

Role of logistics innovation capabilities in supply chains operations at manufacturing firms

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ABSTRACT

This study aims to examine the impact of Logistics Innovation Capabilities and mitigating the disruption risk in supply chain operations in the manufacturing Industries of Karachi Pakistan. With the fast growth in Pakistan's economy and vision 2025 seeks to enhance the national transport infrastructure and logistics network system. The demand for logistics services in Pakistan has been steadily expanding. Pakistan's Industry focuses more on adopting logistics innovation capabilities to provide their customer with better services. Quantitative research is designed to study the link between the capabilities of dependent and independent variables to minimize the risk. By empirically analyzing survey data SPSS is a popular method to validate the study model. The impact of innovation in logistics technologies has a huge positive influence affect by firm performance, environment uncertainty, technology implementation & customer side. Through Logistics Innovation capabilities, many empirical studies have been conducted to minimize the supply chain risk. This study provides empirical support for dependent and independent variables. Our results can help Pakistan's manufacturing industry develop logistics strategies and adopt innovation capabilities to reduce supply chain risk.

Keywords: Logistics innovation capabilities, Firm performance, Technology, Environmental, Supply chain risk

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1. Introduction

Logistics refers back to the delivery of goods and offerings in a suitable quantity, condition, location, and cost (Baloch & Rashid, 2022). As the logistics and delivery industries become more competitive, a growing number of logistics and transportation operations are trying to offer excellent operational overall performance to obtain marketplace share and maintain a stable, long-term, sustainable marketplace environment. Logistics and delivery increase in marketplace competition (Christopher, 1996; Rasheed, 2024). Innovation in logistics offers brand-new beneficial ideas, practices, and approaches in logistics and delivery operations that might be extraordinary present-day practices of firms (Grawe et al., 2009; Rashid et al., 2024a). Logistics innovation talents are one of the critical goals of the industry revolution (Lasi et al., 2014; Frank et al., 2019). Each level of the supply chain offers managers the possibility to mix carrier roles and boost delivery chain efficacy in conventional delivery chain management, thereby improving consumer intimacy and garnering more attention (Youngdahl & Loomba, 2000). Logistics offerings innovation abilities consist of a sturdy relationship with the consumer, a supply upward push barrier to competition, proper purchaser loyalty, a fee discount, and making marketplace activities more efficient (Morellet et al., 2007; Rashid et al., 2024b).

The supply chain business activities are disrupted, causing the coronavirus outbreak. The economic system and society are the veins of supply chain operations (Ivanov, 2020; Rashid et al., 2024c). Businesses at some stage in the world have confronted unparalleled demanding situations because of disruptions caused by the outbreak and shutdown. Therefore, as a result, it's miles censorious to analyze lessons from the COVID-19 disruption so that it will make smarter and stronger green logistics operations. The studies additionally examine the correlation between logistics provider innovation abilities and marketplace performance. This paper covers operational risks (system breakdowns, unscheduled supply discontinuities, human-centred issues, along with moves and fraud), in addition to natural disasters, terrorism, and political instability. The prospect of disruption has received lots of interest in modern history. The motives for this are self-evident: longer hyperlinks and quicker clock speeds increase the risk of disruption and decrease the margin for error if one happens. SCR is one of the tasks of refining supply chain excellence (Wang, 2018; Rashid et al., 2024d).

Logistics innovation abilities are the key to supply chain actions. Become a more viable benefit. The swift adjustments in business surroundings are demanding situations for the organization, and innovation is a key tool (Lin et al., 2006). Implementing innovative logistics innovations to solve an issue is crucial for the success of many businesses, including logistics service providers (Flint et al., 2005). Logistics provider groups compete based on their abilities and ability to put in force new provider innovations (Wang et al., 2020). Every level of supply chain operation presents manager performance that grows consumer intimacy and attracts excellent attention (Youngdahl & Loomba, 2000). Organizational structure is additionally critical to being involved with the alignment of firm assets in such a manner that logistics may be developed and supported, offering innovation capabilities (Bergfors & Larsson, 2009). Our approach to efficiently coping with supply chain disruption risks seeks to acquire the subsequent objectives: joint danger evaluation and danger mitigation efforts are efficiently integrated, in addition to strategic regulations and moves that assist in increasing cost-efficient mitigation initiatives.

The coronavirus outbreak has created masses of disruption in supply chain operations. On this, have a look at cognizance of a way to manage the disruption risk in the supply chain. When there are such a lot of individuals in a supply chain, measuring its miles is a dynamic effort. Businesses perform a whole lot of environmental elements, consisting of social, political, technological, and economic elements, and their channels of supply are more complicated than ever (Gunasekaran et al.,

2015; Samvedi & Viswanadham, 2013). In this look, we advocate that LIC can help commercial enterprises manipulate by enhancing logistics operations to lessen the supply chain risk. The reason for this look is to see if there's a hyperlink between logistical innovations (LI) and supply chain management (SCM) threats. The results should have effects on SCM danger methodologies and logistics innovation implementation in Pakistani enterprises to lessen delivery chain risk. The implication for logistical operations, consisting of delays, destruction, and loss, is more often than not because of delivery chain risks (Sanchez Rodrigues et al., 2010).

In today's logistics landscape, businesses encounter a myriad of challenges that impact their operational efficiency and profitability. These challenges encompass various aspects such as fuel costs, business process improvement, technology strategy and implementation, improved customer services, economic factors, government regulation, and environmental concerns. Understanding and effectively addressing these challenges are crucial for businesses to thrive in the competitive global market.

- a. **Fuel Cost Challenge:** One of the prominent challenges faced by businesses is the soaring fuel costs, which significantly contribute to the overall transport cost problem. Finding ways to manage and reduce these costs is essential for optimizing logistics operations.
- b. **Business Process Improvement:** There is a pressing need for businesses to implement recent technologies to enhance and streamline their operational processes. Leveraging technological advancements can lead to improved efficiency and productivity.
- c. **Technology Strategy and Implementation:** The implementation of modern technologies, such as ERP systems, plays a crucial role in shaping a robust technology strategy for logistics operations. Integrating these technologies effectively can lead to better decision-making and operational agility.
- d. **Improved Customer Services:** Meeting customer expectations for timely and transparent transport services is paramount in today's competitive business environment (Rashid & Rasheed, 2024). Businesses must focus on enhancing customer service standards to build strong relationships and loyalty.
- e. **Economic Factors:** Businesses must navigate through challenges such as fuel cost fluctuations, currency variations, and growing inflationary needs. Developing strategies to mitigate the impact of these economic factors is essential for sustainable growth.
- f. **Government Regulation Challenges:** The logistics industry is subject to distinct policies and laws imposed by federal, state, and local governments. Adhering to regulatory requirements while ensuring operational efficiency is a critical balancing act for businesses.
- g. **Environmental Concerns:** Promoting sustainability and reducing carbon footprints are increasingly important considerations for logistics operations (Albhirat et al., 2024). Implementing environmentally friendly practices can lead to cost savings and a positive brand image.

The research aims to investigate the Impact of Logistics Innovation Capabilities and Strategies for Mitigating Distraction Risks in Supply Chain Operations within the Manufacturing Industries of Karachi, Pakistan. By analyzing these challenges and proposing effective strategies, this study seeks to contribute valuable insights to the field of logistics management and operations.

1.1 Significance of Study

Observe and focus on LIC and its implications for the supply chain, in addition to risk control in Pakistan's production industry. To deal with the Supply chain risk (SCR) within the industries, LIC provides essentials consistent with the resource-based review (RBR).

Logistics businesses now vary not only in terms of service offerings but also in terms of

service skills and network expansion. Various sorts of logistics companies are primarily based on quite a few fee-based technology logics. Furthermore, logistics businesses use quite a few techniques to enlarge their service networks and gain entry into new markets. Logistics companies are networking industries with the experience that their business approach is centred on tying collectively organization, coordinating actions, and bringing collectively the assets of many industries. How they develop their offerings and networks can have a significant effect on their business.

A comprehensive outline can depict the following of the procedure given below to assess the influences of logistical innovation skills on supply chain operations and control disruption risk. A collection of information stats, figures, and theory through literary sources as referenced. The result indicates that innovation in logistics capabilities moderates the positive effect of logistics services capability, flexibility and capability on business performance.

2. Literature Review

As competition intensifies, the demand for effective logistics innovation management also rises. This heightened need for logistics innovation stems from megatrends such as globalization and outsourcing. However, due to the continuous influx of new Logistics Service Providers (LSPs) into the market, profit margins remain minimal. Innovations offer LSPs a competitive edge in gaining market share. Nevertheless, empirical studies indicate that the practical implementation of innovation management in logistics is lagging in terms of effectiveness. Field research shows that time and cost constraints pose challenges to the efficient management of innovation. Logistical innovations are often developed on the go when clients seek specific solutions. This reactive approach is significantly more challenging to manage than a proactive one due to time constraints. Proactive innovation strategies enable LSPs to create standardized solutions that can cater to multiple customers.

2.1 Limitations of Configuration and Resource-Based Theory

Analyzing the dynamics of Logistics Management Information Systems (LMIS) through a configuration perspective of Logistics Management System Networks (LMSN) is feasible. However, existing research has primarily focused on various configurations without explicitly linking them to performance or explaining the processes and their influences. Moreover, there is a lack of comprehensive understanding regarding how routines are embedded in specific capabilities, partly because the concept of capability is abstract, and research on configuration and capabilities has been conducted in isolated silos.

2.2 Logistics Innovation Capabilities (LIC)

Logistics operations provide direct value by allocating resources to enhance and support LIC services. The following services have been identified: digital data interchange (EDI) connectivity, customer clearance and feedback, shipper service attributes, storage facilities, shipment tracking, inland transportation services, packaging materials, carrier reliability, and value-added services as key drivers for high-performance (Rashid & Rasheed, 2023; Bergfors & Larson, 2009). According to this theory, every organization consists of four interconnected and interactive components: people, tasks, structure, and technology. The success of organizational changes depends on the interplay of these four elements. The variable "people" refers explicitly to the human aspect. This paradigm encompasses all human-related considerations within an organization, from employee recruitment and training to the company's engagement with social systems beyond its own supply chain's boundaries. Due to government-imposed COVID-19 pandemic regulations, many businesses have made behavioural adjustments such as sheltering in place, social isolation, and working from home, which may impact supply chain operations. Organizations are taking initiatives in supply chain operations through digitalized device sensors, virtual technologies, and new technologies. Each area may also encounter challenges in focusing on online delivery services. It is challenging for companies to enhance logistics innovation capabilities, which refer to new, beneficial concepts, procedural methods, and logistical operations that go beyond current practices (Grawe et al., 2009; Rashid et al.,

2023). Various dimensions of organizational structure can help in leveraging logistics innovation capabilities. Innovation is enhancing the service capabilities of logistics service providers to adopt new technologies (Gallouj, 2002).

Many industries opt for outsourcing (3PL) logistics services to ensure timely product delivery. The primary reason for this is the organization's focus on logistics innovation capabilities. In a rapidly changing and uncertain business environment, innovation abilities have a significant impact on organizational effectiveness and achieving a competitive advantage. These abilities encompass various skills, capacities, and intelligence. Enhancing their logistics service capabilities allows organizations to build excellent customer relationships and loyalty, thereby offering high-quality services to their customers (Flint et al., 2005; Rasheed & Rashid, 2023). Nowadays, Logistics Service Providers (LSPs) are increasingly emphasizing innovation capability to meet the needs of a growing customer base for a range of logistical services. 3PL companies are most successful when they have innovative logistics capabilities.

2.3 Impact of Logistics Capabilities

The main goal of the economic revolution was to accelerate the development of innovation capabilities across various industries (Frank et al., 2019). According to the Resource-Based View (RBV) paradigm, organizations can gain and maintain a competitive advantage by developing and utilizing key-value capabilities and knowledge. Industries achieve greater competitive advantage by implementing the ability to enhance logistics operations, making them more efficient, which is known as logistics functionality. This helps companies increase their market share and achieve their goals. We believe that further research into organizational innovation within the context of a logistics scenario framework is necessary, given the essay covers a wide range of factors that drive innovation (Flint et al., 2005). The black swan event, the Coronavirus Disease (COVID-19), has impacted supply chain operations by introducing complexity, environmental changes, economic pressure, and trade disputes.

2.4 Risk in Supply Chain

The increased risk in managing the supply chain, coupled with the rapid spread of disruptions, has placed many companies in a challenging position, compelling them to operate in a more volatile business environment. Uncertainty and risk within the supply chain, along with significant issues related to commodity flow, are considered in this study. These issues include delays, communication challenges, storage problems, supplier capacity, and freight delivery operations, all of which can impact logistics operational performance. Supply Chain Resilience (SCR) can be defined as a logistics capability aimed at reducing the risk of items being damaged during transportation, including potential disruptions, impacts, and errors within the logistics and supply industry. Risks arise because no one can predict what will happen in the future. Something could happen to disrupt normal routines or prevent things from going as planned, making the future continuously uncertain (Waters, 2011).

Previous studies have examined Supply Chain Resilience (SCR) factors within a specific context, encompassing five key variables in this study: (1) Firm Performance, (2) Eco-friendly Uncertainty, (3) Technology Implementation, (4) Customer-Side (Jüttner et al., 2003; Christopher & Lee, 2004; Manuj & Mentzer, 2008; Sanchez-Rodrigues et al., 2010). Analyzing company performance is a metric for determining a company's success and achievement of specific objectives, such as profit, sales growth, market share, service quality, product quality, and customer satisfaction (Hashmi et al., 2021a). Potential disruptions in the flow of goods and information, along with various performance metrics that affect an organization's long-term viability, are classified as firm performance factors. Some aspects of Logistics Risk impact logistics operations, including delays in delivery time, management of transport infrastructure, storage issues, conveyor efficiency, and freight transport operations (Sanchez-Rodrigues et al., 2010).

H1: Logistics innovation capabilities have a significant impact on firm performance.

In this study, environmental risks such as labour issues, road bottlenecks, force majeure events, oil prices, and regulations significantly impact current operations and necessitate innovation implementation (Sanchez-Rodrigues et al., 2010; Rashid et al., 2022a). Supply chain risks are influenced by a combination of network and environmental factors. Environmental uncertainty is crucial for promoting green innovation by logistics service providers (Manuj & Mentzer, 2008; Sodhi & Lee, 2007; Rashid et al., 2022b).

H2: Logistics innovation capabilities have a significant impact on environmental uncertainty.

Constructing logistics innovation capabilities and implementing technology plays an important role in mitigating supply chain risk. They are crucial for the smooth functioning of supply chain operations, as new technologies and ideas provide real-time information, inventory levels, transportation times, production planning, and scheduling. These strategies, coupled with supply chain risk management, help integrate the logistics network (Frank et al., 2019; Hashmi et al., 2021a). Commitment, coordination, and comprehensive information technology (IT) utilization, including industrial Internet platforms, pose significant challenges for supply chain management and key partners in effectively addressing disruptions and swiftly recovering from them (Frohlich, 2002; Brandon-Jones et al., 2014; Sawik, 2013; Hashmi et al., 2021b). The COVID-19 pandemic has globally disrupted supply chains, leading many organizations to implement various technologies such as Business-to-Business (B2B) communication through the Internet and Electronic Point of Sale (EPOS) systems.

H3: Logistics innovation capabilities have a significant impact on technology implementation.

In supply chain performance indicators, the effectiveness of the firm's relationships among at least members of the supply chain, including production and trading companies, is crucial. On-time delivery is the primary customer-facing challenge. Improved communication with customers allows for cooperation to achieve common goals more efficiently. Logistics innovations that enhance customer satisfaction can lead to increased revenue, profitability, and sustainable customer relationships (Mithas et al., 2005).

H4: Logistics innovation capabilities have a significant impact on customers.

2.5 Conceptual Framework

Based on a review of existing ideas and literature, six configuration dimensions have been established: 1) Consumer portfolio; 2) Product portfolio; 3) Network Structure; 4) Governance & Relationship; 5) Flow of Network; and 6) Architecture & Service. These topics are covered in the Logistics and Supply Chain Management Network (LMSN) configuration parameters, which are linked to logistical capabilities and performance in a conceptual model. The success of offline retail is influenced by both the product portfolio and the consumer portfolio. In the online retail context, the relationship between the product and consumer portfolio and performance is mediated by a second-order model of logistics capability. This model includes network structure, network flow, relationship and governance, and service architecture as sources or drivers of competency. A reflective or formative connection can exist between first-order and second-order structures. Given that the four configuration dimensions are complementary; a formative second-order model is better suited for representing logistical capabilities.

2.6 Research Model Development

As you can see in Figure 1 the research model section, we focus on a statistical method that measures the relationship between logistical innovation capabilities (LIC) and the categories of supply

chain risk (SCR) mentioned below.

Independent variables

- a. Technology Implementation
- b. Environmental Uncertainty
- c. Firm Performance
- d. Customer

Dependent variable

- a. Logistics Innovation Capabilities

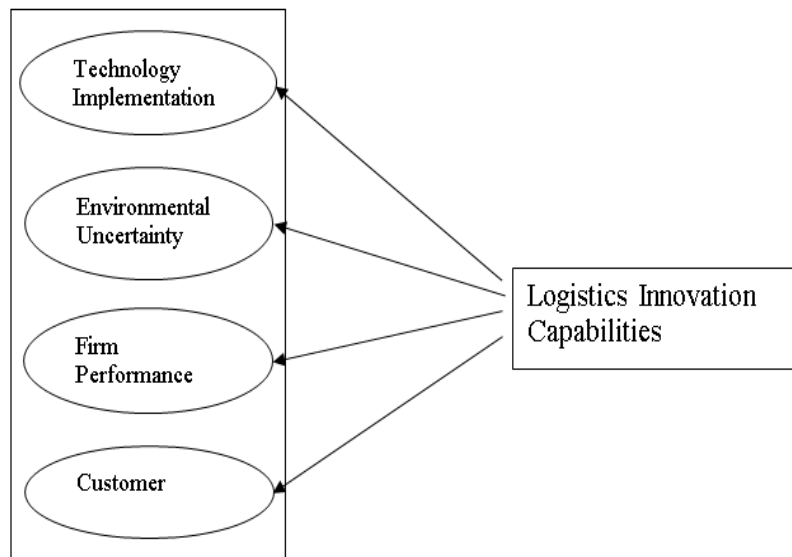


Figure 1: Conceptual framework (author's creation from literature)

3. Research Methodology

This approach is grounded in the findings of a previous investigation, specifically, quantitative research chosen to enter this new field of study (Amirah et al., 2024; Rashid et al., 2021; Haq et al., 2023; Rasheed et al., 2023). To achieve this, it relies on two sources of empirical data. Firstly, a focus group session was conducted to gain a deep understanding of the opportunities and challenges of innovation contests in logistics. This group comprised seven individuals with similar backgrounds, such as managers of Logistics Service Providers (LSPs) or logistics managers from manufacturing companies. This group represented a typical sample. Additionally, the Hermes "Getting, Delivering. What else?" innovation challenge was examined as an example of a logistics-related innovation contest that has been previously implemented. The purpose of this case study is to establish standards for logistics innovation contests based on the lessons learned from this experience (Rashid & Rasheed, 2022). To conduct this research, content analysis of secondary materials was performed, followed by semi-structured interviews with two of the major internal actors in the Hermes competition. Based on the gathered data, success factors can be inferred.

Pakistan's manufacturing industries are rapidly adopting new state-of-the-art systems such as logistics parks, distribution points, and warehouses at an exponential rate (Hashmi & Mohd, 2020). An increasing number of logistics companies in Pakistan are embracing new technologies to enhance their logistics service capabilities and reduce supply chain disruption risks. Due to Covid-19, practitioners were contacted via email and phone calls to validate the above hypothesis. An online survey was utilized to gather empirical data. The online survey was considered the most suitable data

collection tool for the study to improve the effectiveness and efficiency of data collection. Statistical methods are being employed to ensure the objectivity and reliability of the questions. The questionnaire is accessible to participants online, providing greater flexibility for practitioners to respond to the questions. Additionally, primary data was personally collected through a questionnaire survey of industrial firms and logistical service providers to boost the response rate (Rashid et al., 2019). The questionnaire was developed based on structured interviews with experts from supply chain departments of manufacturing firms and then pilot-tested in Karachi with 30-50 manufacturing firms and logistics service providers.

3.1 Sample Size

The sample size for this research may be very large, and it is necessary to decide on a high number of research respondents based on the findings (Hashmi et al., 2020a; 2020b; Rashid & Amirah, 2017). The population for this research would be extensive, encompassing the entire city of Karachi. However, investigating this large sample size isn't feasible, and it is the investigator's responsibility to select the best sample size for the research. The questionnaire was created through structured interviews with experts from manufacturing businesses' supply chain departments, and it was then pilot-tested in Karachi with 30-50 manufacturing enterprises and logistics service providers. The sample size is kept high and determined based on the experience of logistics providers.

3.2 Instrument for Data Collection

The data collection tool is based on a quantitative approach consisting of experiments, observation, and structured interviews (Rashid, 2016). This research utilized the Likert scale methodology. Initially exploring the relationships between the dependent variable and four independent variables was a primary approach to support our research hypotheses. A limitation of the study is that we may have missed valuable data about the individual components underlying our model's three variables (Hair et al., 2005; Rashid et al., 2020). A five-point Likert scale questionnaire will be used for the independent variable in the research, providing respondents with the following scales to make their answers.

- a. Strongly Disagreed
- b. Disagreed
- c. Neutralizes
- d. Agreed
- e. Strongly Agreed

The responses would be recorded according to the objectives.

4. Analysis of Result

4.1 Validity and Reliability Test

The measurements were implemented to assess their reliability and validity. Reliability is a metric that gauges the consistency among various variables (Hair, 2010; Khan et al., 2023a; 2023b). After critically evaluating the questionnaire, each aspect was analyzed to determine the pre and post-impact logistics innovation abilities and the impact of supply chain operations on an organization's overall success (Hashmi, 2022). Validity is a crucial factor for assessing the accuracy of predictions. In a pilot study, face/content validity is tested.

Table 1: Reliability Statics of LIC

	Cronbach's Alphas	No. of the Items
Reliability Statics of FP	.761	030
Reliability Statics of EUC	.678	930
	.725	3

Reliability Statics of TI	.689	040
Reliability Statics of Customer	.644	3

Source: SPSS output

The value of Cronbach's alpha in Table 1 is reliable. This suggests that the sampling results are credible, and thus the data gathered can be processed further for more statistical tests and analysis.

4.2 Findings and Interpretations of the Results

The statistics gathered were analyzed and processed into SPSS 19 to get the results. This study applied regression to determine the degree of impact an independent variable has on a dependent variable.

Table 2: Models Summary

Models	R	R Square	Adjusted R Squares	Std. Errors of the Estimated
1	.835 ^a	.698	.689	.45137

a. Predictors: constant, C, EUC, FP, TI

Source: SPSS output

As you can see in Table 2 the R-Square (R^2) shows the part of adjustment in the dependent variable (Logistics Innovation Capabilities) that the independent variables can predict. (Technology Implementation, Environmental Uncertainty, Customers, Firm Performance). Table 2 indicates that 69.8% of the accurate prediction of the dependent variable is "explained" by "independent variables" (Das et al., 2021; Hashmi, 2023; Khan et al., 2021).

Table 3: ANOVA^A

Models		Sums of the Squares,	df	Means of a Square	Fit	Sig.
1	Regressions	60.720	4	15.180	74.510	.000 ^b
	Residual	26.281	129	.204		
	Total	87.002	133			

a. Dep. Variable: LIC

b. Predictors: constant, C, EUC, FP, TI

Source: SPSS output

Above ANOVA Table 3 shows an F value of 74.510, which shows the high significance of independent variables. Moreover, F statistics further elaborate that the model is significant (sig-value < 0.05).

Table 4: Coefficients

Models		Unstandardized Coefficients		Standardised Coefficients	t	Sig.
		B	Std. Errors			
1	(Constant)	-.968	.285		-3.400	.001
	FP	.423	.084	.355	5.044	.000
	TI	.281	.089	.228	3.150	.002
	EUC	.385	.073	.319	5.282	.000
	C	.155	.067	.129	2.331	.021

Source: SPSS output

The above Coefficients Table 4 explains how to calculate the path coefficients' standard error and t-values (Haque et al., 2021; Hair et al., 2014; Khan et al., 2022; Agha et al., 2021). The effects of independent variables on the dependent variable are shown in the results. Technology implementation (TIT), environmental uncertainty (ECUT), customer (CT), and firm performance (FPT) have a significant impact on logistics innovation capabilities (dependent variables).

4.3 Hypotheses Assessment Summary

Hypothesis test: the analysis of the coefficients was used to define the sizes of path coefficients and evaluate whether or not the relationships between the variables are statistically significant. As per the findings of the below results in Table 5.

Table 5: Hypothesis Summary

H	Hypothesis Of Logistic Innovation Capabilities	Sig Value	Conclusion
01	H1: Logistics Inn. Cap. has a positive impact on firm performance.	.000	Accept
02	H2: Logistics Inn. Cap. has a positive impact on environmental uncertainty.	.000	Accept
03	H3: Logistics Inn. Cap. has a positive impact on the technology implementation.	.002	Accept
04	H4: Logistics Inn. Cap. has a positive impact on the customerS.	.021	Accept

Source: SPSS output

A positive relationship is found in the relationship between firm performance and logistic innovation capabilities (H1, coefficients = 50.000, $p < 40.05$). A positive connection is found in the relationship between environmental uncertainty and logistic innovation capabilities (H2, coefficients = 50.000, $p < 70.05$). A positive connection is found in the relationship between technology implementation and logistic innovation capabilities (H3, coefficients = 10.002, $p < 80.05$). A positive connection is found in the relationship between customer and logistic innovation capabilities (H4, coefficients = 60.021, $p < 70.05$). All are sustained and supported, showing that the developed firms need to implement the technologies to improve logistics performance and reduce the risk in the supply chain.

5. Discussion, Implications, Limitations, Recommendations and Conclusion

5.1 Discussion

This report presents the results of an examination of the relationship between logistics innovation capabilities and four different characteristics chosen to illustrate their impact on firm performance: Environmental Uncertainty, Technology Implementation, and customer satisfaction. The empirical results highlight the value of logistics innovation capabilities in terms of improving and implementing technologies. Nowadays, innovative manufacturing firms can enhance their logistics innovation capabilities, leading to more creative operational methods and the adoption of new technologies to achieve business goals. This, in turn, can result in higher service quality and performance. Additionally, we explore logistics capabilities for reducing supply chain risk and unpredictability, as well as enhancing corporate logistics performance, in this research. Furthermore, we found a positive association between logistical innovation capabilities and Technology acceptance, aligning with the resource-based evaluation. In today's context, effective communication, teamwork in supply chains, and supplier involvement are crucial as they form the backbone of supply chain operations. Manufacturing firms should enhance their global skills, which are highly variable and constantly evolving.

5.2 Conclusion

A literature review was conducted to assess the impact of internal and external factors on the logistics innovation capacities of manufacturing enterprises in Karachi. This study explores the relationship among logistics innovation capabilities with factors selected to elucidate their impact on firm performance, Environmental Uncertainty, Technology Execution, and customer satisfaction. The findings reveal a positive relationship between Logistics Innovation capabilities and Firm performance, Environmental uncertainty, customers, and Technology implementation. This presents an opportunity to implement all four variables in their supply chain operations to mitigate risk and uncertainty. This study included 136 respondents, and the reliability of the Cronbach alpha value was found to be reliable. Ultimately, this study concludes that all variables adaptable in manufacturing firms in Karachi are positively associated with logistics innovation capabilities.

5.3 Future Research

In conclusion, our research confirms the relationship between supply chain logistics capabilities, albeit with results that align entirely with expectations. For future research, we aim to explore mediation and moderation effects, increase our sample size, and expand beyond Karachi to gain more comprehensive results. Our study has uncovered some differences from prior research, highlighting the need for further investigation to delve deeper into the topic and achieve optimal outcomes.

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