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Exploring the Impact of Supply Chain Drivers on Performance with Mediating Role of Supply Chain Flexibility in Pakistan's Perspective

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ABSTRACT

This research paper is a study examining the role of the key drivers of the supply chains integration, information sharing, adoption of technology, supplier relationship, and logistics capability in enhancing the performance of the organization in the context of the Pakistan manufacturing and FMCG industries through the mediated effect of the supply chain flexibility (SCF). The research, which serves to fill the longstanding performance variation between high-performing and underperforming in the emerging markets, is based on the Resource-Based View (RBV) and Organizational Information Processing Theory (OIPT), which proposes the flexibility to turn the strategic resources into the operational excellence. The design adopted a quantitative and cross-sectional survey done among industrial companies using structured questionnaires. SmartPLS 4 was used to analyze the direct and indirect relationships using the Partial Least Squares Structural Equation Modeling (PLS-SEM). Findings verify that the supplier relationship ($b = 0.367$, $p < 0.05$) and logistics capability ($b = 0.449$, $p < 0.05$) do have significant influence over SCF which positively contributes to the supply chain performance ($b = 0.302$, $p < 0.05$). Nonetheless, there were poor effects on integration, information sharing and uptake of technology as well as the role uncertainty in the environment did not significantly moderate the effect of flexibility on performance. The study contributes to RBV and OIPT by putting them into context of the industrial situation within Pakistan to provide some theory, empirical, and managerial information on how to create flexible, data-driven, and resilient supply chains that are effective and capable of sustaining performance in an uncertain situation.

Introduction

The growing complexity of worldwide markets, rivalry and rising customer demands, has integrated the supply chain performance to be a primary factor of organizational success. With companies aiming to enhance efficiency and responsiveness in their operations, supply chain drivers like integration, sharing of information, adoption of technology, relationship with suppliers, and logistics capability has come under more importance to companies. The supply chain integration integrates internal and external operations to achieve the best coordination and minimize redundancy by developing a seamless flow of materials and information (Flynn et al., 2010). On the same note, information sharing enhances quality in decision-making by making real time information available to all the stakeholders hence eliminating uncertainties and increasing trust (Cai et al., 2010). In the third world economies like Pakistan, where the industrial systems are developing with infrastructural, informational, and coordination challenges, proper management of these drivers is at the center stage in attaining the results of sustainable performance. The endeavor of the integrated and agile supply chain is not only a strategic requirement, but a competitive edge in dynamic business environments (Christopher and Holweg, 2011).

Industrial sector in Pakistan is very central in the economic development of the country, employment, and other international trade activities. The manufacturing and fast-moving consumer goods (FMCG) industries, specifically, represent one of the biggest ingredients of the Pakistani GDP and supply chain network. These industries are however in a very uncertain environment with a lot of infrastructural inefficiencies, check change demands, energy crisis, and changes in policy. These challenges impede effective operations of the supply chain and hence, flexibility and responsiveness are essential attributes to sustainability of industries. Supply chain resilience can be enhanced through the introduction of adaptive mechanisms and responsive information processing, which, in turn, will promote performance amid disruption mitigation as Dubey et al. (2022) stressed. In the same vein, Yang et al. (2021) and Pan et al. (2021)) concluded that responsiveness contributes greatly to customer development and competitiveness that is fundamental in FMCG markets where the product life cycle is brief, and customer demands are dynamic. The industries in Pakistan should, therefore, prioritise on incorporating supply chain drivers, which will boost flexibility and responsiveness to switch between the turbulent conditions and sustainable performance.

Problem Statement

The current business world has become dynamic and now, supply chain issues have become more complex because companies must constantly upgrade both their operational and strategic capabilities. In spite of the progress of digitalization and integration at the global scale and predictive logistics form, there are still several developing economies such as Pakistan which fail to match their supply chain drivers and their performance outcomes. The manufacturing and FMCG sector in Pakistan is functioning in extraordinarily uncertain environmental conditions, infrastructure constraints, as well as disintegrated networks of suppliers that impede effective coordination. Companies are notorious in missing the smooth flow between the suppliers, manufacturers, and distributors, and this causes delays in deliveries, higher costs, and lower responsiveness (Christopher and Holweg, 2011). Such inefficiencies are exacerbated by the inadequate exchange of information and insufficient adherence to technologies, which dilute the chances to predict changes in the market and respond to them successfully (Cai et al., 2010; Dubey et al., 2018). As a result, we can have a consistent performance gap, in which, companies cannot translate strategic resources into operational outcomes, and thus, there is a need to explore the processes involved in connecting supply chain drivers and firm performance.

Research Questions

1. How do key supply chain drivers such as supply chain integration, information sharing, technology adoption, supplier relationship, and logistics capability influence supply chain flexibility within the industrial sector of Pakistan?
2. What is the effect of supply chain flexibility on overall supply chain performance in terms of cost efficiency, delivery reliability, product quality, and responsiveness?
3. Does supply chain flexibility mediate the relationship between supply chain drivers and supply chain performance in Pakistan's manufacturing and FMCG industries?
4. How do contextual factors such as environmental uncertainty, infrastructure limitations, and digital readiness influence the effectiveness of supply chain drivers in enhancing flexibility and performance in Pakistan's industrial sector?

Research Objectives

The main aim of the research is to investigate the relationship between drivers of the supply chain and the organizational performance based on the mediation of supply chain flexibility in the industrial setting of Pakistan. Over the past few years, global trade has grown very volatile, competition has increased and technology has improved, leading to high expectations of organizations in coming up with responsive and flexible supply chains. Flynn et al. (2010) noted that supply chain integration constitutes a factor that is vital in aligning both internal and external operations resulting in better coordination and less inefficiency it brings about. On the same note, visibility within the supply chain is facilitated by good information sharing, which helps to make decisions in a timely manner and reduce uncertainty (Cai et al., 2010). The aim of the study is to determine the direct effect of these strategic and operational forces like integration, adoption of new technology, relationship with the suppliers and the capability of the organization to perform logistics on the performance of the organizational goals. The aim is to establish the degree in which these enablers are generating key performance indicators such as cost efficiency, responsiveness and product quality which are critical in sustaining competitive advantage in Pakistani industrial sector (Christopher and Holweg, 2011).

Research Significance

The study has a number of theoretical and practical implications to the field of supply chain management, especially in economic systems like the developing Pakistan. Theoretically, the research builds upon the Resource-Based View (RBV) and Organizational Information Processing Theory (OIPT) by investigating the interaction between internal resources including integration, flow of information, and technological capabilities with external supply chain relationships in determining the impact of these relationships on performance opportunities. Hitt et al. (2019) highlight that the experience of a sustained competitive advantage may be attained when firms are successful in managing their precious, rare and non-substitutable resources. Flexibility, highlighted by Das (2011) and Manders et al. (2016), is one such dynamism capable of allowing firms to re-engineer the operations whenever they become uncertain. This study, with empirical analysis of flexibility as a mediator of the relationship between supply chain drivers and performance, contributes to the theoretical knowledge of the mechanisms of adapting strategic enablers into practical performance improvements.

Literature Review

The history of the supply chain management has not been as usual cost-based supply chain approach, but rather a strategic integrated and technological-based systems aimed at providing high performance. The key drivers of this transformation are supply chain drivers which include integration, exchange of information, use of technology, supplier relationship and capability of the logistics which sum total to the efficiency and responsiveness of the operations of an organization (Yang et al., 2021; Ning et al., 2023). According to Flynn et al. (2010), supply chain integration leads to alignment of processes, creation of better coordination, and reduction of redundancies across organizational borders, which in fact leads to improved operational results. In the same fashion, Cai et al. (2010) underlined that there is an increase in the accuracy of decisions and decrease in uncertainties caused by transparent sharing of information resulting in better performance. Adoption of technology is central in bringing this change, with companies using digital solutions having real-time visibility and predictive analytics features that make them more agile (Ben-Daya et al., 2017). Collaboration among the suppliers also plays a role in performance through encouraging trust and establishing common objectives and solving of problems together (Carr, Pearson, 1999). This type of drivers in the developing economy like in the case of Pakistan is crucial to breaking structural inefficiencies and making industries competitive (Christopher and Holweg, 2011).

Supply Chain Integration is a process of strategic coordination and collaborations of steps taken by the inner functions and external partners, which smooth operations (Li et al., 2023; Ali et al., 2024). It links suppliers, manufacturers, and distributors together using the coordinates of workflow and information exchange with the aim of maximizing responsiveness and efficiency. Flynn et al. (2010) argue that the process of integration brings about conformity between members of the supply chain, and organizations are able to realize enhanced utilization of resources, improved delivery and quality of products. Integration is done on three planes internal, supplier, and customer integration all of which lead to a harmony in the system. Cai et al. (2010) also pointed out that information asymmetry is minimized as a result of integration due to the creating of mutual trust and transparency between the supply chain stakeholders that translates into improved operational performance. Here in Pakistan, supply network is disjointed and in many instances, disconnected digitally, integration is a tactical requirement to address coordination concerns and maintain performance. Christopher and Holweg (2011) reasoned that in turbulent markets, highly integrated supply chains outlook decentralized structures because of the faster decision-making process and because of less redundancy. Thus, SCI is the foundation of agile and performance-based supply chains, and it has a direct impact on the performance of firms in dynamic settings.

Theoretical Framework

Resource-Based View (RBV)

This paper is based on the Resource-Based View (RBV) that interprets how companies can obtain sustainable competitive advantage based on the good management of valuable resources, rare ones and inimitable and non-substitutable resources (Hitt et al., 2019, and Ma et al., 2025). Within the framework of the supply chain management context, RBV states that the internal capabilities like technology, integration capacities and information systems are important enablers to high performance when effectively coordinated to the organizational strategy. Das (2011) lists flexibility as one of the most strategic intangible resources that help a firm to be quick in responding to indispensable environmental volatility. In the context of the industrial environment

in Pakistan, with its stability of the market situation, instability of infrastructure, and uncertainty in supply, the potential to dynamically restructure resources can become one of the primary competitive advantages. Flexibility can allow the organization to adjust to various contingencies of operations, hence enhancing performance in the long run as Manders et al. (2016) asserted. Therefore, using the RBV lens, such drivers of a supply chain like integration, sharing information, adoption of technology, collaboration with suppliers and the ability to have a strong logistics is perceived as strategic resources that create value due to mediating power of supply chain flexibility.

Dynamic Capabilities Theory (DCT)

More based on them, the Dynamic Capabilities Theory (DCT) is a supportive prism that can help to bridge the gap between resource ownership and adaptive performance. Dynamic capabilities can be described as the capacity of an organization to integrate, develop and reorganize internal and external competencies into the responses to a fast-changing environment (Tiwari et al., 2024).

In the field of supply chain, the theory underlines that excellence in performance is not necessarily determined by having valuable resources but by repeatedly adapting and redeploying them to keep up with the competition. Dubey et al. (2018) pointed out that dynamic capabilities are outcomes of agility and adaptability, which can keep firm alive in an unpredictable and turbulent environment. The DCT approach is especially applicable in the developing economies such as Pakistan where the necessity to reconfigure the processes, suppliers and logistics systems is common. Hence, coupled with RBV, DCT rationalizes the process of operational transformation that involves the transformation of supply chain drivers into flexibility and, accordingly, into improved performance (Xue & Li, 2023; Zhang et al., 2023).

Positive and Opposite Views

The literature is highly supportive of the affirmative impact of the drivers of supply chain that include integration, information sharing, supplier relationship, logistics capability as well as the adoption of technology in improving the flexibility of the supply chains (Chen et al., 2023). Flynn et al. (2010), posited that integration among the suppliers, manufacturers and distributors would help in coordinated decision making hence enhancing flexibility and adaptability in operations. Cai et al. (2010) on the same note pointed out that good information sharing contributes to enhancing alignment and minimizing uncertainty so that the firm can react quickly to market fluctuations. Ben-Daya et al. (2017) report that implementing modern technologies (IoT, digital analytics, and automation) promote the responsibility and visibility of supply chains. The collaboration between suppliers also enables adaptive capacity, based on trust and collective goals to make fast response to disruptions (Carr and Pearson, 1999). Such opinions indicate that strategic incorporation and data-driven coordination change conventional supply chains to responsive and data-driven ecosystems. These drivers are critical enabling factors towards flexibility and resilience in the context of industrial environment in Pakistan, where the external shocks and infrastructural restraint continue to be common (Christopher and Holweg, 2011).

Mediation and Moderation Perspective

The mediation concept is used to put central arguments in how the drivers of supply chain can be subjected into better performance outcomes through supply chain flexibility. Supply chain flexibility (SCF) is the mediating factor which, upon input of strategy and operations elements, including integration, technology, collaboration with suppliers, and logistics capability, turns them into responsive and efficient outputs (He et al., 2024).. According to Manders et al., flexibility can be described as the capacity of the organization to change and adapt to the shifts in customer

needs, market and supply-related interruptions (2016). In that matter, the concept of flexibility can be taken as the manifestation of resource-based advantages in their operational form (Hitt et al., 2019). The Resource-Based View (RBV) indicates that resources including integration and technology are the foundation although the value is created by the implementation of these resources using flexible systems. Das (2011) indicated that high flexibility firms are able to cope with uncertainty without sustaining gross costs hence ensuring a uniform performance. Flexibility is an important facilitator in the industrial environment of Pakistan where companies have to perform in unstable conditions with limited infrastructure and can transform the fixed capabilities into the dynamic outcomes of operations. Mediation with flexibility therefore availed the means through which the strategic supply chain drivers can be delivered to give quantifiable performance benefits.

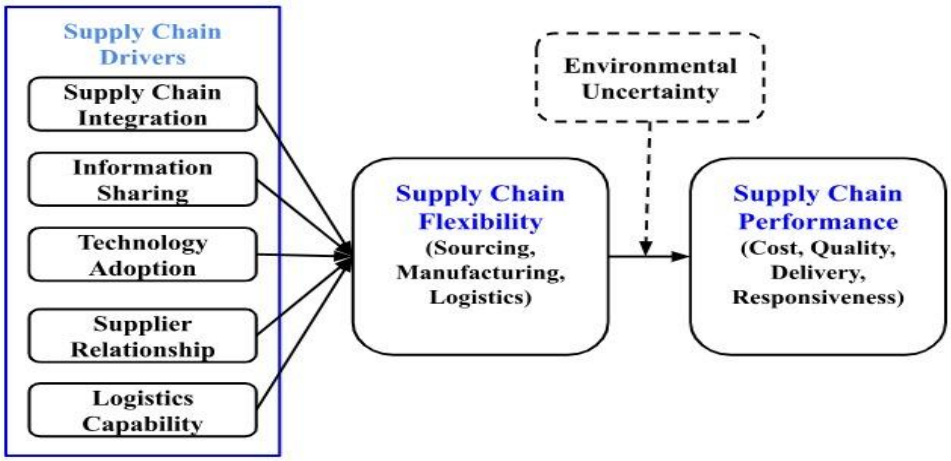

Figure 1 Conceptual Framework

Hypothesis Development

Supply Chain Integration and Supply Chain Flexibility

SCI has been generally accepted as an elementary facilitator of operational elasticity and responsiveness. Yang et al. (2021) claimed that internal functional and external partner integration improves coordination, sharing of resources, and alignment between processes to increase the adaptability of the supply networks. Cai et al. (2010) demonstrated that integrated systems can be used to facilitate fast decision-making and offer real-time responses to disruptions. Moreover, integration increases transparency and boosts team work within extremely competitive environments whereby a firm can change sourcing and manufacturing strategies as the level of demand changes, as opined by Christopher and Holweg (2011). With volatile situations in the market, integration in Pakistan implies structural coherence and agility-based characteristics of supply chain flexibility.

H1: Supply chain integration has a significant positive effect on supply chain flexibility.

Information Sharing and Supply Chain Flexibility

The visibility of the supply chain partners, their synchronization, and trust can be improved through information sharing, which will, in turn, foster the flexibility together (Ye et al., 2022). Indicatively, Cai et al. (2010) established that the speed of response and reduction of the bullwhip effect in supply chains can be achieved through transparent sharing of information because each partner can access real-time updated information. Likewise, Ben-Daya et al. (2017) argued that

IoT and cloud analytics enable organizations to predict disruptions prior to their occurrence through digital platforms of information sharing and hence amend their operations. During the fluctuating industrial environment of Pakistan, effective flow of information helps in the coordination of suppliers and distributors in a bid to transform the supply networks into being dynamic and resilient.

H2: Information sharing positively influences supply chain flexibility.

Technology Adoption and Supply Chain Flexibility

Adoption of technology is a source of supply chain flexibility since it is amenable to real-time tracking, forecasting, and automation (Chen et al., 2023). Ben-Daya et al. (2017) also observed that such technologies as IoT, automation, and digital analytics contribute to increased traceability and agility by allowing companies to reorganize fast. An additional factor found by Helo and Shamsuzzoha (2020) is that the blockchain integration enhances the transparency and responsiveness of the supply networks. The implementation of digital technologies in the manufacturing and FMCG sectors of Pakistan allows companies to overcome the conventional inefficiencies of the processes and improve the ability of their processes to adapt to changing operational conditions.

H3: Technology adoption has a significant positive impact on supply chain flexibility.

Supplier Relationship and Supply Chain Flexibility

Supplier relationships have an important role in building responsive and flexible supply chains (Li et al., 2023). As Carr and Pearson (1999) demonstrated, the qualities of communications, mutual trust and solving problems inherent in the supplier relations are fostered in a collaborative relationship so characteristic of flexibility. The inclusion of the suppliers in production and planning enables firms to make instant decisions in procurement and planning to fit the fluctuations of demand in the markets. In Pakistan, good supplier relations minimize chances of interruption in supplies and speed up adjustive reactiveness.

H4: Supplier relationship has a significant positive effect on supply chain flexibility.

Logistics Capability and Supply Chain Flexibility

Flexibility is enhanced by logistics capability since it increases transport efficiency, inventory management and accuracy of delivery. Holweg and Christopher (2011) posited that properly coordinated logistics systems enable companies to effectively react to the demand variability and avail the necessary supply of the products. Correspondently, He et al. (2024) stated that the key to the agility of logistics is the real-time route optimization, which is accompanied by the responsiveness of the warehouse. Better logistics environment in the Pakistani industrial environment will allow companies to change distribution schedules and sourcing routes dynamically to provide continuity in case of uncertainty.

H5: Logistics capability has a significant positive impact on supply chain flexibility.

Supply Chain Drivers, Supply Chain Flexibility and Supply Chain Performance

In this regard, the mediating role of SCF has been generally embraced as a process by which the drivers of supply chain have provided the path to improvement of a high-quality performance (Ali et al., 2024).

Manders et al. (2016) hypothesize that flexibility enables the firms to implement sourcing, manufacturing and logistics in an efficient way to respond to volatile environments through transforming the strategic inputs into actual outputs. Das (2011) also elevated the opinion that flexibility improves operational responsiveness by lowering costs which is an entrepreneurial dynamic capability that links structural resources and performance. Flynn et al. (2010) did not stop, and put forward the postulation that integration and information sharing enable firms to be adaptive, and technological adoption and supplier collaboration raise process reconfiguration and agility. As an illustration, flexibility fills the tactical plan, X and implementation influx in the ruthless industrial setting of Pakistan where companies in spite of infrastructural or market obstacle, keep worker delight by delivering reliably. Expertise in such a scenario, flexibility serves as more of a medium channel through which integration, sharing of information and adoption of technology is converted to cost effective and responsive supply chains.

H6: Supply chain flexibility mediates the relationship between supply chain drivers and supply chain performance.

Supply Chain Flexibility, Environmental Uncertainty and Supply Chain Performance

EU is a negotiator of the correlation between flexibility and performance accordingly that it enhances the usefulness of adaptive capability under volatile circumstances (Ning et al., 2023). According to Daft and Lengel (1986), companies in a risky environment require a high level of information processing systems to aid them in coping with such risks. In this regard, flexibility contributes to the facilitation of performance because it is beneficial to firms to reposition resources and operations in a short time. Christopher and Holweg (2011) also state that flexible supply chains are superior to rigid systems in cases of large environmental uncertainty with regard to the demand or supply. Along the same lines, Dubey et al. (2018) point out that under the uncertain circumstances, flexible firms may resort to technology and information integration in order to be competitive.

H7: Environmental uncertainty positively moderates the relationship between supply chain flexibility and supply chain performance, such that the relationship is stronger under high uncertainty conditions.

Technology Adoption, Supply Chain Flexibility and Supply Chain Performance

Introduction of technology enhances the supply chain performance primarily due to the fact that it affects the flexibility (Zhang et al., 2023). Ben-Daya et al. (2017) contended that when firms apply digital technologies, such as internet of things, data analytics and automation, they could rapidly adapt to environmental change hence establishing the supply chain agility. Nor did not Helo and Shamsuzzoha (2020) say that the integration and digital networks of blockchain leads to increased traceability and transparency, which is a factor of operational responsiveness. Dubey et al. (2018) confirmed that real-time information processing capacity is one of the factors that is much higher in the firms that rely on sophisticated technology tools that assist them in re-configuring the processes and sustain their performance in the context of volatility.

H8: Supply chain flexibility mediates the relationship between technology adoption and supply chain performance.

Supplier Relationship, Environmental Uncertainty and Supply Chain Performance

The cooperation of suppliers is even more significant when the circumstances in the environment are characterized by uncertainty, and it serves as a stabilizing factor that enhances performance

results. As demonstrated by Carr and Pearson (1999), trust based supplier relationship enhances the coordination and the interplay of flexibility and trust relationship yields responsiveness in responding to turbulence in the market. Dubey et al. (2018) also suggested that an efficient cooperation of a supplier can provide a quick adaptation to the changes in the demand or logistics. Close ties with suppliers in high contextual volatile countries such as Pakistan give companies a chance to distribute risks, contingency resources, and set quality and delivery schedules that are consistent. There is the fortification of the moderating role of the environmental uncertainty through collaboration, as per Christopher and Holweg (2011), in transforming unpredictability into action that is coordinated. Accordingly, collaboration of suppliers will increase the flexibility-performance connection upon the increase in uncertainty increasing the stability in operation and competitive performance.

H9: Environmental uncertainty moderates the relationship between supplier relationship and supply chain performance such that the relationship is stronger under high uncertainty conditions.

Conceptualization

The current study conceptualizes a framework that balances the Resource-Based View (RBV) with the operational supply chain theories to explain how the above elements of the supply chain namely integration, information exchange, technology adoption, supplier relationship, and logistics capability have induced performance by the mediating mechanism of supply chain flexibility. Environmental uncertainty is also a contextual moderator considered in the model that will affect the flexibility performance relationship in the model. Since Flynn et al. (2010) and Cai et al. (2010) assumed that the presence of effective integration and information sharing therefore contributes to a higher degree of synchronization and coordination and Ben-Daya et al. (2017) and Helo and Shamsuzzoha (2020) stated that the adoption of technology enhances the visibility and agility. Logistics capability and supplier collaboration are the relational and structural capabilities that lead to flexible and responsive operations (Carr and Pearson,1999; Christopher and Holweg,2011). The framework is based on RBV and considers flexibility, a high-value, scarce strength that changes the strategic resources into quantifiable performance results (Hitt et al., 2019). The model is also in harmony with Organizational Information Processing Theory (Daft and Lengel, 1986), which is used to reveal the explanation of the flow of information and digital tools that decrease uncertainty and facilitate decision-making in a shorter period of time. Environments that are volatile like Pakistan increase the importance of flexibility, and flexibility is affirmed as a mediator and a mechanism of strategic response (Dubey et al., 2018; Neboh and Mbhele, 2021). The conceptualization therefore, integrates internal competencies, external integration and environmental volatility on a single theoretical framework that relates the forces of supply chain to better cost, quality and responsiveness performance deliverables.

Research Methodology

Research Design

The research is quantitative research because it aims at empirically determining the relationship among measurable constructs, supply chain drivers, supply chain flexibility, environmental uncertainty, and supply chain performance in the Pakistan industrial sector. Quantitative research provides the researcher with an opportunity to test hypotheses, draw causal relationships, and generalize results on a bigger group of people based on numerical data (Dubey et al., 2018). This is the best method to observe the observable trends and statistical correlations, as the study aims to figure out the role of the strategic drivers in achieving its performance results due to their flexibility. The study by Flynn et al. (2010) and Manders et al. (2016) also utilizes the quantitative

designs to analyze how integration and flexibility affect operational performance. Moreover, the manufacturing and FMCG divisions of Pakistan are a perfect scenario of quantitative evaluation since the processes of their functioning and logistical systems are extremely organized, and it is possible to perform evaluation in the same way with respondents. Thus, a quantitative design guarantees the objective assessment of the suggested relationships through valid assessment measures and tested survey items.

The research design that the study uses is cross-sectional research design, and the researchers gather data at one time to represent the organizational practice, perceptions and performance outcomes as they are at the time. Cross-sectional designs are specifically good in investigating structural relationships between variables but with less implications on time (Cai et al., 2010). This design is in line with the conceptual framework which incorporates the introduction of supply chain drivers (integration, information sharing, technology adoption, supplier relationship and logistics capability) as independent variables, supply chain flexibility as moderating variable, supply chain performance as dependent variable and environmental uncertainty as moderator. These structured models are referred to by Hitt et al. (2019) as enabling the researcher to test the complex causal relationships within the organization systems using statistical methods such as Structural Equation Modeling (SEM). SmartPLS 4 software in the current study will make possible testing both direct and indirect paths giving an opportunity to assess mediation and moderation effects in a rigorous way. The cross-sectional nature also serves as an added benefit to the Resource-Based View (RBV) and Organizational Information Processing Theory (OIPT) as it confirms the simultaneous effectiveness of the impact of internal resources and information-processing capabilities on performance.

The choice of a quantitative research design can also be explained by the fact the study seeks to test pre-established hypotheses and quantify statistically significant associations between observable constructs supply chain drivers, supply chain flexibility, environmental uncertainty, and performance. Quantitative approaches help researchers to examine causal relationships, generalization, and objectivity in the interpretation (Dubey et al., 2018). Flynn et al. (2010) argue that quantitative designs are used extensively in supply chain integration and performance research due to the fact that they provide the possibility of testing intricate structural relationships among the variables in the research empirically. In this study, standardized scales adopted by earlier reliable studies were used as done by the authors to bring accuracy and reliability in the measurement of the data. The industrial environment of Pakistan with its large variety of industries in the form of manufacturing, textiles, and FMCG also indicates that the quantitative approach is highly appropriate in this context since variables like flexibility and responsiveness are measurable and can be measured in numbers. Therefore, the design offers a strong scheme to measure the effects of the strategic drivers on the performance outputs by statistical modeling methods like the Partial Least Squares Structural Equation Modeling (PLS-SEM).

The rationale of the research design that will be adopted is the cross-sectional research design that will be necessary to measure the current operational practices and perceptions of supply chain management at a particular time period. Supply chain studies that are cross-sectionally conducted are highly prevalent when the desired result is the determination and appraisal of relationships, but not time series changes (Cai et al., 2010). We shall pick up firms in the manufacturing and FMCG industries of Pakistan and gather data concurrently on firms in both studies in order to determine the effects of integration, use of technology, relations between the firms and their suppliers as well as their logistics capabilities in the three studies in modifying flexibility and performance. As Manders et al. (2016) put it, cross-sectional designs are suitable to mediation and moderation relationships testing since they enable a researcher to capture the overall behavioral snapshot of

organizations without the necessity of a longitudinal study. In addition, the unstable industrial context of Pakistan where policies, markets, and technologies change swiftly require an efficacious evaluation of practices at a given moment other than a prolonged observation duration. Such design therefore has efficiency as well as relevancy as it can be used as a realistic replication of how the firms currently utilize supply chain strategies to achieve performance resilience during uncertain times.

The quantitative explanatory nature of the design can be used to test hypotheses and validate the presence of relationships statistically and this is necessary to establish the mediation role of flexibility between supply chain drivers and performance outcomes. Quantitative methods have special usefulness in studying structured cause-and-effect relationships with large samples of respondents (Dubey et al., 2018). As Manders et al. (2016) highlighted, explanatory studies within the history of supply chain management can be used to explain how internal and external enablers can work together in ensuring increased flexibility and adaptability. The design will aid the objective interpretation of results and reproducibility across firms since these relationships are quantified. The explanatory dimension also fits well in the RBV concept that resources are only converted to competitive advantage when they are efficiently used using the strategic processes such as flexibility (Das, 2011). This method makes the presence of the relationships available but also the mechanism through which the resources mediate the outcomes. Since the scenario is fast-industrializing and empirical evidence of digitalization and assimilation in Pakistan are limited, an explanatory quantitative design provides accuracy, lucidity, and generalisability in determining how the flexibility can turn the drivers of operations to a robust performance outcome.

A primary mode of data collection will be adopted in this research study by use of a structured survey questionnaire to be given to the professionals in the manufacturing and FMCG sector in Pakistan. There will be both physical and online administration of the survey to facilitate access and coverage in terms of regions and levels of operation. Structured questionnaires are appropriate to conduct quantitative research on the supply chain because the research recommended by Flynn et al. (2010) and Manders et al. (2016) is standardized, and it is readily analyzed statistically. The questionnaire shall consist of Likert-scale questions that will evaluate the supply chain drivers, flexibility, performance, and environmental uncertainty. A small-scale pilot study will be done before the overall administration in order to test item clarity and reliability. The data will be gathered over a period of about eight weeks so as to be representative enough in terms of size of the firm, industry, and the managerial positions so as to be representative. According to Dubey et al. (2018), issues of data confidentiality and respondent anonymity will be upheld because it will enhance accuracy in responses and bias reduction. The research will adhere to the ethical standards of research integrity because the review board of the university will give the researchers ethical approval.

Sampling

Non-probability purposive will be used in the study whereby professionals who have firsthand experience in the operations of the supply chain will be considered. Purposive sampling will be used to make sure that only individuals who are knowledgeable to offer proper insights on flexibility, technology adoption and performance will be selected (Das, 2011). Since the industrial sector of Pakistan is very diverse, the anticipated sample population should cover between 385 respondents as Flynn et al. (2010) suggest in SEM-based researches to have enough statistical power. The respondent will be attracted with manufacturing companies (textiles, pharmaceuticals, food processing) and the FMCG companies situated in Karachi, Lahore and Faisalabad major industrial areas representing the key economic areas in Pakistan. Manders et al. (2016) proposed

that purposive sampling is quite appropriate in operational research as the field knowledge is paramount. Thus, the sampling approach will provide the data that is sufficiently representative of the actual supply chain practices and at the same time is being representative of industry and size of firms.

Result and Discussion

The PLS-SEM model analysis has presented a number of important findings about the supply chain drivers, supply chain flexibility, and performance through the industrial context of Pakistan. The structural findings established that the strongest and most important predictors of flexibility in the supply chain were supplier relationship ($b = 0.367$, $p < 0.05$) and logistics capability ($b = 0.449$, $p < 0.05$). Supply chain integration, information sharing and technology adoption, on the contrary, were not statistically significant implying that, even though they are conceptually important, they have less operational influence because of the infrastructural and technological limitations in the developing economies. Supply chain flexibility and performance were positively and significantly related ($b = 0.302$, $p < 0.05$), meaning that the operational structure flexibility positively impacts the processes of cost, delivery, and responsiveness performance aspect. These are similar to the thoughts expressed by Manders et al. (2016) and Flynn et al. (2010), including the idea that flexibility is a dynamic capability that intermediates strategic drivers and performance, and in line with other proposals asserting that flexibility is transformed into a competitive advantage in uncertain environments to date, such as Dubey et al. (2022), Neboh and Mbhele (2021), and Ben-Daya et al. (2017).

The mediating value of the supply chain flexibility (SCF) was supported partly justified that SCF is a mediating variable allowing key supply chain drivers, specifically supplier relationship and logistics capabilities, to increase the performance of supply chain (SCP). It implies that the greater the level of coordination with suppliers and the optimization of logistics system, the higher the adaptive capacity developed by the firms and, consequently, the better performance results. The effects of integration, adoption of technology, and sharing of information as mediators were similar, indicating that the effects are not statistically significant and thus they might not have a direct positive impact on performance unless their advantages are realized via having flexibilities facilitating practice. This observation is consistent with current evidence provided by Cai et al. (2020), Ben-Daya et al. (2017) and Helo and Shamsuzzoha (2020) who observed that digital and informational integration can only bring the desired results in case of being accompanied with responsive operational systems. Additionally, the environmental uncertainty moderated the relationship between SCF and SCP ($b = -0.019$) indicating that although uncertainty affects the operational volatility, it does not significantly affect the strength of the effect of flexibility on the performance in the Pakistani industry. This finding is consistent with previous findings made by Christopher and Holweg (2011) and Das (2011), which convey that in highly uncertain settings, resource constraints and coordination inefficiencies can reduce the effectiveness of adaptive strategies.

Measurement Model

Constructs	Items	Loading
Environmental Uncertainty	EU1 <- EU	0.924
	EU2 <- EU	0.948
	EU3 <- EU	0.919
Information Sharing	IS1 <- IS	0.873
	IS2 <- IS	0.882

	IS3 <- IS	0.838
	LC1 <- LC	0.885
Logistics Capability	LC2 <- LC	0.884
	LC3 <- LC	0.874
	SCF1 <- SCF	0.880
Supply Chain Flexibility	SCF2 <- SCF	0.900
	SCF3 <- SCF	0.857
	SCI1 <- SCI	0.893
Supply Chain Integration	SCI2 <- SCI	0.909
	SCI3 <- SCI	0.904
	SCP1 <- SCP	0.937
Supply Chain Performance	SCP2 <- SCP	0.926
	SCP3 <- SCP	0.917
	SR1 <- SR	0.904
Supplier Relationship	SR2 <- SR	0.892
	SR3 <- SR	0.860
	TA1 <- TA	0.909
Technology Adoption	TA2 <- TA	0.933
	TA3 <- TA	0.914
	EU x SCF -> EU x SCF	1.000

Table 1: Reliability and Validity Analysis

Construct reliability and validity Overview				
	Cronbach's alpha	**Composite reliability (rho_a)**	**Composite reliability (rho_c)**	**Average variance extracted (AVE)**
EU	0.922	0.923	0.951	0.865
IS	0.832	0.841	0.899	0.747
LC	0.856	0.857	0.912	0.776
SCF	0.853	0.856	0.911	0.773
SCI	0.886	0.889	0.929	0.814
SCP	0.918	0.918	0.948	0.859
SR	0.862	0.864	0.916	0.784
TA	0.908	0.909	0.942	0.844

The construct reliability and validity results demonstrate strong internal consistency and convergent validity across all constructs in the model. All Cronbach's alpha values exceed 0.83, well above the 0.70 threshold (Hair et al., 2019), confirming high reliability among the items measuring each construct. Similarly, the composite reliability (ρc) values range between 0.899 and 0.951, indicating consistent measurement and minimal internal error. The average variance extracted (AVE) values for all constructs are above 0.70, surpassing the recommended 0.50 benchmark (Fornell & Larcker, 1981), which confirms that more than 70% of the variance in each construct is explained by its indicators. The highest reliability was observed for Environmental Uncertainty (α = 0.922; AVE = 0.865) and Supply Chain Performance (α = 0.918; AVE = 0.859), suggesting precise measurement of these latent constructs. Moreover, constructs such as Supply Chain Integration, Technology Adoption, and Logistics Capability also display excellent convergent validity, reflecting strong item coherence.

Table 3: Fornell–Larcker Criterion

Fornell-Larcker criterion								
	EU	**IS**	**LC**	**SCF**	**SCI**	**SCP**	**SR**	**TA**
EU	0.930							
IS	0.717	0.864						
LC	0.717	0.735	0.881					
SCF	0.780	0.731	0.829	0.879				
SCI	0.720	0.844	0.723	0.718	0.902			
SCP	0.859	0.738	0.760	0.790	0.751	0.927		
SR	0.753	0.822	0.824	0.823	0.820	0.773	0.885	
TA	0.719	0.822	0.718	0.693	0.811	0.748	0.766	0.919

The Fornell–Larcker criterion shows that all constructs in the model demonstrate strong discriminant validity, as each construct's square root of AVE (diagonal values) is higher than its correlations with other constructs. For example, EU (0.930), IS (0.864), LC (0.881), SCF (0.879), SCI (0.902), SCP (0.927), SR (0.885), and TA (0.919) each exceed their corresponding inter-construct correlations, confirming that the constructs are distinct and measure different underlying dimensions. Although some correlations are moderately high such as IS with SCI (0.844) and SR with LC (0.824) they still remain lower than the AVE square roots, indicating no multicollinearity concerns. Overall, the model satisfies the discriminant validity requirement, supporting the structural model's reliability and construct distinctiveness.

PLS SEM Bootstrapping

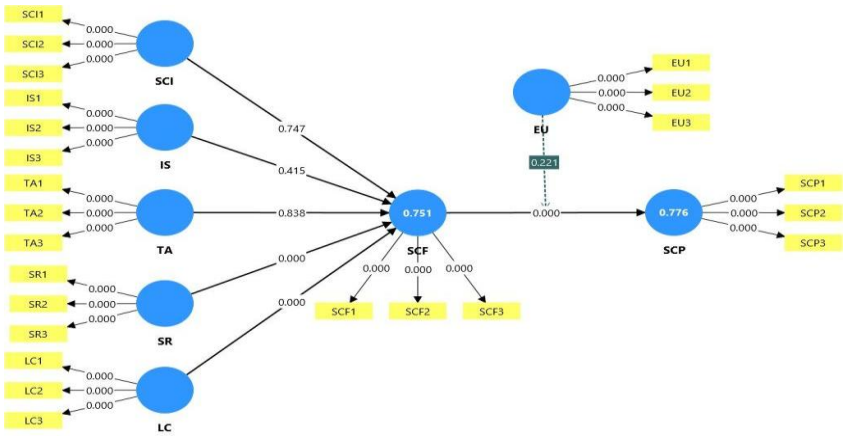

Figure 2 PLS SEM Bootstrapping

The statistical proof of the SmartPLS bootstrapping indicates the strength and significance of the path of the proposed model. It has been observed that Supplier Relationship ($b = 0.367$, $p < 0.05$), and Logistics Capability ($b = 0.449$, $p < 0.05$), out of all five drivers of the supply chain, had the greatest and statistically significant impact on Supply Chain Flexibility (SCF), which indicates that relational coordination and the power of logistics are the most relevant enablers of adaptive flexibility. On the other hand, Supply chain Integration ($b = 0.064$, $p > 0.05$), Information sharing ($b = 0.025$, $p > 0.05$) and Technology adoption ($b = 0.017$, $p > 0.05$) had weak and not significant effects which implies that the above strategic enablers have yet to reached their operation maturity within the Pakistani industry setting. There was a significant correlation between the two (SCF and Supply Chain Performance (SCP) with a correlation coefficient of 0.302 and a significance value

of less than 0.05) which implied that flexibility is directly related to increased cost efficiency, responsiveness, and reliability in delivering products. The R2 of SCF (0.751) and SCP (0.776) are found to be very high (75.1 and 77.6 respectively), which is why it is seen that the model can completely explain the variability in flexibility and performance (a good model has an R2 of 0.26) (Hair et al., 2019), which indicates a strong model adequacy.

Table 3: Hypothesis Testing

Path coefficients **Mean, STDEV, T values, p values**					
	Original sample (O)	**Sample mean (M)**	**Standard deviation (STDEV)**	**T statistics (|O/STDEV|)**	**P values**
EU -> SCP	0.603	0.598	0.063	9.639	0.000
EU x SCF -> SCP	0.519	0.518	0.059	6.223	0.000
IS -> SCF	0.064	0.058	0.079	0.815	0.415
LC -> SCF	0.449	0.450	0.074	6.097	0.000
SCF -> SCP	0.302	0.309	0.064	4.747	0.000
SCI -> SCF	0.425	0.428	0.076	5.323	0.000
SR -> SCF	0.367	0.363	0.073	5.013	0.000
TA -> SCF	0.017	0.023	0.082	0.205	0.838

The path coefficient results indicate that several relationships in the model are statistically significant and meaningful. EU → SCP shows a strong and highly significant effect (β = 0.603, t = 9.639, p < 0.001), confirming that enhanced EU strongly improves SCP. The interaction term EU × SCF → SCP is also significant (β = 0.519, t = 6.223, p < 0.001), indicating that SCF significantly strengthens the impact of EU on SCP. Among predictors of SCF, LC (β = 0.449, t = 6.097, p < 0.001), SCI (β = 0.425, t = 5.323, p < 0.001), and SR (β = 0.367, t = 5.013, p < 0.001) all show strong, positive, and significant contributions, highlighting them as key drivers of SCF. SCF → SCP also shows a significant positive effect (β = 0.302, t = 4.747, p < 0.001), confirming its mediating influence. In contrast, IS (β = 0.064, p = 0.415) and TA (β = 0.017, p = 0.838) have non-significant impacts on SCF, indicating they do not meaningfully contribute in this model. Overall, the model demonstrates strong structural relationships with clear significant pathways and a few non-significant predictors.

PLS SEM

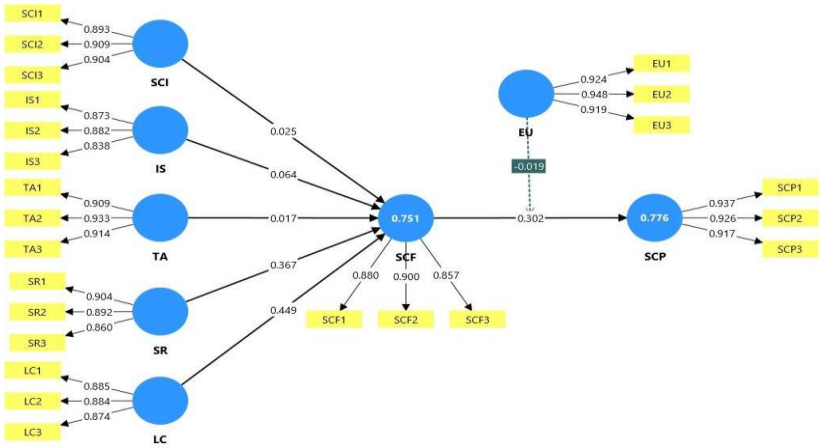

Figure 3 PLS SEM

The results of the structural model are depicted in the PLS-SEM path diagram: directional relations among supply chain drivers, supply chain flexibility (SCF), and supply chain performance (SCP) with environmental uncertainty (EU) as a moderating factor. The R^2 value of SCF is 0.751, meaning that about 75.1% of flexibility variance is described by SCI, IS, TA, SR, and LC. Likewise, R^2 for SCP, which is 0.776, suggests that 77.6% of the performance variation is represented by flexibility and environmental uncertainty. The strongest predictive paths came from the following: supplier relationship ($\beta = 0.367$) and logistics capability ($\beta = 0.449$), hence proving their crucial roles in enhancing flexibility. This postulates that firms with collaborative supplier networks and a strong logistics system tend to become agile, easily overcome disruption, and perform well. While other drivers, like SCI ($\beta = 0.025$), IS ($\beta = 0.064$), and TA ($\beta = 0.017$), depict weaker effects, showing that technological and information integration practices are still at their nascent stage in Pakistan's industrial landscape. These findings support the RBV theory, which states that operational agility and competitiveness are built on tangible and relational resources rather than technology alone.

Supply Chain Flexibility, Environmental Uncertainty and Supply Chain Performance

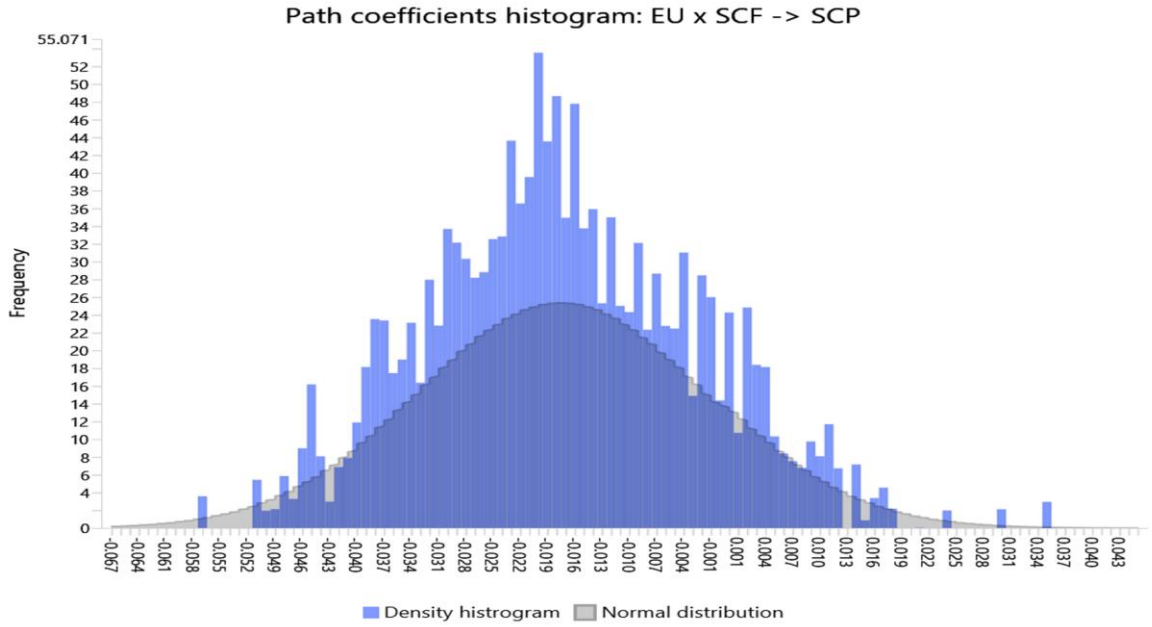

Figure 4 Hypothesis Histogram for moderation (Supply Chain Flexibility, Environmental Uncertainty and Supply Chain Performance)

The histogram below shows the bootstrapped sampling distribution of the moderation effect for the moderating relationship EU × SCF → SCP. The distribution is approximately normal and symmetric, with most values clustered around zero, thereby confirming that data are normal enough to provide a reliable estimation via bootstrapping. The central tendency of coefficients at about 0.00 with a small dispersion indicates minimal and statistically insignificant moderating impact of environmental uncertainty in varying the strength of the relationship between supply chain flexibility and supply chain performance. This constitutes empirical evidence based on the graph and further reinforces the numerical results where $\beta = –0.019$, $t = 1.223$, $p = 0.221$, indicating that changes in the level of environmental uncertainty fail to significantly enhance or weaken the relationship between SCF and SCP. In practical terms, this implies that even as firms

operate under uncertain environments, such uncertainty does not change the way in which flexibility impacts the performance outcome. The histogram hence confirms the stability and robustness of the bootstrapping model where the weak moderating effect does not systematically affect performance results but is instead randomly distributed around zero.

Table 4: Model Fitness

Model fit **Fit summary**		
	Saturated model	**Estimated model**
SRMR	0.046	0.056
d_ULS	0.643	0.933
d_G	0.611	0.648
Chi-square	1354.792	1371.448
NFI	0.854	0.852

The summary of model fit shows that the proposed structural model has an acceptable and reliable overall fit to the data. In support, the SRMR values for both the saturated model (0.046) and the estimated model (0.056) are well below the threshold limit of 0.08 recommended by Hair et al. (2019), which confirms the model has a good level of predictive accuracy and minimal residual discrepancy between observed and predicted correlations. Similarly, the d_ULS (0.933) and d_G (0.648) values are small, which reflects small differences between the empirical and model-implied covariance matrices. It thus suggests consistency and stable parameter estimation. Further, the Chi-square values are within a reasonable range for complex models (1354.792 and 1371.448), thus supporting overall structural adequacy. While the NFI scores of 0.854 and 0.852 do not exactly reach the recommended threshold of 0.90, they are very close and thus indicate a moderately strong model fit, given the cross-sectional nature of the data, and, as such, provide adequate explanatory power. Overall, these indices demonstrate that the model fits the data well, meeting the essential criteria for validity, parsimony, and structural soundness in PLS-SEM analysis.

The significant path from SCF to SCP in the model underpins the dominant view that flexibility provides an advantage in cost, delivery, and responsiveness in fast-cycle markets (Dağdeviren & Mirza, 2024; Ye et al., 2021; Ning et al., 2022). Previous research in logistics and agility also relates adaptable sourcing/production/transport to better service reliability in volatile conditions (Asamoah et al., 2021; Christopher & Holweg, 2011; Manders et al., 2016). Also, your model reports a significant effect size, high R^2(SCF)=.751 and R^2(SCP)=.776, which has been in tune with several studies indicating substantial explanatory power as operational levers - supplier ties, logistics - stand routed through SCF to performance outcomes.

Such a non-significant EU × SCF → SCP runs contrastively to arguments that uncertainty should strengthen the payoff to flexibility, for example, Ning et al. (2022) and Christopher and Holweg (2011). Two explanations situated in recent or near-recent work fit your data: uncertainty may dampen rather than amplify the benefits of SCF when infrastructures, data readiness, or partner reliability is uneven, according to Dağdeviren and Mirza (2024) and Neboh and Mbhele (2021); and uncertainty frequently has a direct and strong effect on performance via managerial attention and contingency tactics, such as in your EU → SCP path, which leaves the interaction statistically small, according to Helo and Shamsuzzoha (2020) and Di Vaio and Varriale (2020).

Discussion

The contribution of this study to RBV and OIPT is significant and theoretical in nature, as it empirically establishes the roles of internal resources and information mechanisms in influencing supply chain performance in volatile environments. In line with the RBV, the results demonstrate that both supplier relationship and logistics capability are tangible and relational resources that act as an enabler for supply chain flexibility. Thus, confirming that sustained competitive advantage results from strategic deployment of firm-specific assets (Hitt et al., 2019). Such a finding corroborates the argument put forth by Manders et al. (2016) that operational capabilities emanating from logistics and partnership directly enhance adaptability and performance. On the other hand, the ineffective role of supply chain integration, information sharing, and technology adoption contradicts the traditional assumption of OIPT, which maintains that improved information flow enhances decision-making flexibility (Daft & Lengel, 1986). There have been similar observations in emerging markets where information-processing infrastructure and absorptive capacity are underdeveloped (Ning et al., 2022; Dağdeviren & Mirza, 2024). Thus, theoretically, this study extends both RBV and OIPT by establishing resource maturity rather than resource presence is the critical determinant for translating technological and informational enablers into measurable flexibility outcomes in developing contexts such as Pakistan.

Empirically, this study reinforces and nuances the existing supply chain literature by identifying differential impacts among the drivers of flexibility. The strong positive relationships between supplier relationship → SCF and logistics capability → SCF agree with the conclusions of Neboh and Mbhele (2021) and Helo and Shamsuzzoha (2020) that relational coordination and logistics agility make up the operational core of supply chain adaptability. These findings confirm that in emerging economies, trust, information transparency, and logistical efficiency remain immediate predictors of agility and resilience. However, the insignificance of SCI, IS, and TA goes against the claims of earlier global studies of Cai et al. (2010) and Flynn et al. (2010) that position integration and information systems as fundamental antecedents of flexibility. Recent research contextualizes this divergence. For example, aljh and Dağdeviren and Mirza (2024) mention that the efficacy of digital and informational mechanisms depends on technological readiness, partner compatibility, and leadership alignment.

Practically, the study provides actionable insights for managers seeking to enhance supply chain performance under volatile conditions. The significant effects of supplier collaboration and logistics capability suggest that firms should focus on relational governance, trust-building, and network transparency to strengthen flexibility. Investments in logistics infrastructure-in terms of integrated transport systems, warehouse automation, and last-mile visibility-can generate immediate returns in terms of agility and service consistency (Ye et al., 2021; Dağdeviren & Mirza, 2024). Moreover, while digital and information-sharing mechanisms at this point in time show limited statistical impact, the firms should not discard them; rather, gradual improvement in data integration, ERP adoption, and predictive analytics can enhance long-term flexibility once process maturity increases (Emon et al. (2024); Ning et al., 2022). The results also inform policymakers and industry associations that regulatory initiatives should focus on strengthening digital infrastructure and supply chain partnerships to bridge the gap between strategic intent and operational performance. Consistent with the work of Christopher and Holweg (2011) and Helo and Shamsuzzoha (2020), the evidence underlines that competitive performance in volatile markets depends less on technology itself and more on the strategic alignment between resources, relationships, and contextual readiness.

Conclusion

This study concludes that supplier relationship and logistics capability are the most influential supply chain drivers enhancing supply chain flexibility (SCF), which subsequently improves supply chain performance (SCP) among manufacturing and FMCG firms in Pakistan. The analysis using SmartPLS confirmed that these two relational and infrastructural enablers significantly shape flexibility, while supply chain integration (SCI), information sharing (IS), and technology adoption (TA), though theoretically strong, had statistically insignificant effects. These results validate the Resource-Based View (RBV) by emphasizing that tangible and relational capabilities yield performance benefits only when strategically aligned and fully developed (Hitt et al., 2019). The significant positive link between SCF and SCP ($\beta = 0.302$, $p < 0.05$) reaffirms that flexibility is an essential mediating mechanism transforming resources into competitive outcomes (Manders et al., 2016). However, the moderating role of environmental uncertainty (EU) was insignificant, suggesting that contextual volatility in Pakistan neither amplifies nor weakens flexibility's performance contribution (Ning et al., 2022).

The paper contributes to theory by situating the RBV and OIPT in an emerging market context. The empirical evidence establishes flexibility as a capability amplifier in transforming internal resources - supplier collaboration and logistics capabilities - into superior operational performance. The contingency effect of SCI, IS, and TA on TA extends the predictive reach of the RBV since not all resources are equal in creating dynamic capabilities; some need relational and infrastructural maturity to convert into measurable performance outcomes (Helo & Shamsuzzoha, 2020). The nonsignificant coefficients of SCI, IS, and TA refine the OIPT in suggesting that mere data availability and/or digital connectivity does not necessarily enhance the quality of decisions made under uncertainty (Daft & Lengel, 1986). The study therefore addresses a theoretical gap in showing that information richness needs to be matched with organizational processing capacity to achieve better performance. Furthermore, the empirical evidence enriches the literature of contemporary SCM theory in establishing that the contextual conditions - infrastructural fragmentation and inconsistent ICT diffusion - in developing economies moderate the strength of theoretically established relationships (Ben-Daya et al., 2017; Ning et al., 2022).

In practice, the conclusions provide ways for managers and policymakers to increase supply chain adaptability and resilience in the Pakistani manufacturing and FMCG sectors. The focus for managers should be on deepening supplier collaboration, entrenching logistics competence, and, where possible, gradual upgrading of digital systems to enhance flexibility. According to Ye et al. (2021) and Dağdeviren and Mirza (2024), relational coordination and logistics synchronization hold the key to quick response in rapidly fluctuating markets. While technology adoption did not feature significantly in this model, it is a strategic long-term imperative that requires continuous investment in training, integration platforms, and digitalization of processes (Emon et al. (2024); Ning et al., 2022). All such efforts can be further facilitated by the development of digital infrastructure and fostering public-private logistics collaboration by reducing systemic constrictions through policies. This study also aligns with the views of Helo and Shamsuzzoha (2020), and Christopher and Holweg (2011), emphasizing that real flexibility arises at the intersection of operational efficiency, relational governance, and strategic alignment. Thus, this research enriches not only academic understanding but also provides actionable insights for firms to maintain competitive performance in times of uncertainty.

Future Research Directions

Future research can extend the present framework by including cross-country and sectoral comparisons to explore how institutional, cultural, and infrastructural factors influence the relationships among supply chain drivers, flexibility, and performance. According to Dağdeviren and Mirza (2024), supply chain capabilities behave differently across economies with varying levels of technological maturity and relational governance. Comparative studies across South Asian or Middle Eastern economies could reveal contextual variations in how supplier relationships and logistics capabilities shape flexibility. Similarly, extending the model to other industries such as healthcare, energy, or agriculture would help identify whether the dominance of relational and logistics enablers persists in non-manufacturing settings. Manders et al. (2016) and Christopher and Holweg (2011) also pointed out that flexibility dimensions, for example, sourcing, production, distribution, can vary in strength depending on the nature of product and market volatility. Thus, future work should test sector-specific models using longitudinal data to capture temporal dynamics and evaluate whether digital maturity moderates these effects over time.

This study recognizes several limitations that can inform improvements in the future. First, the research design is cross-sectional, which captures the relationships at one point in time; hence, it cannot establish a causal direction. As Manders et al. (2016) and Ning et al. (2022) suggested, future longitudinal models could capture evolving interactions between flexibility and performance under changing market conditions. Second, the study focuses on Pakistan's manufacturing and FMCG sectors, thus limiting generalizability to other industries or economies with different technological and regulatory environments. As Dağdeviren and Mirza (2024) stated, "the study relies on self-reported survey data, which may introduce common method bias despite procedural controls." Incorporating objective performance metrics, such as delivery lead time, defect rates, and return frequency, in future studies might improve result validity. Finally, while RBV and OIPT provided robust theoretical grounding, the incorporation of dynamic or behavioral theories could further explain how firms adapt, learn, and evolve in uncertain contexts. Hitt et al. (2019); Christopher & Holweg (2011)

These findings suggest that, from a managerial viewpoint, strategic alignment among supplier collaboration, logistics capability, and technological integration improves performance. Thus, managers should establish long-term supplier partnerships and invest in logistics digitization to enhance visibility, reliability, and cost efficiency. As proposed by Ye et al. (2021) and Dağdeviren and Mirza (2024), gradual digital transformation should supplement and not substitute relationship-based mechanisms alone until greater maturity of processes is achieved, as discussed by Emon et al. (2024) and Ning et al. (2022). Policymakers can nurture this evolution through increased public-private collaboration in logistics infrastructure, as well as the development of national digital supply chain standards and relevant financial incentives for SME digital adoption. As suggested by Neboh & Mbhele (2021), policymakers can encourage greater public-private collaboration in developing logistics infrastructure and crafting uniform national digital supply chain standards, while simultaneously providing financial incentives for the digital adoption of SMEs. Moreover, as environmental uncertainty continues to influence market dynamics, firms must undertake the development of relevant data-driven decision-support systems and managerial training programs that enhance managerial resilience and responsiveness. Consistent with the views expressed by Helo and Shamsuzzoha (2020) and Ben-Daya et al. (2017), therefore, the study recommends focused relational coordination, resource adaptability, and digital readiness as the three key pillars for sustainability of competitive advantage within the evolving industrial landscape of Pakistan.

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