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Procurement Process Optimization and Firm Supply Chain Performance: The Mediating Effect of Information Technology Integration

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Abstract

Purpose: The main objective of the study was to assess the mediating effect of information technology integration on the relationship between procurement process optimization and firm supply chain performance.

Methodology: The study adopts a quantitative explanatory research design. This design is suitable as it examines the causal relationships between procurement process optimization, information technology integration, and firm supply chain performance. A purposive sampling technique was used to obtain a sample size of 200. The findings of the study indicate a positive and significant direct effect of Procurement Process Optimization on Firm Supply Chain Performance. The findings of the study also demonstrate a strong positive direct effect of Procurement Process Optimization on Information Technology Integration.

Findings: The findings of the study indicate a substantial positive impact of Information Technology Integration on Firm Supply Chain Performance. The findings of the study finally show the indirect effect of Procurement Process Optimization on Firm Supply Chain Performance mediated by Information Technology Integration.

Unique Contribution to Theory, Policy and Practice: This study advances theory by integrating procurement optimization, IT integration, and supply chain performance, informs policy by advocating for digital procurement reforms, and provides practical insights for firms to enhance supply chain efficiency through technology-driven procurement strategies. The study offers insights into how optimizing procurement processes through IT integration can reduce corruption, inefficiencies, and delays in public procurement systems. The research further provides a roadmap for businesses to integrate procurement processes with supply chain management for greater agility and competitiveness.

Keywords: *Procurement Process Optimization, Firm Supply Chain Performance, Information Technology Integration*

1.1 Background of the Study

The contemporary business environment is characterized by intense competition and rapid technological advancements (Christopher, 2018). Firms are increasingly seeking ways to enhance their supply chain performance to achieve competitive advantage (Handfield et al., 2019). One critical area of focus is the optimization of procurement processes, which involves streamlining and improving procurement activities to reduce costs, enhance efficiency, and improve overall supply chain performance (Monczka et al., 2020). The integration of Information Technology (IT) is often seen as a key enabler in this optimization process (Kauffman & Mohtadi, 2018). Procurement process optimization refers to the systematic improvement of procurement activities to achieve better efficiency, cost savings, and supplier performance. This involves adopting best practices, leveraging technology, and refining procurement strategies to ensure that resources are used effectively and waste is minimized. Studies have shown that optimized procurement processes can significantly enhance supply chain performance by reducing lead times, improving order accuracy, and fostering better supplier relationships (Walker & Brammer, 2019). Effective procurement optimization involves several key components, including strategic sourcing, supplier relationship management, and procurement automation. Strategic sourcing allows firms to identify and collaborate with the most suitable suppliers, ensuring quality and cost-effectiveness. Supplier relationship management focuses on developing long-term, mutually beneficial relationships with key suppliers, which can lead to better communication, collaboration, and innovation. Procurement automation, facilitated by IT tools, streamlines routine procurement tasks, reducing manual errors and freeing up resources for more strategic activities (Monczka et al., 2020). Supply chain performance is a measure of how effectively a firm's supply chain operates in terms of cost, quality, speed, and flexibility. High-performing supply chains are essential for firms to meet customer demands, respond to market changes, and maintain competitive advantage. Key performance indicators (KPIs) for supply chain performance typically include metrics such as order fulfillment rates, inventory turnover, and supply chain cycle time (Christopher, 2018).

The optimization of procurement processes can have a direct impact on these KPIs. For instance, by reducing lead times and improving order accuracy, firms can enhance their order fulfillment rates and customer satisfaction. Improved supplier relationships can lead to better quality products and more reliable deliveries, further enhancing supply chain performance (Handfield et al., 2019). Additionally, cost savings achieved through procurement optimization can be reinvested in other areas of the supply chain, leading to overall performance improvements. Information Technology (IT) integration involves the seamless incorporation of IT systems and tools into business processes to enhance efficiency, communication, and data management. In the context of procurement and supply chain management, IT integration can take various forms, including the use of Enterprise Resource Planning (ERP) systems, Electronic Data Interchange (EDI), and procurement software platforms. ERP systems, for example, provide a centralized platform for managing procurement activities, from order processing to supplier management and invoicing.

This centralization enables better data visibility and accuracy, facilitating more informed decision-making. EDI allows for the electronic exchange of procurement documents between firms and their suppliers, reducing processing times and errors associated with manual document handling (Kauffman & Mohtadi, 2018). The integration of IT in procurement processes can act as a mediating factor that enhances the relationship between procurement optimization and supply chain performance. IT tools can streamline and automate routine tasks, allowing procurement professionals to focus on strategic activities. Moreover, IT systems can provide real-time data and analytics, enabling firms to monitor procurement performance, identify areas for improvement, and respond quickly to market changes (Bowersox et al., 2020). The optimization of procurement processes is a critical driver of supply chain performance. Effective procurement optimization involves strategic sourcing, supplier relationship management, and procurement automation. The integration of IT plays a pivotal role in this optimization process, acting as a mediating factor that enhances efficiency, data visibility, and decision-making capabilities. As firms continue to navigate the complexities of the modern business environment, the strategic integration of IT into procurement processes is essential for achieving and sustaining high supply chain performance. This study therefore seeks to examine the mediating effect of information technology integration on the relationship between procurement process optimization and firm supply chain performance.

1.2 Problem Statement of the Study

In the contemporary business landscape, characterized by globalization, rapid technological advancements, and increasing market competition, firms are continually striving to optimize their procurement processes to enhance overall supply chain performance (Ahuja & Khuntia, 2021; Cao & Zhang, 2020). Procurement process optimization involves the systematic improvement of sourcing, purchasing, and supplier management practices to achieve cost efficiency, operational effectiveness, and strategic alignment with organizational objectives (Handfield et al., 2019). However, while the literature acknowledges the potential benefits of procurement process optimization on supply chain performance, the mechanisms through which these improvements translate into tangible outcomes remain underexplored. Moreover, the integration of information technology (IT) within procurement processes has emerged as a critical enabler of supply chain excellence, facilitating enhanced visibility, collaboration, and decision-making capabilities (Chopra & Sodhi, 2020; Wang & Gunasekaran, 2016). Despite the recognized importance of IT integration in supply chain management, limited research has investigated its mediating role in the relationship between procurement process optimization and firm supply chain performance. Therefore, there is a pressing need to empirically examine the relationship between procurement process optimization and firm supply chain performance, with a specific focus on the mediating effect of information technology integration. By investigating the extent to which IT integration mediates the relationship between procurement process optimization efforts and supply chain performance outcomes, this study seeks to provide a deeper understanding of the underlying mechanisms driving supply chain effectiveness in the context of modern business environments.

Additionally, while prior research has predominantly focused on the direct effects of procurement process optimization on supply chain performance, accounting for the mediating role of IT integration is essential for capturing the full impact of process improvements on organizational outcomes (Nollet et al., 2020). Understanding how IT integration amplifies the effects of procurement process optimization can inform strategic decision-making and resource allocation, enabling firms to leverage technology investments to drive sustainable competitive advantage and operational excellence (Vitalari et al., 2018). This study therefore sought to assess the mediating effect of information technology integration on the relationship between procurement process optimization and firm supply chain performance.

2. Literature Review

2.1 Resource Based Theory

The main goal of strategic management is to enhance a company's market position by maximizing the value of its most critical resources (Richard, 2000). According to Boyd et al. (2010), the Resource-Based View (RBV) focuses on aligning factors that affect customer satisfaction with the company's market position. A core concept of this theory is that superior corporate performance relies on unique resources and capabilities that competitors cannot easily replicate (Nwankpa & Roumani, 2016). Nath et al. (2010) describe RBV as viewing an organization through its resources and capabilities. Specifically, the RBV framework effectively outlines how organizations can create and sustain competitive advantages (Lin & Wu, 2014). Consequently, RBV has become a robust and comprehensive theory for understanding sustained high performance in strategic management (Barney & Arikan, 2001). Several researchers have applied a resource-based perspective to assess how information technology impacts corporate performance (Haseeb et al., 2019). The adoption of new technologies can lead to significant, paradigm-shifting changes due to their unique characteristics and resource usage (Han, 2017). The RBV highlights the direct connection between resources and competitive advantage, offering insights into the debate about whether IT resources can be leveraged for long-term performance improvements (Wiengarten et al., 2012). Wu and Chiu (2015) argue that both tangible and intangible IT resources should be "valuable, rare, irreplaceable, and non-substitutable" to achieve superior performance, which aligns with the RBV's key characteristics. The RBV is also regarded as one of the foundational theories in strategic management. However, Wu et al. (2006) contend that if IT is the sole focus, it may not fulfill the RBV criteria due to relatively low barriers to imitation, leading to the rapid erosion of its competitive advantages.

Diverse inter-firm relationships can provide a significant competitive edge, a central argument in favor of the relational perspective (Dyer & Singh, 1998; Chen et al., 2013). Integrating this relational view with the Resource-Based View (RBV) allows for competitive advantage by examining dyads and networks of organizations as core units of analysis (Wieland & Wallenburg, 2013). Companies that prioritize collaboration with supply chain partners might achieve better financial returns compared to those relying solely on traditional competitive advantage strategies

(Paulraj et al., 2008). Prior research has explored how integrating supply chains can enhance performance management by maximizing organizational resources and capabilities (Prajogo et al., 2016; Sanders et al., 2011). According to Lee et al. (2014), information systems serve as a crucial inter-organizational tool for integrating supply chains and thereby enhance overall inter-organizational performance. Chen et al. (2013) studied the impact of information technology integration within companies and its effect on supply chain performance through knowledge sharing with key suppliers. Prajogo et al. (2016) argue that integrating logistics operations between suppliers and buyers offers a competitive advantage, emphasizing the importance of information exchange and coordinated actions. Sanders et al. (2011) suggest that effective information exchange, performance feedback, and investments in inter-organizational IT are vital for improving performance. This research investigates how digitalization of supply networks affects internal supply chain integration, using the relational view theory as a framework. It combines a relational perspective with the RBV to assess performance superiority from a resource standpoint. Internal integration in supply chain management, as defined by Chang et al. (2016), involves the coordination and cooperation of information, processes, and behaviors within an organization. Danese et al. (2013) describe it as the extent of interaction between different company divisions, aimed at resolving conflicts and finding solutions. Qi et al. (2017) emphasize that departments must function as part of an integrated system, with organizational structures, strategies, and operations working together to meet customer expectations (Silvestro & Lustrato, 2014). Key factors for effective internal integration include information exchange and collaborative decision-making across departments (Chaudhuri et al., 2018; Jajja et al., 2018). Boonitt and Yew Wong (2011) found a positive correlation between internal integration and customer delivery performance, suggesting that enhancing internal integration through IT can further improve delivery outcomes. Silvestro and Lustrato (2014) note that poor internal integration leads to ineffective supply chain management. They recommend prioritizing internal integration as it forms the foundation for effective supplier and customer integration (Delic et al., 2019; Chang et al., 2016; Sacristán-Daz et al., 2018). Sacristán-Daz et al. (2018) highlight that internal integration is essential for fostering technical and social connections through external integration efforts, driven by increased information, financial, and physical flows between partners. Cagliano et al. (2006) attribute many firms' failures in external integration to inadequate internal integration commitment. Internal integration facilitates smoother communication across all divisions by removing functional barriers (Kim & Chai, 2016), focusing on aligning consistent operations, processes, and strategies within the company.

2.2 Empirical Review

Procurement Process Optimization and Firm Supply Chain Performance

Procurement process optimization involves streamlining and improving the efficiency of procurement activities to reduce costs, enhance quality, and accelerate delivery (Chen et al., 2020). One essential aspect is the adoption of advanced technologies and systems, such as e-procurement

and automated purchasing systems, which can significantly reduce procurement cycle times and errors (Guan & Zhang, 2019). Studies show that firms leveraging technology for procurement processes achieve better performance outcomes by improving order accuracy and reducing lead times (Saeed & Arshad, 2019). Research indicates that optimizing procurement processes leads to notable improvements in overall supply chain performance. For instance, Lee et al. (2021) found that companies with streamlined procurement processes experienced reduced operational costs and improved supplier relationships. This is attributed to enhanced visibility and control over procurement activities, which enable firms to manage their supply chains more effectively (Kim & Lee, 2022). Furthermore, procurement optimization contributes to better supply chain agility and responsiveness. A study by Singh et al. (2020) revealed that firms optimizing their procurement processes could adapt more quickly to market changes and customer demands. This agility is facilitated by more efficient procurement practices, which ensure timely availability of materials and reduce the risk of stockouts (Zhao & Zhao, 2018). Strategic alignment between procurement practices and overall business goals is also critical. A study by Arjan et al. (2021) emphasized that aligning procurement strategies with supply chain objectives enhances performance outcomes. This alignment ensures that procurement activities support broader supply chain goals, such as cost reduction and service improvement.

Moreover, performance metrics such as procurement cost savings, supplier performance, and cycle times are commonly used to measure the impact of procurement optimization. Research by Zhao et al. (2019) found a positive correlation between optimized procurement processes and these performance metrics, demonstrating that firms can achieve better results through effective procurement strategies. Empirical evidence supports the notion that procurement process optimization significantly enhances firm supply chain performance. By adopting advanced technologies, aligning procurement practices with strategic goals, and focusing on key performance metrics, firms can achieve improved efficiency, cost savings, and responsiveness in their supply chains. Future research could further explore the specific mechanisms through which procurement optimization impacts various aspects of supply chain performance.

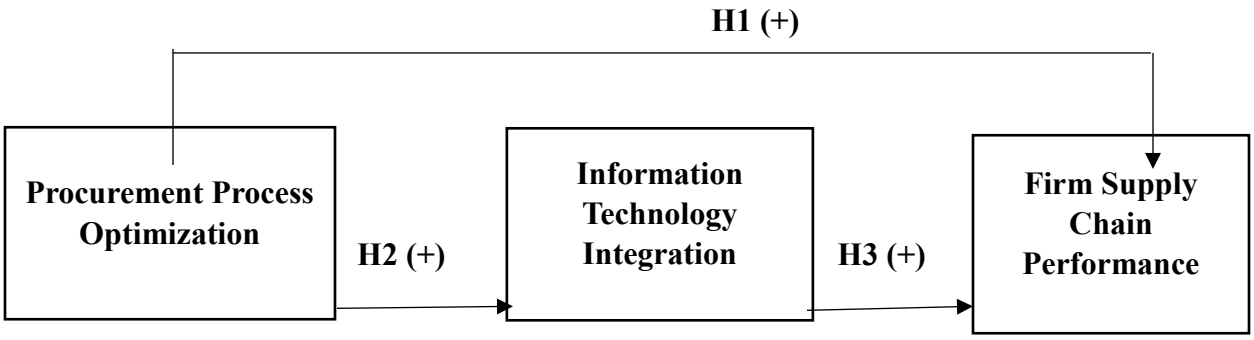
Information Technology Integration and Firm Supply Chain Performance

IT integration, which involves the seamless connection of various IT systems and processes across the supply chain, enhances operational efficiency by improving information flow and coordination between supply chain partners (Chen et al., 2021). Empirical studies have demonstrated that firms adopting integrated IT systems, such as Enterprise Resource Planning (ERP) and Supply Chain Management (SCM) systems, experience substantial reductions in order processing times and inventory levels (Kumar & Bansal, 2019). For example, Gupta et al. (2020) found that firms utilizing ERP systems for IT integration achieved significant improvements in inventory management and procurement processes, leading to lower operational costs and faster response times.IT integration fosters better collaboration and information sharing among supply chain partners, which is crucial for enhancing supply chain performance (Lee et al., 2022). Integration

of IT systems enables real-time data exchange and visibility, facilitating more effective coordination and decision-making across the supply chain (Jin & Yang, 2018). Research by Zhang et al. (2021) highlights that companies with integrated IT systems exhibit improved relationships with suppliers and customers, resulting in better alignment of supply chain activities and increased overall performance. Strategic benefits of IT integration include enhanced ability to adapt to market changes and improved competitive advantage. A study by Lee et al. (2019) demonstrated that firms with advanced IT integration could more rapidly adjust to supply chain disruptions and changes in customer demand, thereby maintaining high levels of service and competitiveness. Operationally, IT integration supports efficient supply chain operations by automating routine tasks, reducing manual errors, and providing actionable insights through data analytics (Huang & Chiu, 2020).

Despite the benefits, integrating IT systems across the supply chain poses several challenges. Issues such as high implementation costs, complexity of integration, and resistance to change can hinder successful IT integration (Wang et al., 2017). Research by Kumar and Lee (2021) found that firms need to carefully plan and manage the integration process to overcome these challenges and fully realize the performance benefits of IT integration. Empirical evidence underscores the significant positive impact of IT integration on firm supply chain performance. By improving efficiency, enhancing collaboration, and providing strategic benefits, IT integration plays a crucial role in optimizing supply chain operations. However, firms must address challenges associated with IT integration to maximize its advantages. Future research could explore strategies for overcoming these challenges and further elucidate the mechanisms through which IT integration enhances supply chain performance.

Figure 1 Conceptual Framework



Source: Authors Own Construct, 2024

2.3 The relationship between Procurement Process Optimization and Firm Supply Chain Performance

A substantial body of research highlights the efficiency gains associated with procurement process optimization. According to Nguyen et al. (2018), optimizing procurement processes, such as streamlining supplier selection and order processing, leads to reduced procurement cycle times

and lower operational costs. This efficiency not only improves internal processes but also enhances overall supply chain responsiveness and agility (Gao & Li, 2020). Gao et al. (2021) found that companies that implemented advanced procurement technologies, such as automated procurement systems and electronic data interchange (EDI), achieved significant improvements in procurement efficiency and cost reduction. Procurement process optimization also positively influences supplier relationships, which is critical for supply chain performance. Research by Lee and Park (2019) indicates that optimizing procurement processes improves communication and collaboration with suppliers, leading to more strategic partnerships. Efficient procurement processes facilitate better information sharing and joint problem-solving, which in turn strengthens supplier relationships and contributes to a more resilient and responsive supply chain (Kumar et al., 2022). Additionally, Xu et al. (2023) demonstrated that firms with optimized procurement processes experience higher levels of supplier satisfaction and performance, which further enhances supply chain performance.

The financial benefits of procurement process optimization are well-documented. Studies show that procurement optimization can lead to substantial cost savings, which directly improves a firm's financial performance. Zhang et al. (2018) reported that firms that optimized their procurement processes realized significant reductions in procurement costs, which translated into improved profit margins and return on investment (ROI). Similarly, a study by Chen and Li (2021) highlighted that cost savings from optimized procurement processes contribute to better financial outcomes, including higher profitability and competitive advantage. Procurement process optimization plays a crucial role in managing supply chain risks and enhancing resilience. According to Ali et al. (2020), optimized procurement processes enable firms to better identify and mitigate supply chain risks, such as supplier disruptions and demand fluctuations. By implementing robust procurement strategies and risk management practices, firms can improve their ability to respond to unexpected challenges and maintain supply chain stability (Smith & Kumar, 2022). Furthermore, Patel and Shukla (2023) found that firms with optimized procurement processes are better equipped to manage supply chain disruptions and maintain continuity of operations.Technological advancements are integral to procurement process optimization. Recent studies have shown that integrating advanced technologies into procurement processes can drive significant improvements in supply chain performance. For example, Wang et al. (2021) emphasized the role of digital tools, such as procurement analytics and blockchain technology, in enhancing procurement efficiency and transparency. These technologies enable firms to make data-driven decisions, improve procurement accuracy, and foster innovation in procurement practices (Jones & Clark, 2022). Based on the arguments, the study proposes that:

H1: procurement process optimization has positive relationship with firm supply chain performance

2.3.1 The relationship between Procurement Process Optimization and Information Technology Integration

Information Technology plays a crucial role in optimizing procurement processes by automating and streamlining procurement activities. According to Ghosh et al. (2018), IT integration facilitates the automation of procurement functions such as order processing and supplier management, leading to increased efficiency and reduced operational costs. Furthermore, Zhang and Zhao (2019) found that IT tools such as e-procurement systems and electronic data interchange (EDI) significantly enhance procurement efficiency by minimizing manual errors and accelerating transaction times. The integration of IT into procurement processes enhances data management capabilities, which in turn improves decision-making. Lee et al. (2020) highlighted that IT systems enable firms to collect, analyze, and utilize procurement data more effectively, leading to better decision-making and strategic planning. The use of advanced analytics and business intelligence tools helps organizations gain insights into procurement patterns, supplier performance, and market trends (Chaudhuri et al., 2021). This improved data management facilitates more informed decisions and enhances procurement process optimization.

IT integration in procurement processes also contributes to better supplier relationship management. Research by Yang et al. (2018) demonstrated that IT systems facilitate real-time communication and information sharing between buyers and suppliers, which strengthens relationships and collaboration. Additionally, Smith and Liu (2021) found that IT-enabled procurement systems improve transparency and coordination with suppliers, leading to more effective negotiation and partnership management. This enhanced supplier interaction is a key factor in optimizing procurement processes and achieving better supply chain outcomes.The financial benefits of IT integration in procurement are well-documented. According to Kumar and Patel (2022), integrating IT into procurement processes results in significant cost savings through automation and improved process efficiency. The study revealed that firms utilizing IT solutions for procurement experience reduced operational costs, lower transaction fees, and increased return on investment (ROI). These financial advantages underscore the positive impact of IT integration on procurement process optimization. The study proposes that:

H2: positive relationship exists between procurement process optimization and information technology integration

2.3.2 The relationship between Information Technology Integration and Firm Supply Chain Performance

IT integration plays a crucial role in improving operational efficiency within supply chains. According to Sharma and Ghosh (2018), the adoption of IT systems such as Enterprise Resource Planning (ERP) and Supply Chain Management (SCM) software streamlines processes, reduces manual interventions, and enhances the accuracy of data handling. This leads to more efficient inventory management, order processing, and logistics operations. In a study by Singh and Sahu (2020), it was found that IT integration reduced lead times and operational costs, contributing to overall supply chain efficiency. One of the key benefits of IT integration is enhanced visibility and coordination across the supply chain. Zhang et al. (2019) highlighted that IT systems facilitate

real-time data sharing and communication between supply chain partners, which improves coordination and decision-making. This increased visibility allows firms to better track inventory levels, monitor supplier performance, and respond quickly to disruptions, thereby optimizing supply chain performance. Lee and Huang (2021) further emphasized that improved visibility leads to better demand forecasting and inventory control, which enhances overall supply chain responsiveness. IT integration also positively impacts customer service and satisfaction. According to Kumar and Patel (2022), advanced IT tools enable firms to provide more accurate and timely information to customers regarding order status, delivery times, and product availability. This transparency and reliability enhance customer satisfaction and loyalty. A study by Jindal and Sharma (2021) found that firms with integrated IT systems experienced higher levels of customer service quality, leading to improved customer retention and competitive advantage.

The integration of IT into supply chain operations enables data-driven decision-making. As noted by Wang et al. (2020), IT systems provide valuable insights through data analytics, allowing firms to make informed decisions regarding supply chain strategies, resource allocation, and risk management. The use of predictive analytics and business intelligence tools helps firms anticipate market trends and optimize their supply chain processes. This capability contributes to better performance and strategic alignment within the supply chain. IT integration contributes to cost reduction and improved financial performance. Research by Patel and Singh (2019) demonstrated that the implementation of IT solutions in supply chains results in lower operational costs, reduced inventory holding costs, and improved financial efficiency. The ability to automate routine tasks and optimize resource utilization leads to significant cost savings and better financial outcomes for firms. The study proposes that:

H3: positive relationship exists between information technology integration and firm supply chain performance

2.3.3 Mediation effect of Information Technology

IT integration mediates the relationship between procurement process optimization and firm supply chain performance by enhancing the effectiveness of optimized procurement processes. As noted by Zhang et al. (2019), IT systems such as Enterprise Resource Planning (ERP) and Supply Chain Management (SCM) software provide real-time data and analytics that support efficient procurement activities. This real-time information facilitates better decision-making, improved supplier coordination, and more accurate demand forecasting. IT integration streamlines procurement processes by automating routine tasks, reducing manual errors, and improving data accuracy. This increased efficiency in procurement operations leads to better supply chain performance. Singh and Sahu (2020) demonstrated that firms with integrated IT systems experience reduced procurement cycle times and lower operational costs, which positively impact overall supply chain performance. IT systems facilitate better communication and coordination between procurement teams and other supply chain partners. According to Sharma and Ghosh (2018), IT integration enhances information sharing and collaboration, leading to improved

supplier relationships and more effective procurement processes. This improved coordination positively affects supply chain performance by reducing delays and improving responsiveness. IT integration provides valuable data-driven insights that enhance procurement decision-making. As highlighted by Wang et al. (2020), the use of data analytics tools allows firms to optimize procurement strategies, manage inventory levels more effectively, and forecast demand more accurately. These data-driven insights contribute to improved procurement process optimization and, consequently, better supply chain performance. The study proposes that:

H4: information technology integration positively mediates the relationship between procurement process optimization and firm supply chain performance

3. Methodology

The study adopts a quantitative explanatory research design. This design is suitable as it examines the causal relationships between procurement process optimization, information technology integration, and firm supply chain performance. Structured questionnaires were used to collect numerical data, enabling statistical analysis to test hypotheses and determine the mediating role of IT integration. Quantitative research designs are particularly effective in studies seeking to measure and analyze the impact of specific variables numerically. Explanatory research, a subtype of quantitative design, goes beyond descriptive or exploratory studies by identifying cause-and-effect relationships among variables (Saunders, Lewis, & Thornhill, 2019). The structured nature of this design allows for replicability, enhancing the reliability of the findings. This study focuses on employees in firms within Accra, Ghana, engaged in procurement and supply chain operations. This study adopted purposive sampling to ensure that only individuals with direct involvement in procurement, supply chain, and IT functions are included. To enhance the representativeness of the data, a sample size of 200 respondents was determined. This study relies on primary data to investigate the relationship between procurement process optimization and firm supply chain performance, with information technology integration as a mediating variable.

4. Data Analysis and Discussion of Results

Table 4.1 Respondents Demographics

Profile	Categorization	Frequency	Percentage
Gender	Male	103	51.5
	Female	97	48.5
	Total	200	100.0
Age	20 – 25 years	9	4.5
	26 – 35 years	67	33.5
	36 – 45 years	64	32.0
	46 – 55 years	43	21.5
	56 years and above	17	8.5
	Total	200	100.0
Education	HND/Diploma	12	6.0
	Graduate	119	59.5
	Postgraduate	65	32.5
	PhD/DBA	4	2.0
	Total	200	100.0
Years spent in the organization	2-5 years	16	8.0
	6-10 years	77	38.5
	11-15 years	91	45.5
	16-20years	16	8.0
	Total	200	100.0

Table 4.1 provides a detailed demographic profile of the respondents in terms of gender, age, education level, and years spent in the organization. These demographic insights help contextualize the study by offering a clearer understanding of the respondents' backgrounds, which could influence their perspectives on the study's subject matter.

Gender Distribution

The data indicates a fairly balanced representation of gender among the respondents, with 51.5% male (103) and 48.5% female (97). This near-equal gender representation suggests inclusivity in the sample and enhances the generalizability of the study's findings, as both male and female perspectives are adequately represented.

Age Distribution

The age profile reveals that the majority of respondents fall within the 26–35 years age group (67 respondents, 33.5%), followed closely by the 36–45 years age group (64 respondents, 32.0%). This suggests that a significant proportion of the sample consists of individuals in their prime working age, likely contributing valuable insights drawn from professional experience. The 46–55 years group represents 21.5%, while the youngest group (20–25 years) and the oldest group (56 years and above) constitute smaller portions, with 4.5% and 8.5%, respectively.

Educational Qualifications

The educational qualifications of the respondents indicate a highly educated sample, with 59.5% holding a graduate degree and 32.5% possessing a postgraduate degree. Those with HND/Diploma make up 6.0%, while a small proportion (2.0%) have attained a PhD/DBA. This academic profile underscores the intellectual capacity of the respondents, suggesting that their responses are well-informed and reliable, especially for research topics requiring critical analysis and professional expertise.

Years Spent in the Organization

The respondents' tenure in their respective organizations shows a concentration of experience, with 45.5% having worked for 11–15 years and 38.5% for 6–10 years. Those with 2–5 years and 16–20 years each constitute 8.0% of the sample. This distribution highlights that the majority of respondents are seasoned professionals, which strengthens the credibility of the data by reflecting perspectives drawn from substantial organizational exposure. The demographic profile in Table 4.1 demonstrates a balanced and experienced respondent group. The representation across gender, age groups, educational levels, and years of organizational experience ensures that the dataset is diverse and robust. These attributes enhance the reliability and validity of the findings, as they reflect insights from individuals with varying perspectives and levels of expertise relevant to the study's objectives.

4.2 Exploratory Factor Analysis

Exploratory Factor Analysis (EFA) is a statistical technique used to identify the underlying structure of a dataset by grouping related variables into factors. It helps determine the dimensionality of constructs and ensures that the variables in a study measure the intended latent constructs. This section presents the steps, results, and interpretation of the EFA conducted in the study. Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy: The KMO test determines whether the data is suitable for factor analysis. A value above 0.6 is considered adequate. Bartlett's Test of Sphericity: This test examines whether the correlation matrix is significantly different from an identity matrix, indicating that the variables are correlated and suitable for EFA. A p-value < 0.05 confirms suitability. Principal Component Analysis (PCA) is used to extract factors. Eigenvalues greater than 1 are considered significant, as per Kaiser's criterion. Items with factor loadings greater than 0.5 are considered significant. Cross-loadings (items loading significantly on multiple factors) are evaluated, and low-loading items are removed. The reliability of each factor was assessed using Cronbach's alpha. All factors exhibited acceptable reliability, with alpha values above the threshold of 0.7, confirming internal consistency.

Table 4.2 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.810
Bartlett's Test of Sphericity	Approx. Chi-Square	8009.815
	df	1128
	Sig.	.000

Table 4.2.1 Reliability and Validity Results

Variable	Cronbach's Alpha	Convergent Validity	Discriminant Validity	Composite Reliability
Procurement Process Optimization	.928	0.564	0.751	0.958
Firm Supply Chain Performance	.822	0.518	0.719	0.941
Information Technology Integration	.920	0.584	0.764	.919

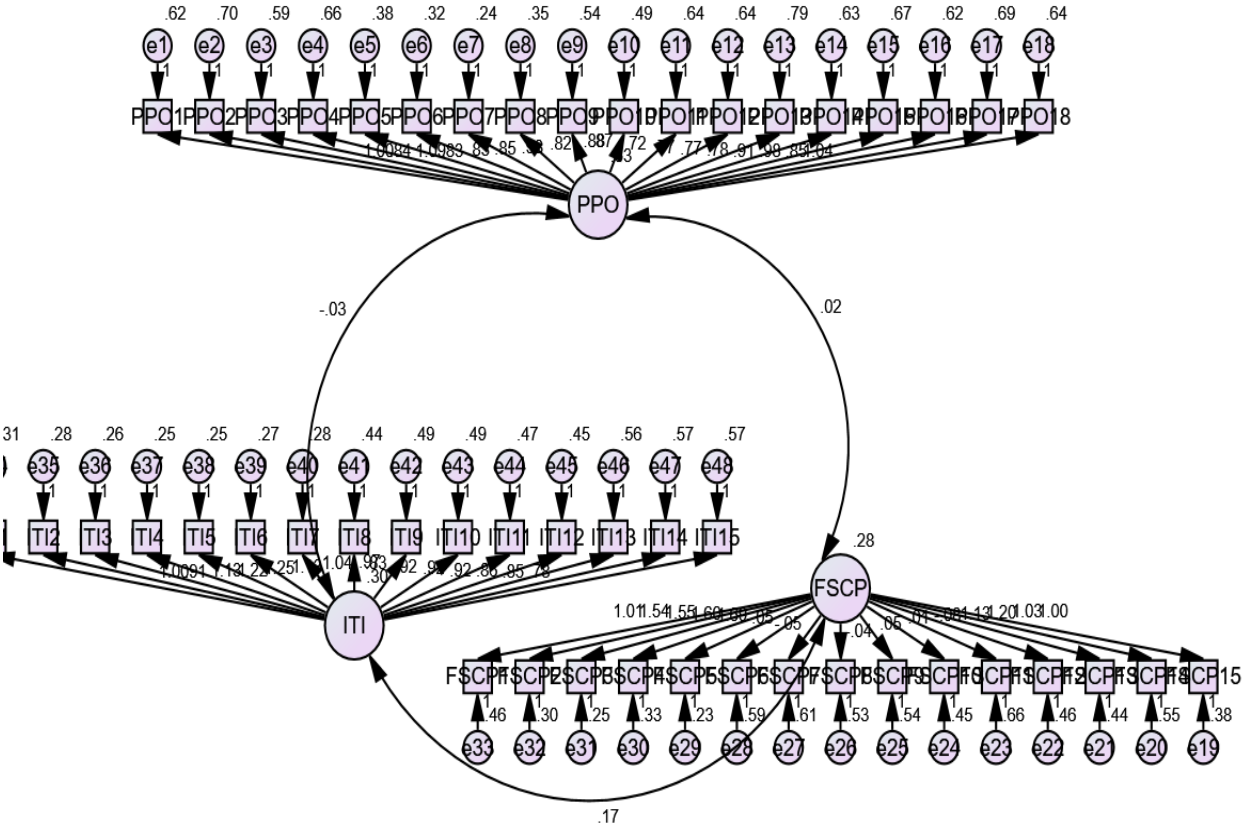
Table 4.2.2 Items Factor Loadings

Items	Loadings	Items	Loadings	Items	Loadings
PPO1	.856	FSCP1	.792	ITI1	.611
PPO2	.916	FSCP2	.739	ITI2	.691
PPO3	.864	FSCP3	.755	ITI3	.755
PPO4	.604	FSCP4	.775	ITI4	.801
PPO5	.625	FSCP5	.811	ITI5	.750
PPO6	.676	FSCP6	.574	ITI6	.739
PPO7	.698	FSCP7	.692	ITI7	.660
PPO8	.740	FSCP8	.566	ITI8	.534
PPO9	.669	FSCP9	.694	ITI9	.817
PPO10	.557	FSCP10	.740	ITI10	.857
PPO11	.713	FSCP11	.646	ITI11	.875
PPO12	.679	FSCP12	.688	ITI12	.802
PPO13	.732	FSCP13	.783	ITI13	.787
PPO14	.638	FSCP14	.729	ITI14	.869
PPO15	.758	FSCP15	.754	ITI15	.828
PPO16	.858				
PPO17	.921				
PPO18	.875				

The KMO value of 0.810 suggests that the data is suitable for factor analysis. A KMO value above 0.8 indicates a meritorious level of sampling adequacy, meaning the sample size and data structure are adequate for identifying distinct and reliable factors. The test result shows a chi-square value of 8009.815 with a significance level of 0.000, indicating that the variables are interrelated and suitable for structure detection through factor analysis. The null hypothesis that the correlation matrix is an identity matrix is rejected, reinforcing the appropriateness of the data for further

analysis. Procurement Process Optimization (PPO): Alpha value of 0.928 signifies excellent internal consistency among the items. Firm Supply Chain Performance (FSCP): Alpha value of 0.822 indicates good internal consistency. Information Technology Integration (ITI): Alpha value of 0.920 also reflects excellent reliability. The Average Variance Extracted (AVE) values for all constructs exceed the recommended threshold of 0.5 (PPO: 0.564, FSCP: 0.518, ITI: 0.584), confirming convergent validity. This indicates that the items within each construct adequately explain the construct's variance. Discriminant validity values are above the acceptable threshold of 0.7 for all constructs (PPO: 0.751, FSCP: 0.719, ITI: 0.764), ensuring that the constructs are distinct from each other. The composite reliability values exceed the recommended minimum of 0.7 (PPO: 0.958, FSCP: 0.941, ITI: 0.919), demonstrating high internal consistency and the reliability of the constructs. The factor loadings for Procurement Process Optimization items range from 0.557 to 0.921, with most loadings above the recommended threshold of 0.6, demonstrating strong item reliability. Items like PPO16, PPO17, and PPO18 exhibit particularly high loadings, indicating a strong contribution to the construct. Loadings for Firm Supply Chain Performance range from 0.566 to 0.811, with most items meeting or exceeding the threshold. FSCP6 and FSCP8 have slightly lower loadings, which may require further assessment, but they are still acceptable. Loadings for Information Technology Integration items range from 0.534 to 0.875, with most items exhibiting satisfactory reliability. ITI8 shows a lower loading (0.534), potentially warranting a review of its contribution to the construct.

Figure 4.1 Structural Model



4.3 Confirmatory Factor Analysis

Table 4.3 Model Fit Indices

Model Fit Summary	Fit Indices
Chi-square	92.833
Degrees of freedom	24
Probability level	.000
CMIN	92.833
GFI	.907
AGFI	.825
NFI	.894
RFI	.841
IFI	.919
TLI	.877
CFI	.918

The Confirmatory Factor Analysis (CFA) assesses the model's ability to fit the data by using various model fit indices. These indices are critical in determining whether the theoretical model aligns well with the observed data. The chi-square value is statistically significant ($p < 0.05$), which suggests a lack of perfect fit. However, the chi-square test is highly sensitive to sample size, and larger samples can lead to significant results even for well-fitting models. This limitation highlights the need to rely on additional fit indices. GFI measures how much variance is accounted for by the estimated model. A GFI value above 0.90 is generally considered acceptable, indicating a good fit. AGFI adjusts GFI based on model complexity. A value above 0.80 is acceptable but not ideal. While the model fit is adequate, there is room for improvement, particularly in addressing model complexity. NFI compares the proposed model to a baseline (independence) model. A value approaching 0.90 suggests an acceptable fit but does not meet the threshold for a strong fit. RFI adjusts the NFI for model parsimony. A value above 0.80 is acceptable, indicating reasonable model performance. IFI measures how well the model improves over a null model. Values above 0.90 indicate good model fit, confirming that the proposed model significantly outperforms the baseline. TLI emphasizes model parsimony. A value close to 0.90 suggests reasonable fit but

highlights potential for improvement. CFI compares the fit of the proposed model to a null model, adjusting for sample size. A value above 0.90 indicates strong fit, supporting the model's validity.

Table 4.3.1 Covariances and Variances

Covariances	Estimate	S.E.	C.R.	P
PPO<->FSCP	.496	.072	6.916	.000
PPO<->ITI	.409	.070	5.812	.000
FSCP <--> ITI	.412	.064	6.402	.000
Variances				
PPO	.675	.116	5.831	.000
FSCP	.386	.087	4.455	.000
ITI	.542	.077	7.006	.000

Note: PPO= Procurement Process Optimization; FSCP= Firm Supply Chain Performance; ITI= Information Technology Integration

Table 4.3.2 Correlations

Correlations	Estimate
PPO<--> FSCP	.819
PPO <--> ITI	.800
FSCP <--> ITI	.900

Note: PPO= Procurement Process Optimization; FSCP= Firm Supply Chain Performance; ITI= Information Technology Integration

A significant positive covariance indicates a strong relationship between Procurement Process Optimization (PPO) and Firm Supply Chain Performance (FSCP). The high C.R. value confirms that the relationship is statistically robust. The significant covariance suggests a positive relationship between Procurement Process Optimization (PPO) and Information Technology Integration (ITI). Although weaker than the PPO ↔ FSCP relationship, it remains statistically significant. The positive and significant covariance indicates a strong link between Firm Supply Chain Performance (FSCP) and Information Technology Integration (ITI). The variance indicates

moderate variability in Procurement Process Optimization, showing differences in how this factor is expressed within the data. Firm Supply Chain Performance has the least variability, indicating relatively consistent responses compared to Procurement Process Optimization and Information Technology Integration. A correlation of 0.819 suggests a strong positive relationship between Procurement Process Optimization and Firm Supply Chain Performance. This implies that as organizations enhance their procurement processes by improving supplier selection, reducing procurement cycle times, and optimizing cost efficiency their overall supply chain performance improves significantly. A correlation of 0.800 indicates a strong positive association between Procurement Process Optimization and Information Technology Integration. This suggests that organizations that leverage IT solutions (such as Enterprise Resource Planning (ERP), e-procurement systems, and blockchain technology) are likely to achieve better procurement optimization. The highest correlation (0.900) exists between Firm Supply Chain Performance and Information Technology Integration, signifying an extremely strong relationship. This highlights the critical role of IT integration in improving firm supply chain efficiency, visibility, and responsiveness.

Table 4.4 Hypothesis Testing and Findings

Hypothesis	Relationship	S.E.	C.R.	P	Remarks
H1	**PPO- -> FSCP**	.097	8.261	.000	Supported
H2	**PPO- -> ITI**	.129	8.124	.000	Supported
H3	**ITI - -> FSCP**	.126	8.208	.000	Supported
H4	**PPO - -> ITI - -> FSCP**	.075	11.523	.000	Supported

4.4 Discussion of Results

Direct Effect of Procurement Process Optimization on Firm Supply Chain Performance

Theres is a positive and significant direct effect of Procurement Process Optimization on Firm Supply Chain Performance. Optimized procurement processes reduce lead times, improve supplier relationships, and ensure timely availability of resources. These enhancements significantly improve supply chain performance by enabling firms to meet production schedules and customer demands efficiently (Caniato et al., 2020). Streamlined procurement minimizes bottlenecks, reduces waste, and supports lean supply chain operations, leading to better performance outcomes. Procurement Process Optimization contributes to cost reductions through effective supplier selection, negotiation, and contract management. These cost savings can be reinvested into the supply chain to enhance infrastructure, adopt new technologies, and improve logistics processes,

thereby driving performance (Ruel et al., 2021). Efficient procurement practices also enable firms to achieve economies of scale and optimize resource allocation, further boosting supply chain performance. Through PPO, firms can establish collaborative relationships with suppliers, ensuring better communication, trust, and alignment of goals. Collaborative procurement practices foster mutual benefits, such as improved quality, reduced costs, and timely deliveries, which directly impact supply chain efficiency and effectiveness (Ivanov & Dolgui, 2020). Supplier collaboration also enables the integration of innovative practices, further enhancing supply chain resilience and adaptability. Optimized procurement reduces supply chain risks by diversifying suppliers, implementing robust sourcing strategies, and maintaining transparency in procurement activities. Effective risk mitigation ensures the uninterrupted flow of goods and services, which is critical to achieving high supply chain performance (Hohenstein et al., 2021). By anticipating and addressing potential disruptions, procurement optimization enhances the reliability and robustness of the supply chain.

Direct Effect of Procurement Process Optimization on Information Technology Integration

There is a strong positive direct effect of Procurement Process Optimization on Information Technology Integration. Optimized procurement processes often require automation to streamline repetitive tasks such as order placements, invoice processing, and supplier communications. This reliance on technology drives IT integration as organizations implement systems like Enterprise Resource Planning (ERP) and Electronic Data Interchange (EDI) to manage procurement activities more effectively (Gunasekaran et al., 2020). Procurement optimization emphasizes the need for accurate and real-time data to improve decision-making. IT systems enable real-time data sharing between procurement teams and suppliers, enhancing collaboration and efficiency (Ivanov & Dolgui, 2020). This alignment necessitates robust IT integration to ensure seamless data flow across the supply chain. Optimized procurement processes often utilize Decision Support Systems (DSS) for better forecasting, scenario analysis, and supplier evaluation. DSS relies on integrated IT systems to aggregate and analyze data, making IT integration a natural consequence of procurement optimization (Li et al., 2022). Such systems help procurement teams align their strategies with organizational goals. Modern procurement strategies emphasize collaboration with suppliers to improve efficiency. This collaboration frequently involves digital platforms that facilitate communication, document exchange, and order tracking, thus promoting IT integration (Kumar et al., 2021). For instance, EDI systems reduce manual processes, thereby integrating IT solutions into procurement workflows.

Direct Effect of Information Technology Integration on Firm Supply Chain Performance

Information Technology Integration directly enhances supply chain performance by enabling real-time data sharing, automation, and decision support systems, leading to cost efficiency, reduced delivery lead times, and improved customer satisfaction. ITI enhances supply chain performance by automating manual processes, such as inventory management, order tracking, and procurement, thereby reducing errors and processing times. Automation streamlines operations and allows

supply chains to meet customer demands with greater accuracy and speed (Kamble et al., 2020). For instance, integrated Enterprise Resource Planning (ERP) systems facilitate real-time tracking of inventory levels, enabling better demand forecasting and resource allocation. By providing access to real-time data and analytics, IT systems improve decision-making. Decision Support Systems (DSS) enable supply chain managers to evaluate multiple scenarios and choose optimal solutions quickly. Zhu et al. (2023) emphasize that ITI empowers supply chain managers with actionable insights, allowing firms to respond effectively to demand fluctuations or supply disruptions. IT integration ensures that supply chains remain agile and capable of adapting to dynamic market conditions. With tools like predictive analytics and advanced planning systems, firms can anticipate and address changes in demand or supply, thereby maintaining high levels of performance. Li et al. (2022) found that IT-enabled supply chains demonstrate superior responsiveness and customer satisfaction.

Indirect Effect of Procurement Process Optimization through Information Technology Integration on Firm Supply Chain Performance

Information Technology Integration positively mediates the relationship between Procurement Process Optimization and Firm Supply Chain Performance mediated. Procurement does not operate in isolation; its success depends on its integration with other supply chain functions such as inventory management, logistics, and production planning. ITI creates a unified digital ecosystem that connects these functions, ensuring that procurement optimizations are effectively translated into improved supply chain performance. Li et al. (2022) observed that IT integration allows firms to reduce lead times and improve service levels by ensuring procurement aligns with supply chain operations. Information Technology Integration amplifies the benefits of Procurement Process Optimization by digitizing procurement workflows, automating routine tasks, and facilitating real-time data exchange. Gunasekaran et al. (2020) argue that ITI helps organizations identify the best procurement strategies by integrating data analytics and predictive tools into procurement processes. This integration reduces inefficiencies, ensuring that PPO efforts yield greater performance outcomes.

5. Conclusions

Procurement Process Optimization (PPO) has both direct and indirect positive effects on Firm Supply Chain Performance (FSCP). Procurement Process Optimization improves Firm Supply Chain Performance by streamlining procurement activities, reducing inefficiencies, and fostering operational agility. Information Technology Integration (ITI) plays a dual role: it directly enhances Firm Supply Chain Performance by enabling automation, real-time data sharing, and decision-making capabilities, and it mediates the relationship between Procurement Process Optimization and Firm Supply Chain Performance. This mediating role emphasizes the importance of Information Technology Integration in translating optimized procurement processes into superior supply chain outcomes. Together, Procurement Process Optimization and Information Technology Integration create a synergistic framework that maximizes supply chain performance, reducing

costs, improving delivery accuracy, and achieving operational excellence. Organizations seeking to enhance FSCP should focus on integrating IT systems with optimized procurement practices.

5.1 Theoretical Implication

The finding that Information Technology Integration (ITI) positively mediates the relationship between Procurement Process Optimization (PPO) and Firm Supply Chain Performance (FSCP) carries significant theoretical implications for the field of supply chain management and related academic literature. This result highlights the evolving role of information technology as a critical enabler of effective procurement processes and enhanced supply chain outcomes. The study reinforces the RBV theory, which posits that firms can achieve a competitive advantage by leveraging valuable, rare, inimitable, and non-substitutable resources (Barney, 1991). ITI serves as an intangible resource that amplifies the effectiveness of PPO, which in turn drives improvements in FSCP. The positive mediation of ITI suggests that organizational resources—particularly those related to technology—can facilitate and optimize the use of procurement processes to enhance overall supply chain performance. This provides further support for the importance of technology integration in achieving operational excellence. The findings contribute to the stream of literature that integrates operations management with information technology management. Traditionally, operations management literature focused on the optimization of processes and efficiency improvements, while IT was seen as an enabling function. The mediating role of ITI suggests that IT is no longer just a supportive tool but a central component that enhances operational strategies. This integration helps to reconcile the operational and IT perspectives within the field of supply chain management, advancing our understanding of how these dimensions interact.

5.2 Managerial Implication

The finding that Information Technology Integration (ITI) positively mediates the relationship between Procurement Process Optimization (PPO) and Firm Supply Chain Performance (FSCP) carries significant managerial implications. Managers and leaders in supply chain, procurement, and IT departments can leverage this knowledge to enhance operational efficiency, competitiveness, and overall performance. The results suggest that information technology plays a critical role in optimizing procurement processes. Managers should recognize the importance of investing in advanced IT systems (such as ERP systems, EDI platforms, or decision support systems) to facilitate the integration of procurement processes. This investment will not only streamline procurement tasks but also enable real-time data sharing, decision-making, and process automation, leading to better procurement outcomes and stronger supply chain performance.

The study highlights the need for an integrated approach to procurement strategy and IT strategy. Managers should align these two functions to ensure that technology supports procurement objectives such as cost reduction, timely deliveries, and better supplier relationships. By fostering collaboration between IT and procurement departments, firms can ensure that technological

solutions directly support procurement optimization efforts, improving both operational efficiency and decision-making capabilities.

The direct impact of Information Technology Integration on firm supply chain performance suggests that IT systems can improve decision-making by providing real-time data, scenario planning tools, and performance analytics. Managers should ensure that the IT infrastructure allows for seamless data flow across the supply chain, enabling more accurate and timely decision-making. The use of Decision Support Systems (DSS), for instance, can aid managers in making strategic decisions that positively influence supply chain performance.

The study emphasizes the role of IT in automating procurement processes and reducing operational errors. Managers should focus on automating routine tasks such as inventory management, order processing, and supplier communication. Automation can not only reduce costs but also improve accuracy and speed, leading to higher supply chain efficiency. Managers should prioritize the adoption of technologies that enable end-to-end automation, facilitating smoother and faster supply chain operations.

The study underscores the importance of IT in enhancing supply chain collaboration. Managers should consider implementing collaborative technologies such as cloud-based platforms or EDI systems to share information in real time with suppliers and partners. By doing so, firms can ensure greater alignment across the supply chain, improve transparency, and foster stronger relationships with suppliers. This collaborative approach can lead to more efficient and responsive supply chains, ultimately improving overall performance.

5.3 Recommendations

Organizations should prioritize investments in IT systems that enhance the integration of procurement processes. This includes systems such as Enterprise Resource Planning (ERP) software, Electronic Data Interchange (EDI) platforms, and Cloud-based Supply Chain Management tools. These technologies enable seamless data flow across departments, streamline procurement activities, and facilitate real-time decision-making, ultimately boosting supply chain performance.

For Information Technology Integration to effectively mediate procurement optimization, there needs to be close alignment between the procurement and IT departments. Managers should create collaborative spaces where both teams work together to design and implement technology solutions that directly address procurement challenges, such as automating procurement tasks, improving supplier communication, and enhancing data analytics.

The success of IT integration depends on the ability of employees to effectively use the technology. It is critical for training programs to be developed that focus on increasing the IT literacy of procurement teams, ensuring they are proficient in using digital tools that support procurement

and supply chain processes. This training should cover the functionalities of IT systems and their role in improving operational efficiency, reducing errors, and enhancing decision-making.

IT systems offer valuable insights through real-time data sharing and analytics. To leverage the full potential of IT integration, firms should emphasize a data-driven approach to decision-making. Procurement managers should use data collected from integrated IT systems to assess supplier performance, track procurement efficiency, and forecast supply chain trends. This leads to more informed decisions that improve overall supply chain outcomes.

Automation is a key benefit of IT integration. By automating routine procurement processes like order processing, inventory management, and supplier communications, organizations can reduce human errors, cut operational costs, and accelerate procurement cycles. Automating these processes allows procurement teams to focus on more strategic activities, improving the overall effectiveness of the procurement function.

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