with future market needs [44]. By employing historical sales data, market intelligence, and advanced predictive analytics, firms can anticipate demand more accurately, reducing uncertainty and inventory errors [44]. Accurate forecasting supports optimized reorder points, reduced safety stock, and efficient production planning [95]. Similarly, IT infrastructure plays a foundational role by providing real-time data, automated tracking, and seamless information exchange across departments and partners [46]. Kros et al. [58]; [100] studies found that robust IT capabilities enable firms to manage inventory more precisely foster collaboration with suppliers, and support just-in-time (JIT) systems. Technology Integration (TEI) further enhances inventory practices by connecting various software systems such as ERP, procurement, warehouse management, and customer order platforms into a cohesive and synchronized network [89]. Integration minimizes data silos, reduces lead times, and improves inventory accuracy across multiple locations. In other words, supply chain resilience (SCR) focuses on a firm's ability to resist a proper recovery of goods [25]. In the face of global uncertainties such as pandemics, natural disasters, and geopolitical issues, resilience ensures inventory continuity through agility, flexibility, and risk mitigation strategies [63]. Together, these four capabilities DF, IT infrastructure, TEI, and SCR form the backbone of an efficient, responsive, and robust inventory management system. Therefore, the study focused on these four factors to affect the IM of manufacturing companies.

Nonetheless, the effectiveness of these capabilities in improving IM is significantly influenced by the quality of organizational decision-making. Decision-Making Effectiveness (DME) acts as the cognitive and strategic filter through which technological and operational capabilities are translated into actionable outcomes [17]. DME refers to a firm's ability to interpret complex data, evaluate alternatives, and make proactive choices that align with strategic objectives [11]. High-quality decision-making can reduce stockouts, avoid overproduction, and optimize inventory turnover ratios [31]. Gami et al. [39] also suggested that DME is enhanced when managers are supported with real-time data dashboards, predictive analytics, and collaborative decision environments. Additionally, cross-functional integration, leadership training, and scenario planning also contribute to effective decision-making [20]. In this context, DME not only directly impacts inventory outcomes but also mediates between DF, IT, TEI, SCR, and inventory performance. Therefore, the study used DME as an intervening variable.

With the significance of the above variables for increasing the IM, prior studies still have various gaps. For instance, prior studies were mainly concentrated on individual effects of IT infrastructure, TEI, SCR, and DF on the IM with a limited attention on the combined effect of these factors in one framework [27; 47; 61; 91]. Therefore, this study contributed to the literature with the combined effect of TEI, SCR, DF, and IT infrastructure on IM. Furthermore, prior studies also limited attention to the impact of exogenous variables on IM [90]. So, current research added literature in the context of IM of manufacturing companies [54]. In addition, prior studies also have inconsistent findings on IT infrastructure, TEI, SCR, and DF, that is also supports conducting a study in other contexts [26; 45; 50; 88]. As prior studies on DME have a direct effect on IM or firm performance, and previous studies have inconsistent findings [93; 101]. Therefore, this contributed to the literature with the mediating effect of DME. Moreover, prior studies mainly concentrated on a specific country with limited attention on general manufacturing companies, which is also limiting the scope of the study [33; 73]. Consequently, current research contributed to the literature in the context of manufacturing companies with the specific objective to test the impact of IT infrastructure, DF, TEI, and SCR on IM with the mediating effect of DME.

The practical significance of this study lies in its comprehensive approach to enhancing IM practices in manufacturing companies by examining the combined and mediated effects of key operational and technological factors. By simultaneously analyzing DF, IT infrastructure, TEI, and SCR, the study provides manufacturing managers with a holistic framework to optimize inventory processes. Unlike fragmented past research, this integrated approach allows decision-makers to understand the synergistic impact of these variables rather than viewing them in isolation. Furthermore, the study introduces DME as a mediating factor, offering practical insights into how better-informed, data-driven decisions can amplify the benefits of IT systems and supply chain capabilities on IM. This is particularly relevant for firms seeking to enhance agility, reduce waste, and increase service levels in highly volatile environments. The findings serve as a strategic guide for practitioners to invest not only in technology and infrastructure but also in building internal decision-making competencies, ultimately leading to more resilient and efficient inventory systems tailored to the broader needs of manufacturing operations. Further research has four sections, namely the literature review. Then research methodology from research design, sampling, and population perspectives was discussed. Then data analysis from demographic and inferential perspectives was discussed. Lastly, the discussion of study findings was highlighted and supported by previous studies.

2. Literature Review

2.1 Demand Forecasting and Inventory Management

Demand forecasting (DF) is a strategic process that includes historical data, market trends, and future demand for consumers using a statistical model [104]. This plays an important role in coordinating the supply chain operation with customers' expectations by estimating the demand exactly in advance. It is fundamental to deliver expected chain efficiency, especially in inventory management, where a balance between demand and supply is important in order to avoid redundant or a lack of stock [96]. An accurate forecasts allow companies to adjust order amounts, reduce the lead time, and manage security shares effectively [34]. Empirical researches strongly support the role of demand forecast to increase goods performance. Saleh [81] showed that organizations that use advanced forecasting methods reduced storage levels and improved service levels. Gupta and Agarwal [48] empirically observed that companies that incorporated real-time sales and promotional data in their forecasts achieved better share accuracy. Salari et al. [80] also demonstrated that the exact forecast led to the effective inventory that delivers in retail settings. In addition, Tadayonrad and Ndiaye [91] emphasized that the accuracy of the forecast was directly related to the cost reduction in the inventory management systems. In viewing previous studies, the hypothesis is below,

H1: Demand forecasting significantly affects inventory Management.

2.2 IT Infrastructure and Inventory Management

Information technology (IT) infrastructure refers to the overall hardware, software, data storage, and communication technologies that support business operations and decision–making [32]. When it comes to inventory management, a strong IT infrastructure facilitates real-time monitoring, automatic share repayment, and improves data visibility in the supply chain. Integration of IT systems helps organizations that require changes, streamlines logistics, and react quickly to reduce human errors in warehousing [72]. Many empirical studies confirm the positive effect of IT infrastructure on inventory management. Bejlegaard et al. [10] found that companies with more IT increase their inventory control through coordination and lower costs. Amajuoyi et al. [7] revealed that flexible IT infrastructure supports adaptive product systems capable of responding to dynamic market needs. Rubel [79] explained that ERP and inventory management systems increased storage accuracy and operating efficiency. Chopra et al. [24] emphasized that IT competition chains experienced minor disruptions and more reliable stock levels. Fang and Chen [35] also confirmed that a strong IT allowed close integration between goods systems and supplier networks contributed to customized inventory control. These studies emphasized that IT infrastructure also increases the inventory management and have the following hypothesis below,

H2: IT infrastructure significantly influence to inventory management.

2.3 Technology Integration and Inventory Management

Technology integration (TEI) involves integrating advanced technologies to improve business operations and decision-making [60]. In inventory management, the integration of such technologies improves data transparency, enables the truthfulness of stock levels, automates processes such as reorganization, and helps in the forecast analysis for storage forecasting [69]. Rahman et al. [77] empirically found that IoT and data analysis improved the performance and warehousing of the warehouse. Tan and Sidhu [92] reported that the IT infrastructure system reduced deviations in storage registers and improved filling cycles. Vaka [96] also emphasized that TEI increased responsibility for demanding change, reduced stock and surplus. Monino [65] showed that companies using integrated IT systems reduced product costs, which increases the effectiveness of inventory management. These studies enforced that TEI increases the inventory management system and hence has the following hypothesis below,

H3: Technology integration significantly influences to inventory Management.

2.4 Supply Chain Resilience and Inventory Management

The supply chain resilience (SCR) refers to the supply chain process which is maintains a continuity of flexible operations, while maintaining the continuity of Abdulrahman and Yuvaraj [2]. Flexible SCR use strategies such as surplus, flexibility, and visibility to ensure the strength of inventory management systems under uncertainty, such as delay in the supply, delay in offers, natural disasters, or geopolitical problems [47]. Flexibility in the supply chain enables companies to reduce stock risk by using the stock strategies in real time. Bower [16] demonstrated that companies with flexible SCR maintained a stable warehouse level. Abdulrahman and Yuvaraj [2] further emphasized that redundancy and agility improved the stock continuity during transport and production disorder. Santos et al. [84] found that the identification of the risk and adaptive storage policy contributed to better storage results, which helps to manage the inventory. De Martini [29] also found that companies with flexible logistics networks quickly recovered the storage flow after disturbance, which increases the inventory management. Kumar et al. [59] also supported that the flexibility, combined with active decision-making, lack of significant fixtures under the shock of the large supply chain, maintains the inventory in a better way. Another empirical study of Zhou et al. [103] also found the significant SCR influence on the inventory management, and hence study has hypothesis below,

H4: Supply chain resilience significantly influences to inventory management.

2.5 Decision-Making Effectiveness and Inventory Management

Decisional efficiency (DME) refers to the process of creating data-informed and reference-adapted alternatives, at the time of increasing organizational performance [57]. Inventory management includes analysis of stock data in effective decision-making, forecast development and procurement, stock management, and make informed decisions on rear levels [67]. This is especially important in complex and dynamic markets where incorrect decisions can lead to stock or excessive fixtures. The role of DME in inventory management is widely supported in empirical literature. Zhou et al. [103] found that organizations that used data analysis for decision-making had high inventories. Gade [38] showed that improvement in data-driven decision making reduces accuracy and minimal holding costs. Bousdekis et al. [15] concluded that structured decision-making processes led to more efficient storage control and low operating disorder. Acciarini et al. [3] emphasized that cognitive preconceptions in management decisions can adversely affect storage decisions, but these effects were reduced by analytical frameworks. Mittal [64] highlighted the contribution from decision support systems for inventory optimization, enabling managers to make better stock-related decisions in real time which helps to manage the inventory control and hence the study has the following hypothesis below,

H5: Decision making effectiveness a significantly influence to inventory management.

2.6 Mediating role of decision-making effectiveness

Demand forecasting involves projecting future customer demand based on historical trends, market behavior, and analytical models [8]. It plays a fundamental role in inventory management through firms to support procurement with anticipated needs. However, the effectiveness of demand forecasting is often contingent upon managerial decision-making skills. DME is defined as the ability to make timely, data-driven, and contextually appropriate choices [74]. When decision-makers interpret forecasts accurately and act on them efficiently, the benefits of demand forecasting are maximized, leading to reduced stockouts and excess inventory [8]. Chen et al. [22] highlighted that forecasting only enhances performance when paired with sound managerial judgment. Tadayonrad and Ndiaye [91] found that demand forecasts were more reliable when interpreted by experienced managers who adjusted for market fluctuations. Jasiński [51] showed that data-driven decision-making improved the responsiveness and accuracy of inventory systems based on demand predictions. Thongam [94] also argued that managerial biases could distort forecast utility, but structured decision-making frameworks mitigated these effects. Verma [97] also affirmed that effective decision-making transforms raw forecasting outputs into actionable strategies, improving stock planning and overall supply chain efficiency.

Furthermore, IT infrastructure which comprises software, hardware, databases, and communication technologies, facilitates data collection, integration, and automation in inventory management systems [8]. This infrastructure enables real-time tracking, demand planning, and responsive replenishment. However, the value derived from IT systems is significantly increases the DME. Cheng [23]; Olayinka [71] studies further highlighted that managers must be capable of utilizing the available IT tools to interpret data, recognize trends, and make timely decisions, which could lead to improving the inventory management. Sallam et al. [82] study also emphasized that IT infrastructure alone does not ensure success in inventory management, but it also increases with the improvement of managers' decision-making. Teerasoponpong and Sopadang [93] confirmed that IT infrastructure supports to the managers in proper decision support systems to increase for inventory optimization.

TEI in inventory management involves embedding tools like IoT, RFID, ERP systems, and cloud platforms to enhance operational efficiency and data accuracy [92]. These technologies enable organizations to automate stock tracking, streamline reordering, and predict inventory needs. However, the benefits of such integration are fully realized only when managers can effectively analyze and act upon the information provided by these technologies [8]. Thus, TEI played an integral role in increasing the DME by ensuring that technological inputs translate into intelligent inventory actions. Al-Khatib [6] found that while IoT enhanced visibility, managers' ability to act on this data determined inventory outcomes. Villacis et al. [98] highlighted that analytics tools require strong decision-making to implement meaningful inventory strategies. Zhao and Tu [102] concluded that ERP systems supported decision-making but required active managerial involvement for full inventory optimization. At last, SCR also increase the DME of the organizations to increase the firms inventory management [55]. SCR maintains consistent inventory flow during events such as demand surges, supplier delays, or geopolitical disruptions [63]. Boonlua et al. [12] study also found that SCR strategies only improved inventory management when managers proactively responded to disruptions. Settembre-Blundo et al. [86] showed that flexible supply chains performed better during crises, especially when coupled with informed decision-making. Olaleye et al. [70] study also argued that resilience is only valuable if managerial responses are swift and data-informed. These previous studies highlighted that when the DME of any product is increased, then inventory management is also increased. Therefore, this study used the DME as a mediating variables and has the following hypothesis below,

H6: Demand forecasting significantly influence to inventory management with mediating effect of decision making effectiveness.

H7: IT infrastructure has a significantly influence to inventory management with mediating effect of decision making effectiveness.

H8: Technology integration significantly influence to inventory Management with mediating effect of decision making effectiveness.

H9: Supply chain resilience significantly influence to inventory management with mediating effect of decision making effectiveness.

3. Research Framework

Research framework in Figure.1 established based on previous gaps which are existed in the extant literature.

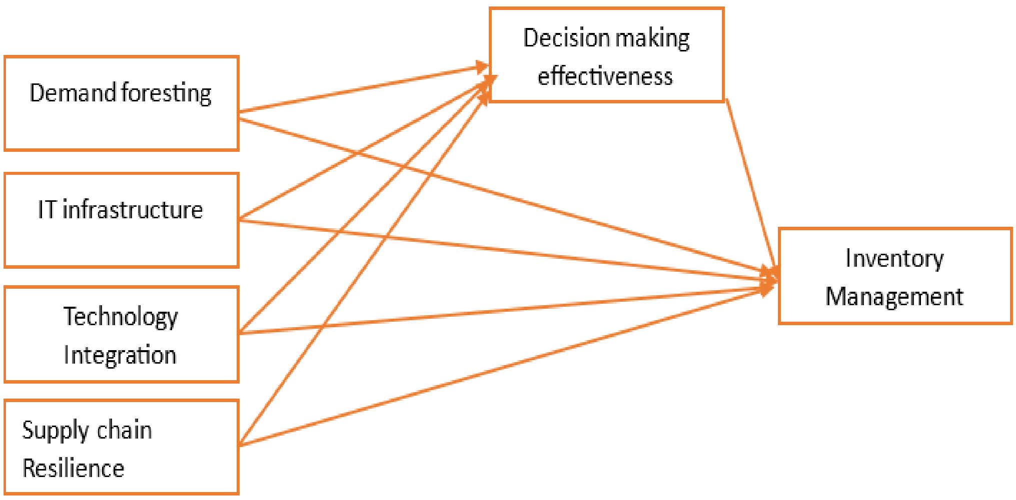

Fig.1: Research Model

Framework comprises of three types variables. Demand forecasting, IT infrastructure, technology integration and supply chain resilience are independent variables. Decision making effectiveness is a mediating variable. While, inventory management is a dependent variable.

4. Research Methods

4.1 Research Design and Sampling

The study objective was to test the impact of IT infrastructure, demand forecasting (DF), technology integration (TEI), and supply chain resilience (SCR) on inventory management (IM) with the mediating effect of decision-making effectiveness (DME) of manufacturing companies. For this purpose, a quantitative research approach used. Quantitative research provides objective, measurable, and generalizable insights through statistical analysis of numerical data [41]. Furthermore, cross cross-sectional research design was employed to test the study objective. Cross-sectional research design is important for capturing a snapshot of relationships among variables in one time, allowing for efficient comparison and analysis across groups [62].

In research population comprises the entire group of individuals that show the common characteristics in the study [19]. In the context of this study, the population includes employees working in manufacturing companies, as they are directly involved in supply chain and inventory management practices and thus represent relevant informants for the research variables. The sampling is an integral factor of the population, which allows any researcher to divide their larger group into smaller groups [85]. There are two sampling methods, Probability and non-probability, which help ensure that the selected sample is accurate [87].

From the non-probability sampling, a convenient sampling technique was employed where participants were selected based on their accessibility. It is normally used in social science research due to its cost-effectiveness [5]. A total of 350 survey instruments were circulated using the self-administered method. The use of this method ensured participant privacy and reduced interviewer bias, increasing the chances of honest responses [28]. Out of the 350 questionnaires, 278 were returned, which indicates a strong response rate, which reflects good participant engagement. Among the returned questionnaires, 260 were found valid for analysis after screening for completeness and consistency. The final sample size of 260 respondents is robust enough to ensure the reliability of the statistical analysis and model testing [43]. The collected data was entered in the Excel sheet for analysis.

4.2 Questionnaire Development and Data collection Procedure

The survey instrument was taken from prior literature. Decision-making effectiveness comprises from 3 items of [17]. Demand forecasting comprises from 3 items of [78]. Information technology integration comprises from 5 items of [14]. In other words, inventory management comprised 4 items [66]. IT infrastructure comprises from 4 items of [18]. Lastly, supply chain resilience comprises 5 items of [9]. Each of the items ranked on 5 point Likert scale. The questionnaire was distributed among respondents through self-administered questionnaires. One week was given to each respondent if respondents was unable to given response on time. If the respondent was unable to fill out the questionnaire in a week then questionnaire was discarded.

5. Data Analysis and Results

5.1 Respondents Profile

This section shows respondents demographic profile of 260 employees in manufacturing. From the gender perspective, there were 68.5% belongs to males and the remaining 31.5% were females. The majority of respondents fall within the 31–40 years age group (43.1%), followed by 20–30 years (28.5%), indicating a relatively young to mid-career workforce. In terms of education, over half of the respondents hold a master's degree (53.1%), while 39.2% have a bachelor's degree, reflecting a highly educated sample. Regarding organizational roles, a significant portion of respondents are managers (44.6%), suggesting that the data reflects perspectives from individuals with decision-making authority, complemented by supervisors (33.8%) and executives (21.5%). The respondents are distributed across three key manufacturing sectors: textile (36.9%), automotive (32.3%), and electronics (30.8%), providing a balanced representation of different industry segments. This demographic diversity enhances the generalizability of the findings across the manufacturing sector. The above results are depicted in the Table.1 below,

Table 1
Demographic Profile of Respondents (N = 260)

Demographic Variable	Category	Frequency	Percentage (%)
Gender	Male	178	68.5%
	Female	82	31.5%
Age	20 to 30 Yrs	74	28.5%
	31 to 40 Yrs	112	43.1%
	41to 50 Yrs	54	20.8%
	Above 50	20	7.7%
Education	Graduation Degree	102	39.2%
	Master Degree	138	53.1%
	Ph.D.	20	7.7%
Position	Executive	56	21.5%
	Supervisor	88	33.8%
	Manager	116	44.6%
Industry Sector	Automotive	84	32.3%
	Textile	96	36.9%
	Electronics	80	30.8%

5.2 Measurement Model

Hypotheses were tested in two models namely the measurement and structural model. The measurement model defines how latent variables are measured by observed variables in a Partial Least Squares (PLS)-Structural Equation Modeling (SEM) using SmartPLS 4. Cronbach’s Alpha above 0.70 is considered acceptable [68]. Factor loading values must be above 0.5. Below 0.5 values were deleted from the model 2. CR provides a more precise reliability estimate by accounting for the actual factor loadings of items; a CR value above 0.70 denotes good reliability [36; 49]. AVE further assesses the construct indicators' variance explained, where a value above 0.5 indicates that the construct adequately explains the variance in its indicators [36]. In this study, all construct are exceeding their respective thresholds.

Table 2
Reliability and Validity Results

Construct	Alpha	CR	AVE
DF	0.871	0.905	0.659
IT	0.884	0.916	0.684
TEI	0.868	0.902	0.648
SCR	0.890	0.919	0.675
DME	0.895	0.923	0.698
IM	0.902	0.928	0.712

Note: DF-demand forecasting, IT infrastructure-IT, technology integration-TEI, supply chain resilience-SCR, Decision making effectiveness-DME, inventory management-IM

These results confirm that the measurement scales are both consistent and valid, ensuring that the constructs accurately represent the underlying theoretical concepts for further analysis [49]. Table.2

and Figure 2 shown above results.

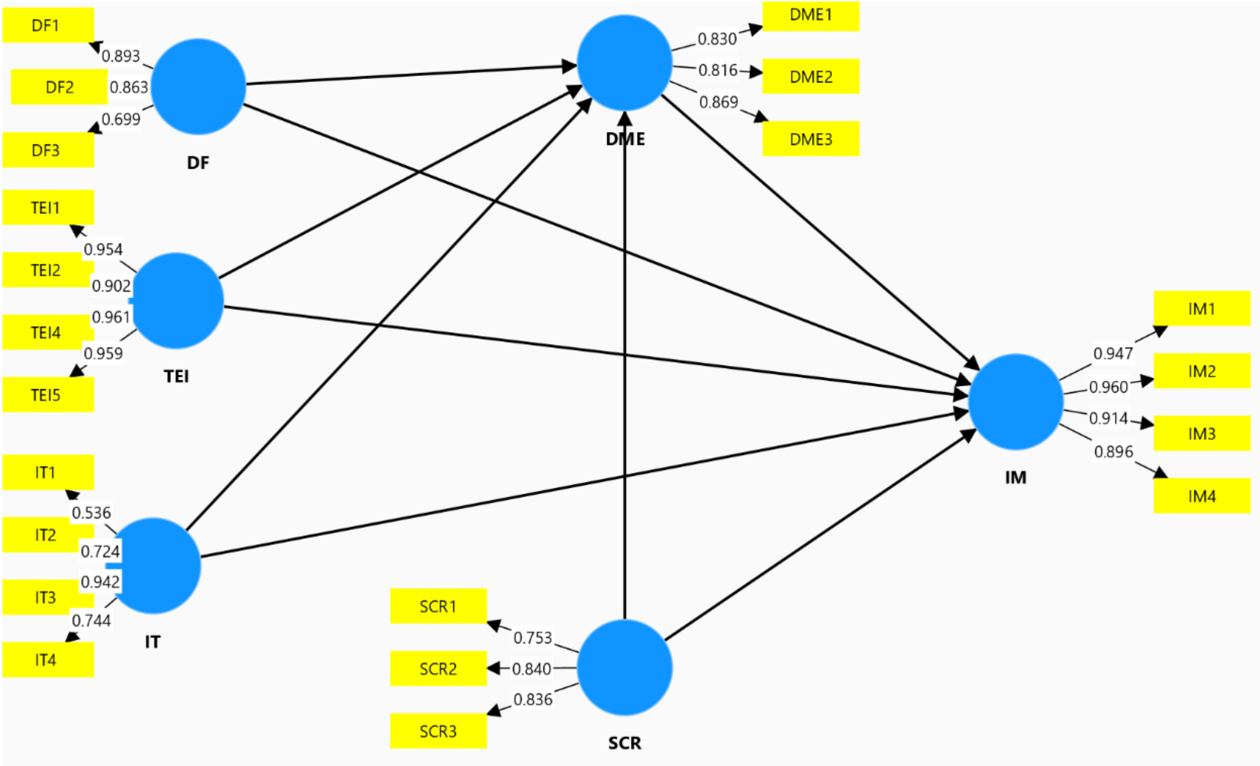

Fig.2: Outer Loadings

The discriminant validity which represents that each construct correlation should be different from other constructs. It could assessed from fornell and Larcker, cross loadings and as well as from Heterotrait Monotrait Correlation (HTMT) [1]. From these criteria's current study reported the results of Fornell-Larcker criterion, show that the square root of the AVE for each construct (displayed on the diagonal) is higher than the correlations with other constructs in the corresponding rows and columns which highlights construct convergent validity.The above result is depicted in Table 3.

Table 3
Fornell-Larcker Criterion

Construct	DF	IT	TI	SCR	DME	IM
DF	0.812					
IT	0.576	0.827				
TEI	0.549	0.604	0.805			
SCR	0.562	0.518	0.493	0.822		
DME	0.589	0.611	0.601	0.628	0.835	
IM	0.672	0.643	0.639	0.661	0.689	0.844

5.3 Model Fitness

In the measurement model, model fitness indicated the overall fitness of the model. The SRMR threshold value is less than 0.08 and study SRMR value is 0.063 that is below the recommended threshold. The NFI and CFI values of 0.914 and 0.938, which are higher than 0.90 as shown the fit analysis [49]. The Chi-Square to degrees of freedom ratio (2.34) that is less than 3 that is showing the fit analysis. Lastly, the RMSEA value of 0.059 is below 0.08 that also shown the fit analysis. Overall, these indices confirm that the model fits the data well and result is predicted in Table 4.

Table 4
Model Fit Indices

Fit Index	Recommended Value	Obtained Value
SRMR	< 0.08	0.063
NFI	> 0.90	0.914
Chi-Square/df	< 3.00	2.34
RMSEA	< 0.08	0.059
CFI	> 0.90	0.938

Note: "SRME-Standardized Root Mean Square Residual, NFI-Normed Fit Index, CFI-Comparative Fit Index, RMSEA-root mean square error"

5.4 Hypothesis Results

After the measurement model, the next process is hypothesis testing employing the structural model. In the structural model, demand forecasting (DF) shows a positive and significant impact on inventory management (IM) (β = 0.316, t = 4.94). Similarly, IT Infrastructure positively and significantly influences IM (β = 0.284, t = 4.90), which indicates that well-established technological frameworks facilitate better inventory tracking and control. Technology Integration (TEI) also exhibits a significant positive impact on IM (β = 0.278, t = 4.56), which highlights how integrating advanced systems enhances inventory accuracy and responsiveness. Supply chain resilience (SCR) also contributes positively and significantly to IM (β = 0.295, t = 4.68). Decision-making effectiveness (DME) represents the strongest positive significant impact on the IM (β = 0.352, t = 6.18), and this result emphasizes the critical role of sound decision-making in improving IM. Further mediating effect results also show that significant mediating effect of DME among all independent and dependent variables. These results indicate that effective decision-making processes amplify the benefits of these key factors, leading to more efficient inventory management in manufacturing firms. All hypothesis result is predicted in Table 5 and Figure 3.

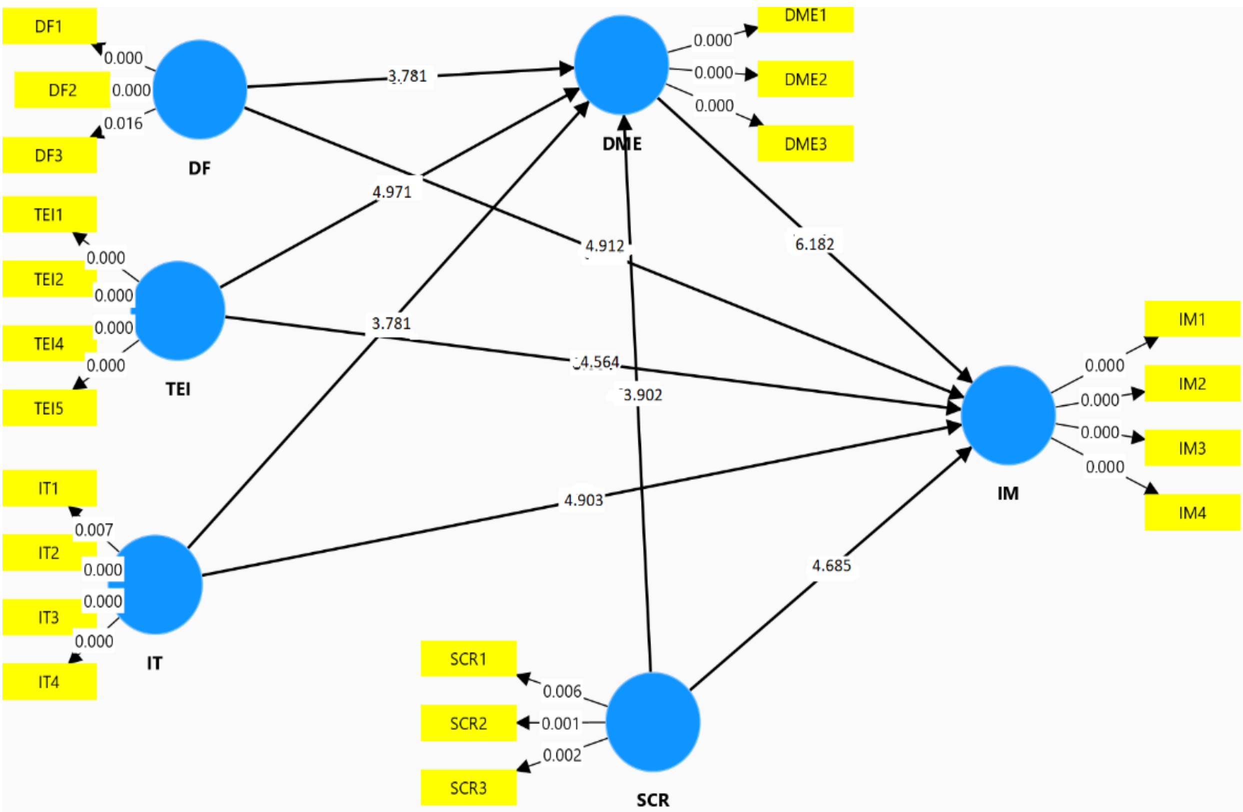

Fig3: Structural Model

Table 5
Hypothesis Testing Results

Path	Original Sample	Standard Deviation	T Statistics	Result
DF → IM	0.316	0.064	4.912	Supported
IT → IM	0.284	0.058	4.903	Supported
TEI → IM	0.278	0.061	4.564	Supported
SCR → IM	0.295	0.063	4.685	Supported
DME → IM	0.352	0.057	6.182	Supported
DF→ DME → IM	0.171	0.048	3.563	Supported
IT→ DME → IM	0.159	0.046	3.452	Supported
TEI → DME → IM	0.144	0.049	2.942	Supported
SCR→ DME → IM	0.166	0.050	3.321	Supported

6. Discussion

The study objective was to test the impact of IT infrastructure, demand forecasting (DF), technology integration (TEI), and supply chain resilience (SCR) on inventory management (IM) with mediating decision-making (DME). Hypothesis results show that DF positively and significantly improves IM, which shows that accurate demand prediction enables manufacturing firms to align their inventory levels effectively with market needs. Historically, it has been highlighted that if the companies have good forecasting, then it could increase the inventory control, which also means that manufacturing firms are focusing on DF to optimize their inventory control. This is consistent with Pasupuleti et al. [75], who emphasized that DF enhances overall inventory accuracy and operational agility. Likewise, Chandran and Khan [21] highlighted that firms employing statistical forecasting models and market intelligence are better equipped to balance supply and demand. To strengthen DF capabilities, manufacturing companies should implement AI-driven forecasting models, integrate point-of-sale (POS) between sales, operations, and supply chain teams. This holistic approach will make demand forecasts more accurate and actionable in enhancing overall inventory performance.

Further results reveal that IT Infrastructure has a significant impact on IM, highlighting the foundational role of information technology in modern inventory practices. In the context of manufacturing firms, a strong IT infrastructure ensures visibility through the supply chain by enabling automated inventory tracking, real-time updates, and integration of enterprise systems. This facilitates quicker decision-making, minimizes human error, and promotes inventory optimization. Yang et al. [100] supported the same results and found that firms with strong IT capabilities can implement better inventory systems more effectively, contributing to cost savings and operational excellence. Similarly, Ganbold et al. [40] found that IT integration supports effective data exchange with suppliers and customers, leading to reduced lead times and better inventory control. To maximize these benefits, manufacturers should invest in scalable ERP platforms and RFID systems. These technologies help not only in monitoring inventory levels but also in analyzing usage patterns and predicting future inventory needs. IT infrastructure should thus be viewed as a strategic asset that directly contributes to inventory efficiency and long-term competitiveness.

Technology Integration (TEI) also demonstrates a strong and significant impact on IM, which is indicating that seamlessly connected systems and technologies significantly enhance the performance of inventory-related processes. In manufacturing, the integration of production planning systems, inventory control tools, procurement software, and customer order management platforms raises real-time synchronization and information flow. This integration breaks down departmental silos, reduces lead times, and ensures consistency in stock levels across locations. Fang and Chen [35] also found the same results and highlighted that integrated information systems enhance responsiveness and flexibility, especially in volatile and demand-sensitive markets.

Moreover, Salwa and Zulfikri [83] also asserted that TEI leads to improved coordination and reduces the bullwhip effect in supply chains. These empirical findings highlighted that manufacturing firms can achieve this integration through APIs, middleware, and by adopting interoperable platforms such as SAP or Oracle. By embedding integration throughout the supply chain, firms can elevate the agility, accuracy, and resilience of their inventory management systems, which leads to improved competitive advantage.

Furthermore, SCR also significantly contributes to increasing the IM. This finding indicates that resilient supply networks are essential for maintaining uninterrupted inventory flows during crises or disruptions. In an era where global supply chains face increasing risks from pandemics and geopolitical tensions to natural disasters, resilience becomes a key determinant of operational stability. The finding is supported by Johnson [53] who highlighted that early advocates of resilience in supply chains, proposing strategies like redundancy, agility, and risk-sharing as ways to manage uncertainty. Dey [30] also emphasized the need for visibility and supply chain design strategies that allow for quick recovery and continuity of operations to improve the company's IM. These findings emphasized that companies should focus on the SCR system in their operations to maintain safety stocks, and invest in risk monitoring tools that are better positioned to protect inventory flows. This is also essential to strengthen their competitive edge by embedding resilience into supply chain design for maintaining stable inventory systems and meeting customer expectations under uncertain conditions.

Further results highlighted that DME also showed a significant positive on the IM of manufacturing companies. These results indicate that sound managerial decisions significantly improve how inventories are controlled, replenished, and optimized in manufacturing firms. The findings are supported by the study of Vukasović et al. [99], where they found a significant positive impact of DME on IM. The study findings and previous empirical studies' results emphasize that even with the presence of advanced technologies and infrastructure, the quality of decisions made by managers and supply chain leaders ultimately determines inventory performance. Efficient decision-making ensures timely procurement, optimal stock levels, and reduction of carrying costs. Moreover, it also helps firms respond quickly to demand fluctuations, supply delays, and operational risks. As such, decision-making acts as a central processing unit that interprets data, sets priorities, and guides strategic actions. Without effective decisions, even the best tools or forecasts fail to deliver desired outcomes that could minimize the company's IM. Therefore, the importance of DME is especially critical in complex manufacturing environments where various inputs, ranging from demand signals to supplier performance that must be continuously to raise competitive advantage.

In addition to its direct influence, DME also shows a significant mediating effect across all independent variables and IM. This mediation reveals that resource effectiveness and capabilities in improving IM are significantly amplified when paired with strong decision-making processes. For example, accurate demand forecasts are only valuable if decision-makers use them to adjust production and reorder points. Similarly, sophisticated IT systems and integrated technologies require leadership that understands how to interpret their outputs and apply them strategically. The mediating role of DME aligns with the insights of Gade [38], who emphasized that analytics and technologies alone do not guarantee efficiency unless supported by timely and informed decisions. The findings are also supported by the study of Gonzalez et al. [42], where they found a significant mediating effect of DME that also strengthens the finding of the current study. These findings highlighted that manufacturing firms must foster decision-oriented cultures, provide real-time data dashboards, conduct scenario planning, and invest in leadership development programs. Enhancing decision-making capabilities not only strengthens the direct management of inventory but also unlocks the full value of technological and operational investments, leading to sustainable competitive advantages. Therefore, manufacturing companies should focus on improving DME to increase their company's IM, which could lead to the company's competitive edge in providing their goods on time to their customers.

7. Implications

The study has various implications. Firstly, study contributed a prominent literature in the existing body of knowledge through being the first study which is empirically tested the mediating role of DME between IT infrastructure, DF, TEI, SCR, and IM, which is offering a fresh theoretical lens for understanding how managerial capabilities bridge technological and operational factors with IM. Second, the findings contribute to extending the Resource-Based View (RBV) by demonstrating that organizational resources such as IT systems, forecasting tools, and resilient practices do not inherently improve inventory performance unless complemented by effective decision-making, thereby positioning DME as a critical strategic capability. Third, the study contributes to contingency theory by showing that the effectiveness of operational tools and technologies is not uniform but is contingent on how decisions are made within the organizations, which is highlighting that internal decision-making dynamics contribute significantly to inventory outcomes. Fourth, it contributes to operations management literature through offering a holistic model where DME becomes a key enabler, which increases the effectiveness of integrated technologies and forecasting practices in real-time inventory optimization, which is enriching the theoretical understanding of cognitive integration in inventory systems.

The first practical implication is that the study emphasized that production companies should go beyond investing in technology, where they need to build and support the effectiveness of decision-making to convert these investments into better inventory management results. Second, the results contribute to operational practices that show that accurate demand forecasts and IT systems in real time are only impressive when managers use them efficiently, and encourage companies to increase management training and support systems. Third, conclusions contribute to the strategic plan that companies use AI-powered forecasts, integrated CRMs and POS systems, while also explaining data and providing training to coaches to provide training to coaches to interpret data and make timely decisions. Fourth, the study contributes to acting insights by advising companies to enter a decision-oriented culture supported by real-time data dashboards, landscape planning equipment, and leadership development programs, and ensures that decision-making processes increase the value of operating technologies and contribute directly to obtaining competitive control.

8. Conclusion and Future Directions

Research aimed to test the impact of IT infrastructure, DF, TEI, and SCR on IM, with the mediating effect of DME of manufacturing companies. Cross-sectional quantitative data was collected from 260 employees of manufacturing companies using a convenient sampling technique. Results show that IT infrastructure, DF, TEI, and SCR have a positive and significant impact on IM. DME also significantly increases the IM. DME also mediates among IT infrastructure, DF, TEI, SCR, and IM of manufacturing companies. The findings suggest that enhancing IT infrastructure, DF, TEI, and SCR can significantly improve IM in manufacturing companies. Moreover, strengthening DME amplifies these impacts by serving as a key mediating mechanism. This study uniquely integrates multiple technological and strategic factors into one model, highlighting the mediating role of DME in improving inventory management. The study still has various limitations. Firstly, the study is not limited on one country, so its results cannot be generalized to other countries, which limits the study's scope. Therefore, future research could be conducted on a specific country to increase the study scope. Moreover, the current study concentrated on the mediating effect while ignoring the moderating effect. Therefore, future study might explore on moderating effect to increase the study scope. Lastly, the study does not include the service industry, which limits the study scope. Hence, future research could be conducted on service industry to increase the study scope.

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