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The Impact of Supply Chain Integration on Firm Performance: Exploring the Mediating Role of Demand Uncertainty in Pakistan's Textile Industry

Ghulam Mohiuddin Liaquat
ghulammohi936@gmail.com
Research Scholar, Karachi University Business School, University of Karachi, Pakistan.

Sheikh Muhammad Fakhar E Alam Siddiqui
fakhrealam@uok.edu.pk
https://orcid.org/0009-0000-1073-5623
Assistant Professor, Karachi University Business School, University of Karachi, Pakistan,
Corresponding Author: * Ghulam Mohiuddin Liaquat ghulammohi936@gmail.com

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ABSTRACT

Textile Industry is one of the most important sector in Pakistan, it contributes to 60% of the total exports and around 423 companies are operating currently. This sector contributes greatly in the overall GDP; it is the 8th largest exporter of textile products in Asia. Despite of this sector being the backbone of the country's economy, this sector needs to improve its supply chain, improve productivity and maximize value addition in order to be fruitful in the future too. This study will enlighten the impacts of supply chain integration on industry performance, and will also study the mediating impact of Demand uncertainty in this regard. All the available data will be gathered and new data will be collected with the help of survey forms. The study will use deductive approach, and the data collected will be empirically tested and verified. This study is innovative and aims to enrich the literature on SCI and performance by providing empirical evidence on the effect of demand uncertainty as one of the main contingency factors that affect the relationship between SCI and firm performance. The research model will be empirically validated surveying 5% of the listed companies, valid survey responses from the Textile Industry which were subjected to quantitative research design and regression analysis. To the best of researcher's knowledge, this is first study that empirically test Supply Chain Integration (External, Internal, Customer, Supplier, Process and Product) on Firm Performance (Operational Performance), considering Demand Uncertainty as the mediator.

Keywords: *Supply chain integration, Demand uncertainty, & Firm performance.*

INTRODUCTION

Background of the Study

In the most uncertain economic conditions, in which no one can predict or believe in something or in which businesses can't rely on any one strategy due to the changing patterns of the consumer market, firms are still working to get the best product in the most reasonable prices, easily available to the customers. Strategies are being designed and redesigned time and again in order to achieve the right fit, in the right form, for this firms have to study and focus on every part of the Supply chain and add value in each stage so that a seamless process is followed throughout the chain and the ultimate goal is achieved. Due to the increasing competition, firms now have to focus on designing the perfect set of strategies in order to be competitive and survive in the industry. This makes it more difficult for firms because competition can be faced in any stage of the chain, it could be in the procurement stage, manufacturing stage, distribution stage or the aftersales stage. For a firm to focus on all the stages, develop strategies and excel in all, is indeed the most difficult part of all. A firm can have command on one stage and be

competitive enough there, while another firm could be good on other and give competition there, for this reason, the supply chain integration concept was introduced. The significance of SCI in managing supply chain risks and enhancing performance has recently been recognized in the literature (Chaudhuri, 2018)

In order to improve collaboration, efficiency, and visibility inside a supply chain, multiple entities, systems, and processes are connected. This process is known as supply chain integration. The smooth movement of information, goods, and services throughout the whole supply chain network is made possible by the seamless integration of suppliers, manufacturers, distributors, retailers, and customers. Companies can gain a number of advantages by integrating various supply chain stages and services, including better inventory management, shorter lead times, faster responsiveness to client requests, and improved overall supply chain performance Chaudhuri, A. (2018).

Supply chain integration significantly affects a company's performance in a number of ways. The first benefit of integration is increased operational effectiveness and cost savings. Organizations may boost productivity and resource utilization, which eventually leads to cost savings, by streamlining processes, getting rid of redundant steps, and improving workflows. The second benefit of integration is improved supply chain visibility, which enables businesses to efficiently assess inventory levels, follow the status of manufacturing, and manage shipments. Thirdly, integration encourages collaboration between supply chain parties, improving coordination, communication, and trust. This cooperation aids in risk management, strategy alignment, and cooperatively meeting market expectations, ultimately improving the supply chain's overall performance. Lastly, integration gives businesses a competitive edge and boosts customer satisfaction by allowing them to react swiftly to shifts in the market and client needs. Supply chain integration boosts efficiency, visibility, collaboration, and responsiveness inside an organization, resulting in increased profitability and client loyalty (Chang, W. E. (2016). Despite of the fact that there are many studies for supply chain integration & firm performance, there a gap in this area, the most important mediating factor that is Demand uncertainty has not been considered in the previous researches. Supply chain integration can be strongly impacted by demand uncertainty, a crucial aspect. Supply chain integration strives to coordinate different Integration becomes more difficult when faced with significant demand unpredictability, such as changeable client wants or market dynamics (Boon- Itt, S. &. 2010).

According to "Textile Division" (2018), Pakistan's textile industry, which accounts for 57% of all exports, is a significant contributor to economic growth. There is tremendous competition in the sector, and the current global market environment is becoming more demanding. However, the textile industry's logistics network needs serious strengthening and expansion, the output needs to be raised, and there is a requirement for having a distinctive selling offer in order to survive and compete. The textile sector needs to create plans, strategies, and policies in order to overcome the obstacles and become resilient and powerful enough to compete on a worldwide scale. According to The Nation, the sector's value increased by 7.18% on a semiannual basis at the start of 2018 to reach USD 7.72 billion (Nini, 2019). According to what was written, one of Pakistan's major export sectors is the textile industry. The textile industry in Pakistan accounts for 50 to 60 percent of all exports and employs 40 percent of all workers.

It has been said that the textile industry has underperformed and fallen short of its full potential (Javed, O. 2019).

The Economic Survey of Pakistan claims that the textile industry's development has not been without bumps in the road. The onset of the global economic crisis was an immediate setback, and it was joined by rising manufacturing costs, escalating power costs, rising commodity prices, and a sharp decline in the value of the local currency as some of the many factors that contributed to the collapse of Pakistan's textile industry. The sector's growth reached an astounding 24.50% in 2004–2005 before collapsing to just 1% in 2010–2011 (Ahmed, 2019). Review revealed that there were just 3 textile factories when Pakistan was founded, but that number has since risen to almost 600. In terms of worldwide cotton

production, Pakistan ranks third and third in terms of cotton consumption. As of 2017, 63% of all exports were made up entirely of textiles. The natural, unprocessed form of cotton that is readily available is extremely important to the textile industry, and a growth in this industry is thought to aid in replenishing the nation's declining foreign exchange reserves. A total of $2.3 billion was allotted to the sector for the years 2009 through 2014; however, for the years 2015 through 19, this number mysteriously decreased to 640 million (Azeem, 2017).

Pakistan's textile industry has both potential and challenges in his piece for Pakistan Economist. One of the problems is a lack of automation and technological innovation, and another is a lack of threads and wools of a decent level. 9084 cloth weaving machines are located in factories, however only 6384 of them are functional. Off-the-rack clothing is a significant section of the textile industry. In the domestic and international markets, this industry has tremendous appeal and potential. Another industry that is quite prominent is the premium quality sector, where sewed apparels account for 35 percent of all fabrics exported overseas (Kazmi, 2018). The textile sector of Pakistan is playing a central role in the economy.

Problem Statement

The textile industry is one of the most crucial sectors for Pakistan's economic growth. It makes a substantial contribution to its industrial exports. Over the years, this industry has seen ups and downs for a number of reasons.

The textile industry's performance has occasionally fallen short of expectations. 125 textile companies have decided to stop operations thus far, and most of them have only recently done so. Devaluing the Pakistani rupee in relation to the US dollar did not improve the textile industry's situation either. As evidenced by The News, textile exports decreased by almost 6% in November 2018 as compared to the same month the previous year (Ahmad, 2018).

The industry has struggled because of expensive manufacturing costs, frequent power outages, and defective products. The main problem identified here was the lack of efficient workers, this industry has workers who can do one type of work that they have been doing since the birth of this industry, these workers are not used to any type of changes, and they can’t adopt any new methods or techniques to make this industry flourish, this is why this sector has been facing problems since a very long time now.

Research Objectives

- To identify the impact of Supply Chain Integration factors (Internal Integration, External Integration, Customer Integration, Process Integration and Product Integration) on Firm Performance.
- To identify the mediating impact of Demand Uncertainty over Supply Chain Integration (Internal Integration, External Integration, Customer Integration, Process Integration and Product Integration).
- To identify the significance of the Supply Chain Integration factors on firm performance and the mediating effect of Demand Uncertainty.

Research Questions

RQ1. What is impact of Supply Chain Integration factors (Internal Integration, External Integration, Customer Integration, Process Integration and Product Integration) on firm performance?

RQ2. What is the mediating effect of Demand Uncertainty on Supply Chain Integration and Firm Performance?

RQ3. What does Demand Uncertainty significantly affect the relationship between Supply Chain Integration factors and Firm Performance?

LITERATURE REVIEW

This chapter discusses literature review of all variables comprising research framework and their theoretical background. It also covers in detail all the variables as demonstrated by previous studies, their empirical relations as concluded by preceding studies. This chapter also presents research hypothesis of the current study. It encompasses literature table and a detailed explanation of mediating relation of demand uncertainty among the concerned variables. Finally, it represents the study's conceptual structure. Overall chapter possesses title of Literature review in a comprehensive manner.

Theoretical Foundation

A growing number of academics have taken an interest in the impact of supply chain integration on business performance. Several hypotheses are now being established on how supply chain integration affects overall firm performance. Although each study has its own unique set of factors, some studies have looked at the impact of supply chain integration on operational and financial success. (Flynn, B.B, 2010), some have considered supply chain integration and financial performance of the firm (M.beheshti, 2014), while others have considered, three types of supply chain integration, i.e. Financial flow, information flow, and physical flow, relation to firms performance (Hussein Zolait, 2010). Most research on this subject focuses on either internal integration or outward integration. According to Mass, the only element affecting the performance of the organization is external integration. (Quesada, 2008). The importance of this study cannot be justified with one type of integration, firms now have to shift their focus towards both the integrations. Recent research has shown the relationship between supplier integration on firm's performance, considering internal integration as a mediator (Feng, 2013).

SCI is defined as "the extent to which a manufacturer cooperatively manages intra- and inter-organization processes and strategically collaborates with its supply chain partners." In order to give the client the most value at the lowest possible cost and at the fastest possible pace, the objective is to accomplish the effective and efficient flows of information, money, decisions, and goods and services (Flynn, 2010). It has been acknowledged that there may be variations in the scope and focus of these capabilities in SC integration. The benefit and function of SC integration in the interactive relationship between SC operational capability and corporate competitive capability may vary depending on the degree of development of SC integration (Panayides, 2017). The three elements of SCI internal, supplier, and customer integration are well acknowledged in the literature (Flynn, B.B, 2010). Many firms have moved toward the appropriate operation of supply chain integration in order to achieve a win-win situation for themselves. Many scholars believe that performance can be enhanced by merging supplier and customer bases and technologies, removing unnecessary supply chain procedures, speeding up information, technology, and material flows, and establishing enduring connections with key suppliers and customers (Zailani, 2005). SCI encourages value creation, cooperative planning, and cross-firm problem-solving strategies to guarantee the efficacy of the supply chain (Wong, 2011).

The degree to which a factory organizes its own organizational strategies, procedures, and processes into cooperative, synchronized operations in order to satisfy the needs of its consumers and effectively communicate with its suppliers is known as internal integration (Flynn, 2010). In order for businesses to coordinate operations across multiple functional areas, internal integration necessitates the integration of data and information systems (Kim, 2009). The ability of an organization to coordinate its organizational practices, procedures, and behaviors into cooperative, synchronized, and manageable processes in order to satisfy client requirements is another definition of internal integration (Cespedes, 1996). Questions about internal integration address topics including data integration among business groups, integrated

warehouse management, and routine interagency meetings (Huo, 2012). Many researchers have defined internal integration as the process needed to improve company's overall performance, external integration cannot be successful if internal integration is not the first step to improve. The significance of internal integration can be clearly seen when achieving the company's strategic goals, the cross-functional cooperation and collaboration is the major element in internal integration. The goal of this integration is that departments within a company can work together as a whole to achieve goals and maximize value for the whole chain. Recent research describes how internal, cross-functional integration techniques that are commonly incorporated into a company's supply chain organization result in information processing capabilities.

In order to enhance communication and collaboration among supply chain participants and avoid mistakes throughout the supply chain, external integration can assist in the timely acquisition of information about the supply chain, including information on supplier activity and customer demand (Swink, 2007). Businesses can take advantage of two main competitive advantages. High levels of integration among supply chain partners have the potential to lower net costs of doing business and total delivered costs to customers. This is because of improved operational knowledge and information visibility, which can first make businesses more responsive to changing demand (Rosenzweig, 2003). External integration is the coordinated management of operations and procedures among business associates. Upstream examples include sharing production plans and costs with suppliers, whereas downstream examples include the various shared information and processes involved in cooperative planning, forecasting, and replenishment (Germain, 2006).

Customer integration is a new challenge for businesses because it makes it possible to gather a tone of vital data, enhancing overall performance as well as customer satisfaction, product diversity, and innovation performance (Flynn H. a., 2010). Customer integration is the component of customer relationship management which puts technology in place that allows customers to process their own transactions and to have direct contact with the organization. Customer integration involves engaging with key customers to better understand their needs.

Although the customer has long been thought of as a passive player in the SCM, recent study demonstrates that he actually has a significant and active role to play (Reaidy, 2020). Studies have even defined customer integration as "Customer integration includes information, material, and service flows to the customer and from the customer to the focal firm" (Yang, 2020). Another crucial element of customer integration is the dissemination of data regarding customer satisfaction throughout the company. This will allow businesses to use knowledge anchored in inter-organizational processes to better understand future market trends (Flynn B. H., 2010). Customer integration, an emerging capability, entails interacting with important clients to better comprehend their needs and encourage coordination between organizational departments to produce value for the end user. Customer integration is a broad concept of supply chain integration (Koufteros, 2005).

Supporting and Negating Views

According to Fisher, a foundation for bettering consumer demand plans is created through customer integration, which includes the strategic information sharing and collaboration between focus manufacturers and their customers. In other words, a higher amount of consumer data denotes more information sharing. More knowledge on consumer preferences can be obtained by manufacturers, enabling them to foresee market conditions more correctly and greatly assisting senior management when making long-term operational decisions (Fisher, 1994). Consumers are no longer viewed as a passive group to whom businesses must deliver products or services that meet their needs. In order to better serve the many SC partners, the rise of collaboration with the customer marks a fundamental shift in supply chain management and necessitates new reflections and "rethinking" of the supply chain idea among

scholars and experts (Ta, 2015). Consumer integration empirical research is currently lacking in the supply chain integration literature.

A focus on strategic collaboration between manufacturers and suppliers in the management of inter-company business activities, such as information sharing, strategic partnerships, project cooperation, and collaborative product creation, is known as supplier integration (SI) (Ettlie, 1992). Since people connected to the supply chain can improve decision-making quality, distribute assets and market risk, and strengthen enterprise response capabilities, increasing the effectiveness of decision-making and enhancing the quality of services or products, Tracey argued that the involvement of vendors and producers in the supply chain in making choices can create a competitive advantage (Tracey & Vonderembse, 2000). This collaboration includes idea generation, the development of new products and product concepts, industrial-scale manufacturing, and market research. Supplier integration allows both the business and the suppliers to deepen their relationship and better understand one another's duties.

Crucially, Hammer (2001) said that the integration of business operations across supply chain firms may be where the real "gold" lies. The efficiency and efficacy of transactions and relationship structures can be increased by better managing business processes through process integration both inside and between supply chain participants. Although there is no consensus on what supply chain process integration actually entails, the prior discussion concentrated on the internal-external foci of integration studies and the process-oriented approaches promoted by supply chain theorists. Supply chain process integration is the interaction and cooperation of supply chain actors who want to create a network (Huang, 2014). Building various supply chain networks that can help increase supply chain efficacy and efficiency requires having viewpoints on supply chain processes (Ellram).

In order to ensure that the right product is available to the right customers, supply chain participants can coordinate both the upstream and the downstream flow of operations, such as exchange of data, tangible product movement, and automatic resource transfer, through utilizing supply chain process perspectives (Chen, 2009). Process integration is an essential component of attaining supply chain integration since it allows for the smooth coordination and synchronization of diverse business activities across multiple supply chain entities. Process integration guarantees consistency and compatibility across partners by establishing standardized processes, methods, and formats for information transmission, enabling for smooth integration. Information exchange is an important part of process integration. Partners in the supply chain must exchange real-time and accurate information such as demand estimates, production schedules, inventory levels, and delivery status.

Involving suppliers and customers in the creation of new products is known as product integration (Huo B. H., 2014). Product integration with customers and vendors can improve a company's capacity to create new goods and improve the quality, adaptability, and creativity of existing ones (Koufteros X. C., 2007). However, in order to reduce product development costs through early supplier involvement, product integration highlights the significance of high-level customer and supplier interaction (Handfield, 1999).

The smooth incorporation of numerous products or components from various suppliers and manufacturers into the overall supply chain network is referred to as product integration in the supply chain. It entails assuring product compatibility, quality control, and efficient handling along the supply chain. Product integration strives to minimize bottlenecks, reduce lead times, and optimize inventory levels by integrating items into the manufacturing, storage, and distribution processes as efficiently as possible. This integration requires excellent communication and collaboration among supply chain partners to ensure that products satisfy specifications, are available when needed, and are delivered to the right place at the right time. Businesses can obtain a competitive advantage in the market by successfully integrating items into the supply chain. Li discovered that internal and product integration improved operational performance in organizations in the transportation, electronics, and equipment industries (Li, 2015).

Product integration, on the other hand, saves production costs by integrating suppliers in the early stages of new product development (Handfield R. R., 1999). Finally, successful product integration in the supply chain leads to higher customer satisfaction, cost savings, operational efficiency, and competitiveness. Businesses may respond rapidly to market demands, provide products faster, and provide a seamless experience to customers throughout the product lifecycle by efficiently integrating products into the supply chain.

Demand uncertainty refers to the external factors that cause demand to suddenly grow or fall. A public health emergency or even a sudden shift in customer preferences could be at the foundation of this situation. Internal qualities of the organization and its clients, as well as external influences, can all contribute to demand uncertainty. While businesses that experience seasonal fluctuations can frequently use data from previous years to predict and forecast the current seasonal shift, seasonal fluctuations are still a sort of inherent uncertainty. Demand uncertainty (DU) is the term describing unforeseen and erratic shifts in the volume and timing of demand across the supply chain. Due to DU, demand projections are frequently inaccurate (i.e., real and expected demand are not the same). Uncertainties in supply, process, and demand all have a substantial impact on the manufacturing function. Uncertainty affects the network, resulting in inefficient processing and non-value-added actions. One type of micro-level uncertainty that can have a major impact on firm performance is demand uncertainty (DU) (Flynn B. K., 2016). Geary even claims that demand uncertainty in an organization can be defined as the difference between real market demand and predicted client orders (Geary, 2002). The mediating role of demand uncertainty in the relationship between SCI and firm performance is examined in this study.

The terms "firm performance" and "firm operation" can be used interchangeably to describe organizational performance and operational outcomes. In strategic management research, the idea of firm performance has lately acquired traction and is frequently used as a dependent variable. Achieving both financial and market-oriented objectives through competitive and financial success is the focus of firm performance (Yamin, 1999).

Performance of the supply chain is highly correlated with firm performance. A company's total performance and competitiveness can be strongly impacted by the effectiveness and efficiency of its supply chain. Supply chain performance directly impacts various aspects of firm performance, including cost efficiency, customer satisfaction, responsiveness, product quality, operational efficiency, and risk management. A well-functioning and optimized supply chain can contribute to improved financial results, market competitiveness, and long-term success for a company. The term "firm performance" describes a company's total success and accomplishment in attaining its aims and objectives. It includes a range of factors, such as general competitiveness, market share, customer satisfaction, and financial performance.

Previous research has utilized a variety of factors to evaluate organizational effectiveness, including operational performance (Devaraj, 2007). Organizations should develop a diverse set of performance metrics because focusing solely on financial performance metrics can have a negative impact on an organization's long-term viability (Kafetzopoulos, 2015). In compared to its competitors, operational performance demonstrates improvement in an organization's reaction to a dynamic environment, whereas business performance relates to an organization's financial success in terms of profitability and investment return (Abu-Taieh, 2022). In order to identify and establish the foundation for assessing operational performance, this study chose to employ operational performance as a metric for performance. The effectiveness and efficiency of a company's regular operations and processes in attaining its goals is referred to as operational performance. It covers a range of business operations, including manufacturing, supply chain management, resource management, and quality control. Customer happiness, overall performance, and competitive advantage are all directly impacted by operational performance.

Organizations can improve their operational performance and provide better results by concentrating on efficiency, quality, supply chain management, cost control, adaptability, and continuous improvement.

Integration of the supply chain is essential for enhancing organizational performance. Organizations can increase efficiency, cut costs, and improve customer service by cooperating and aligning with supply chain partners. Processes are streamlined, redundant tasks are removed, and logistics, production planning, and demand forecasting are all improved by integration. SCI has the potential to improve firm performance (Li, 2015). Additionally, SCI enables businesses to quickly obtain the necessary information about demand, technology, and strategy. This can help supply chain partners better align and coordinate their efforts, reduce waste, and provide products to customers faster and cheaper (Li, 2015). Internal integration can help to optimize internal processes and prevent non-value-added and duplicated activities within a company. As a result, higher-quality items are produced at reduced costs (Flynn, B.B, 2010). As a result, expenses are decreased, inventory is lowered, and lead times are cut, increasing operational efficiency. Furthermore, by exchanging real-time information and working closely with partners, supply chain integration helps businesses to adapt quickly to client requests. This adaptability and responsiveness help to increase customer happiness and loyalty, which benefits the performance of the entire organization.

Mediating effect of demand uncertainty

The relationship between SCI and organizational performance is influenced by many external conditions. Demand uncertainty is one of the important external factors that can mitigate the relationship. The literature claims that the degree of demand uncertainty affects how SCI affects organizational performance. Liao (2010). The mediating function of demand uncertainty in the process is essential to comprehending the connections between supply chain integration and its impacts on organizational performance. When demand is less unpredictable, supply chain integration can benefit businesses more. By collaborating with partners, exchanging information, and coordinating efforts, organizations may improve productivity, reduce expenses, and please customers. However, the importance of supply chain integration increases when dealing with high demand ambiguity. By incorporating flexibility, adaptability, and responsiveness into their business processes, integration initiatives assist organizations in reducing the detrimental consequences of uncertainty. Organizations may effectively navigate demand swings and lower the risks associated with uncertainty by working closely with suppliers, sharing real-time information, and harmonizing demand planning processes. The influence of SCI on organizational performance, according to the literature, varies depending on the extent of demand uncertainty (Boon- Itt, 2010).

Research Hypothesis

H1: Different dimensions of Supply Chain Integration have positive impact on Operational Performance.

H1a: External Integration has positive impact on Operational Performance.

H1b: Internal Integration has positive impact on Operational Performance.

H1c: Customer Integration has positive impact on Operational Performance.

H1d: Supplier Integration has positive impact on Operational Performance.

H1e: Process Integration has positive impact on Operational Performance.

H1f: Product Integration has positive impact on Operational Performance.

H2: Demand Uncertainty moderates the significant effect of Supply Chain Integration on Operational Performance.

H2a: Demand Uncertainty moderates the significant effect of External Integration on Operational Performance.

H2b: Demand Uncertainty moderates the significant effect of Internal Integration on Operational Performance.

H2c: Demand Uncertainty moderates the significant effect of Customer Integration on Operational Performance.

H2d: Demand Uncertainty moderates the significant effect of Supplier Integration on Operational Performance.

H2e: Demand Uncertainty moderates the significant effect of Process Integration on Operational Performance.

H2f: Demand Uncertainty moderates the significant effect of Product Integration on Operational Performance.

Table 1: Summary of Literature Review

Authors	Country	Methodology	Independent Variable	Dependent Variable	Mediator	Findings
Ra'ed Masa'deh, Ismail Muheisen	Jordan	Survey Instrument	Internal Integration, Customer Integration and Supplier Integration	Operational performance		Positive & significant
Rosa Hendijani & Reza Saeidi Saei	Iran	Survey Instrument	Internal Integration and External Integration.	Organizational Performance	Demand Uncertainty	Positive & Significant
Flynn, B.B & Huo	China	Survey Instrument	Internal Integration, Customer Integration and Supplier Integration.	Operational and business Performance		Positive & Significant
Chang	Alabama	Survey Instrument	Internal Integration	Financial Performance	Time, Relationship & quality.	Positive & Significant
Boon Itt	Thailand	Survey Instrument	Internal Integration and Supplier Integration.	Customer Delivery Performance	Technological & Demand Uncertainties	Positive & Significant
Yamin & Gunasekaran	Australia	Survey Instrument	Competitive Advantage	Firm Performance		Positive & Significant
Ta, H.	North America	Survey Instrument	Role of Consumers	Supply chain Management		Positive & Significant
Kafetzopoulos, D.; Psomas, E	Greek	Survey Instrument	Innovation Capability	Performance		Positive & Significant

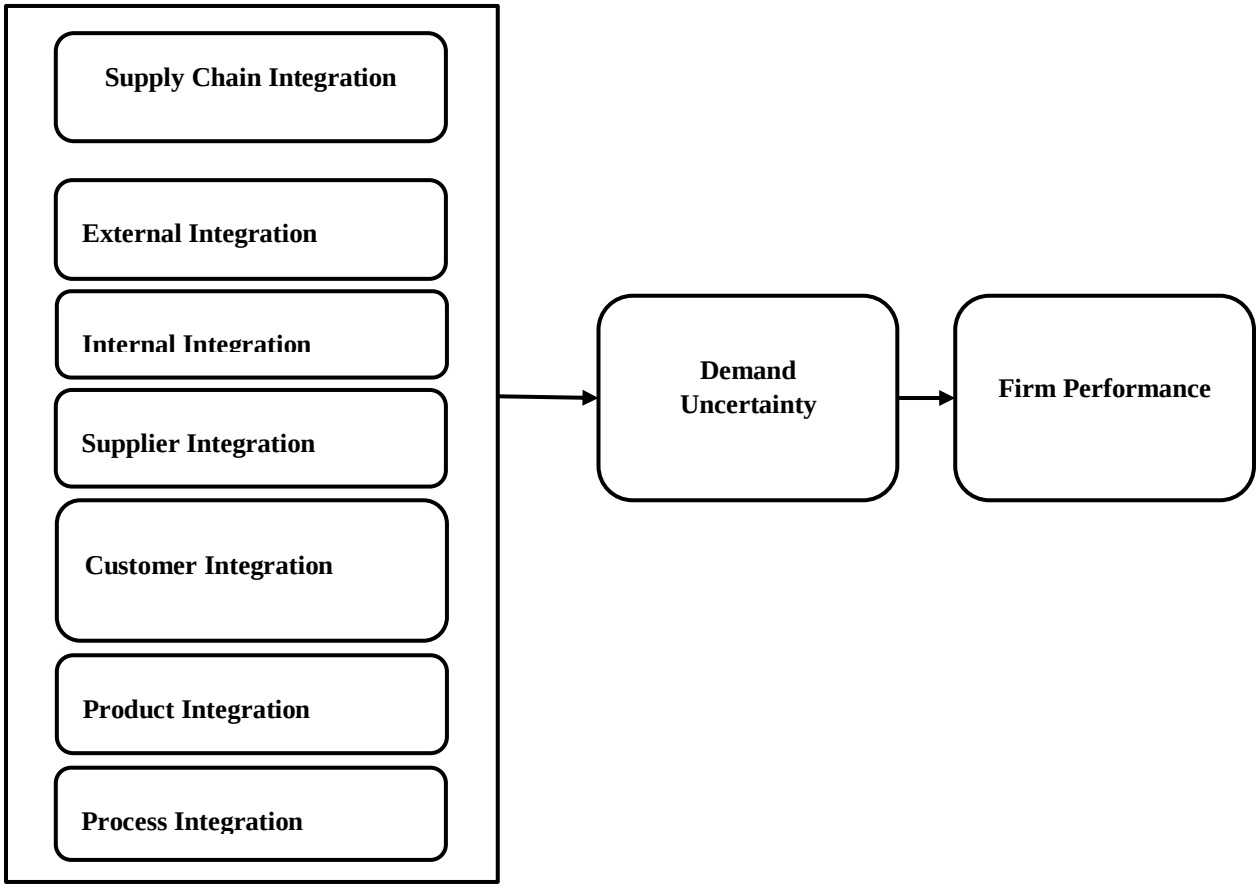

Figure 1 Conceptual Framework

RESEARCH METHODOLOGY

Research Design

The study technique, data set type, and data collecting timeframe are all demonstrated in this chapter on research design. Additionally, a thorough explanation of population measuring and data gathering techniques is provided. For the purpose of achieving the study goal and hypothesis, econometric models are also described. Finally, there are several panel models and data analysis techniques, along with a chapter summary at the conclusion. All things considered, the chapter covers the topic of research methods in a thorough and cohesive manner.

Research Approach

"Methods of research" refers to the strategies and processes used to do research. They range from general theories to specific techniques for gathering, evaluating, and interpreting data. A qualitative approach, a quantitative approach, and a mixed approach are the three categories of research methodologies. The quantitative technique was adopted for this study as objective and statistical conclusions are drawn from the data collection and analysis using numerical data.

In quantitative research, the quantitative approach is a method used to evaluate objective hypotheses by analyzing the connection between variables. In order to enable the statistical analysis of numerical data, these variables can be measured, sometimes with the use of devices. An introduction, literature and theory

review, methodology, findings, and discussion are all included in the final written report, which adheres to a preset framework. Those who use this kind of study, like those who do qualitative studies, make the assumptions that the results can be duplicated and generalized, take into consideration conflicting hypotheses, include bias safeguards, and test ideas deductively. Creswell (2014).

The term "research design" refers to the selection of the entire study methodology. It covers every stage of the procedure, from selecting a study strategy to arriving at the end results. Research design is the overall strategy or plan that guides the researcher in answering research questions or hypotheses. It entails decisions on the study plan, methods for collecting data, sample plans, and techniques for data analysis (Creswell, 2014). The same idea is described as the framework of research design, which integrates qualitative and quantitative approaches in a single study, in another book. It involves combining data collection and analysis methods to approach research problems or goals from several perspectives (Clark, 2018). Research is usually conducted using two approaches: deductive and inductive. (Sekaran, 2016)

Using the process of creating hypotheses to validate the existing theory is the aim of the deductive approach (Wiles, 2011). This approach concentrates on a specific aspect of the knowledge gained during the research process and is backed by generalized theory (Kothari, 2004). Developing new theoretical concepts and progressing from a particular or unique point to the generalization of an idea are both components of the inductive approach (Bell, 2022). The current study used a deductive methodology, which looks at existing beliefs and then backs them up with hypotheses and empirical data. Other study objectives and questions are also defined in order to quantify the research design. Quantitative data is the sole kind of data utilized to examine the relationships.

Population and Data Collection

There are now 423 industries operating in Pakistan, with 5% of them having stock exchange listings. Annual reports will be used to gather data, which will then be empirically tested for the 5% of listed companies.

Sample Size and Sampling Technique

The sample size is the number of observations utilized to compute estimates for a given population. The population was used to determine the sample size, which will be drawn from the 5% of textile companies that are listed on the stock exchange for this study. This study will employ convenience sampling, snowball sampling, and random sampling as its sample methods. This makes it possible to obtain robust statistical data by selecting mixed data at random.

Table 2: Research Instrument

VARIABLE	AUTHOR/SOURCE	LIKERT SCALE
Internal Integration	(Li, 2015)	1-5
External Integration	(Droge, 2004)	1-5
Supplier Integration	(Koufteros X. C., 2007)	1-5
Customer Integration	(Chavez, 2015)	1-5
Process Integration	(Huo B. Q., 2014)	1-5
Product Integration	(Huo B. Q., 2014)	1-5

Data Collection

In order to answer specific research questions, test hypotheses, and evaluate findings, data collection is the act of gathering and evaluating information on pertinent variables in a planned, systematic manner. In

order to gather data for this study, a variety of sources will be used, including published reports for prior data analysis and survey forms and questionnaires for fresh data collection.

Data Analyses Method

Structural equation modeling, or SEM, is a statistical tool for modeling that allows researchers to examine and analyze the connections between observed variables and underlying latent constructs. SEM will be used to analyze the data for this study. In many fields, including marketing, finance, social sciences, and economics, it is widely used to generate estimates or forecasts and to comprehend how independent factors affect the dependent variable.

RESULTS AND DISCUSSION

The precise goals of the study, the size and makeup of the textile industry that was being targeted, and the availability of people with pertinent experience all influenced the choice of respondents. In general, it comprises academics and scholars, industry associations, supply chain managers, supply chain experts, operational managers, textile executives and managers, and research and development (R&D) teams.

Table 3: Respondents Profile

		Frequency	Percentage
	Post Graduate	78	50%
	31-40	42	27%
	41-50	27	17%
Age	50 above	8	5%
	Total	**155**	**100%**
	Male	127	82%
Gender	Female	28	18%
	Total	**155**	**100%**
	Graduate	97	63%
	Post Graduate	22	14%
	Inter	28	18%
Education	Diploma	8	5%
	Total	**155**	**100%**
Work Experience	0-2 years	39	25%
	3-5 years	69	45%
	6-8 years	44	28%
	8-10years	25	16%
	10+ years	17	11%
	Total	**155**	**100%**

Reliability Analysis

The internal consistency of the variables is measured with the aid of reliability analysis. The reliability of the items is assessed using Cronbach alpha, rho, composite reliability (rho_a), and average variance retrieved. According to Banihashemi, Fei, and Chen (2019), the Cronbach's alpha value needs to be higher than 0.7. According to Fahim and Mahadi (2020), the composite reliability value must be better than 0.6 and the rho's value must be greater than 0.7. All of the construct values are dependable, according to the reliability test findings.

PLS SEM Bootstrapping

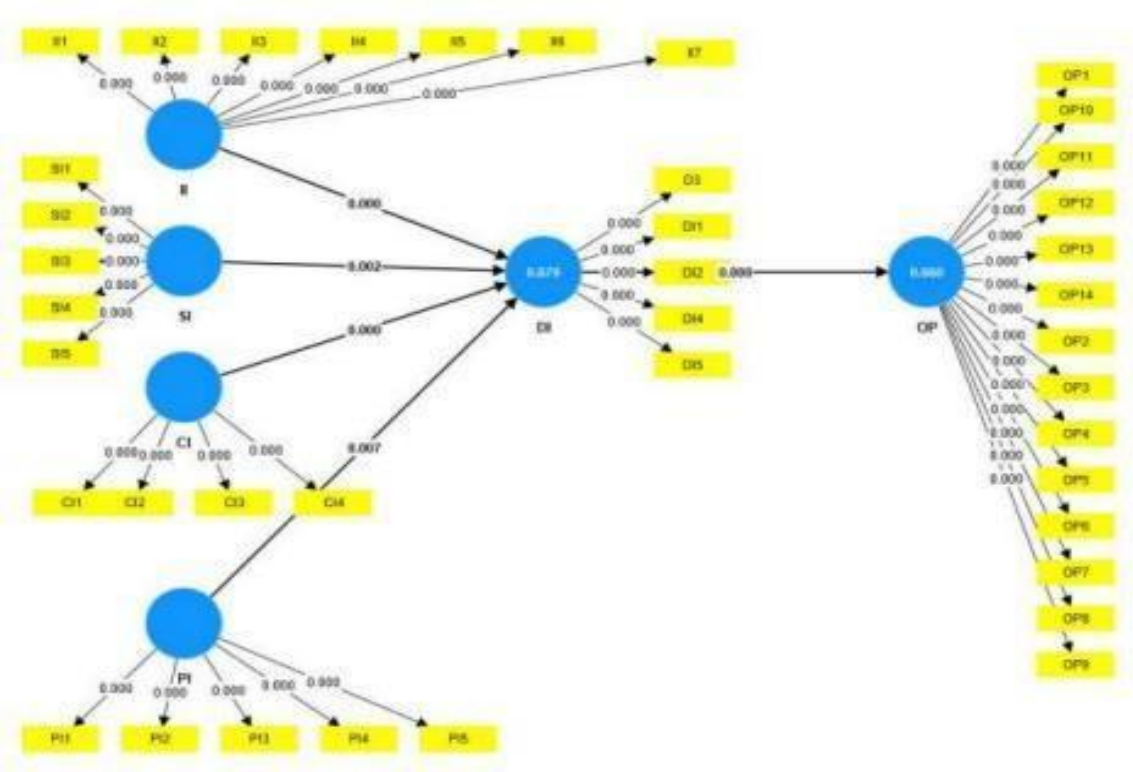

Figure 2 PLS SEM Bootstrapping

Outer Loading

Table 4: Outer Loadings

Outer model						
	CI	DU	II	OP	PI	SI
CI1	0.731					
CI2	0.755					
CI3	0.819					
CI4	0.778					
D3		0.820				
DU1		0.724				
DU2		0.693				
DU4		0.732				
DU5		0.693				
II1			0.738			
II2			0.637			
II3			0.684			
II5			0.706			
II6			0.793			
II7			0.656			
OP1				0.685		
OP10				0.660		
OP11				0.712		
OP12				0.743		
OP13				0.652		
OP14				0.649		
OP2				0.666		
OP3				0.674		
OP4				0.750		
OP5				0.670		
OP6				0.734		
PI1					0.795	
PI2					0.722	
PI3					0.761	
PI4					0.752	
PI5					0.653	
SI1						0.745
SI2						0.780
SI3						0.822
SI4						0.753
SI5						0.714

The factor loading of the elements in each construct is shown in Table 4. Luthra and Pankaj (2019) state that no value should be less than 0.5. Values less than 0.5 ought to be eliminated. All of the numbers in our analysis are over 0.5, indicating that they satisfy the requirements.

Correlation

The positive or negative link between the variables is defined by correlation. Two variables have a strong, positive correlation when the correlation is greater than 0.9, a very strong connection when it is 0.8, and a moderate correlation when it is 0.6 (Afif, Rebolledo, & Roy, 2021).

Collinearity (VIF) Inner model

A VIF between 1 and 5 suggests moderate collinearity, a number above 5 indicates strong collinearity, and a value of 1 shows no collinearity (Hair, Hult, Ringle, & Sarstedt, 2014).

Table 5 Collinearity (VIF) Inner model

	CI	DU	II	OP	PI	SI
CI		3.078				
DU				1.000		
II		3.109				
OP						
PI		3.903				
SI		2.868				

Validity

The validity is assessed using discriminant validity and convergent validity. AVE (Average Variance Extracted) is used to quantify convergent validity. According to Mendiratta (2019), it must be higher than 0.5. The variables' AVE values are displayed in Table 7. Fornell-Larcker is used to measure the items' discriminant validity (Table 8). The value is a square root. Its value ought to be higher than every other build value (Zhang & Dong, 2022). The square root of AVE is displayed in Table 6.

Table 6: Discriminant validity

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
CI	0.773	0.778	0.854	0.595
DU	0.785	0.792	0.853	0.538
II	0.829	0.834	0.872	0.495
OP	0.914	0.917	0.926	0.475
PI	0.790	0.799	0.856	0.545
SI	0.821	0.823	0.875	0.583

Table 7: Fornell-Larcker

	CI	DU	II	OP	PI	SI
CI						
DU	0.861					
II	0.373	0.851				
OP	0.432	0.612	0.81			
PI	0.612	0.561	0.721	0.85		
SI	0.231	0.621	0.234	0.612	0.84	

Hypothesis Testing

Since the p-value is used to determine the statistical significance between variables, it is imperative that the hypothesis be accepted if the p-value is less than 0.05 and rejected if it is greater than 0.05. David (2016). The p-value is displayed in Table 8.

Table 8: Hypothesis Testing

	Original sample	Standard deviation	T statistics	P values
CI -> OP	0.148	0.024	6.163	0.000
DI -> OP	-0.121	0.023	5.260	0.000
II -> OP	-0.322	0.081	3.962	0.000
PI -> OP	0.460	0.052	8.835	0.000
SI -> OP	0.700	0.087	8.092	0.000
DI x CI -> OP	0.169	0.022	7.681	0.000
DI x DI -> OP	0.144	0.033	4.361	0.006
DI x II -> OP	-0.423	0.071	5.962	0.000
DI x PI -> OP	0.561	0.062	9.035	0.000
DI x SI -> OP	0.801	0.0776	10.312	0.000

Table 9: Hypothesis Results

Hypothesis	Results
H1: Dimensions of Supply Chain Integration improves Operational Performance.	**Accepted**
H1a: Internal Integration improves Operational Performance.	**Accepted**
H1b: Customer Integration improves Operational Performance.	**Accepted**
H1c: Supplier Integration improves Operational Performance.	**Accepted**
H1d: Process Integration improves Operational Performance.	**Accepted**
H1e: Product Integration improves Operational Performance.	**Accepted**
H2: Demand Uncertainty moderates the effect of Supply chain Integration on Operational Performance.	**Accepted**
H2a: Demand Uncertainty moderates the effect of Internal Integration on Operational Performance.	**Accepted**
H2b: Demand Uncertainty moderates the effect of Customer Integration on Operational Performance.	**Accepted**

H2c: Demand Uncertainty moderates the effect of Supplier Integration on Operational Performance.	**Accepted**
H2d: Demand Uncertainty moderates the effect of Process Integration on Operational Performance.	**Accepted**
H2e: Demand Uncertainty moderates the effect of Product Integration on Operational Performance.	**Accepted**

DISCUSSION

Since the various components of the supply chain are challenging to monitor, each element is important and interconnected, and varied supply chain dimensions enhance the operational performance of the company. This is especially true in the textile industry. Internal integration enhances the company's operational performance. Every department in the textile company must be integrated internally, and data and information sharing throughout departments is vital to the supply chain and the company's overall operational success. Customer integration boosts the company's operational performance. In today's rapidly expanding world, it's critical to understand what your customers want and how and when they want it. Customers are the key link in the chain for this, so customer integration is essential to an organization's success.

The operational performance of the company is enhanced by supplier integration since suppliers own the most comprehensive data that reflects the best material and needs for a product, as well as market insights and trends that no one else would. The system's overall quality and operational performance are enhanced when suppliers are included in the development process and integrated with the system. Process integration enhances the operational effectiveness of the company. Textile companies have extremely complex processes, each with unique requirements and stages that must be completed before they are done. This necessitates that every process be properly connected; otherwise, the system would be a total mess, and operational performance will also suffer significantly. The operational performance of the company is enhanced by product integration, which also promotes supplier and customer integration. Understanding client preferences and how to supply them in the most efficient manner are crucial, and both of these integrations contribute to the firm's overall operational efficiency. For this reason, supplier integration is required.

The impact of supply chain integration on operational performance is mitigated by demand uncertainty. The moderating function that demand uncertainty plays in the process is essential to comprehending the connections between supply chain integration and its consequences on organizational performance. When demand is less unpredictable, supply chain integration can benefit businesses more. By working with partners, exchanging information, and coordinating efforts, organizations may improve productivity, reduce expenses, and please customers.

The impact of internal integration on operational performance is moderated by demand uncertainty. Since it would be expensive to realign tasks internally if demand were not accurately forecasted, it is crucial to consider demand when internal departmental alignment is being done to achieve optimal operational performance.

The influence of consumer integration on operational performance is moderated by demand uncertainty. While it is crucial to read and understand customer preferences, failing to do so may result in repercussions for mistakes made. Demand plays a big part in the process of getting to know your clients and providing them with the best possible service. It significantly and favorably affects operational performance. Given that suppliers can offer you the best materials at competitive prices, demand uncertainty mitigates the impact of supplier integration on operational performance. It is crucial to remember that demand is a key component of the process and is closely linked to the firm's operational

performance. The impact of process integration on operational performance is moderated by demand uncertainty; if demand is not accurately projected, operational issues will always arise, regardless of how highly linked the processes are. Therefore, demand unpredictability should be taken into account in order to have a proper flow of activities. The effect of product integration on operational performance is moderated by demand uncertainty. It is crucial to keep in mind that demand has a positive and substantial influence on the firm's operational performance when attempting to strike the ideal balance between product integration and performance.

CONCLUSION

The purpose of this study is to ascertain how supply chain integration affects a company's performance while taking demand uncertainty into account as a moderating element. Based on information from 5% of the listed companies, this report examines Pakistan's textile sector. Improving organizational performance depends on the supply chain's critical integration, which enables businesses to work with supply chain partners to increase productivity, cut costs, and improve customer experience. This integration improves logistics, production planning, and demand forecasting while removing duplications and streamlining procedures (Li, 2015). By enabling rapid access to critical information on strategy, technology, and demand, supply chain integration (SCI) has the potential to improve overall business performance. As a result, supply chain participants are able to coordinate their efforts, cut waste, and provide goods to clients more effectively and economically (Li, 2015). Internally, integration streamlines procedures by getting rid of redundant and non-value-added work, which leads to the creation of better products at lower prices (Flynn, B.B, 2010). Increased operational efficiency is a result of these cost, inventory, and lead time reductions. Furthermore, supply chain integration and real-time information sharing enable firms to work closely with partners and quickly adjust to client needs, improving responsiveness and flexibility. In the end, this flexibility promotes increased client loyalty and happiness, which enhances the organization's overall success.

RECOMMENDATIONS

There are a number of limitations in this work that might be addressed in future studies. First and foremost, this paper only examines one industry, the textile sector; other industries could be examined in future studies using the same criteria. Second, just 5% of the listed firms are the subject of this study; additional target audiences may be taken into account in future research. Although the primary components of the supply chain are covered here, additional factors may be taken into account for future studies, and the literature may be further enhanced.

LIMITATIONS OF THE RESEARCH

The findings of this study cannot be extrapolated to other sectors or regions of Pakistan because it is restricted to the textile industry that was founded in Karachi and data was only gathered from workers in Karachi. There was a tight deadline for completing this study. Another drawback is that it just takes the convenience sampling method into account, which is dependent on sample size and sampling technique.

FUTURE RESEARCH DIRECTION

This study is restricted to Karachi's textile industry; with a larger sample size, additional research can be conducted on other industries or Pakistani cities. Future researchers may take suppliers' perspectives into account when analyzing the connection between green supply chain practices and organizational success, as this study is restricted to the viewpoints of employees.

REFERENCES

Abu-Taieh, E. A. (2022). Factors influencing Youtube as a learning tool. *Jordan case study*, 5856.

Ahmad, M. (2018). Textile sector performs worst during PML-N tenure . *The News* .

Ahmed, A. (2019, August). Growth Trends of Pakisan Textile Industry. *Rawalpindi Chamber of Commerce and industry.*

Angeles, R. (2009). Anticipated IT infrastructure and supply chin capabilities for RIFD and their associated deployment outcomes. *International Journal of Information Management* , 219-231.

Azeem, K. Q. (2017). Exports performance of Pakistan's textile Industry. *Journal of Poverty, Investment and development* , 1-8.

Beheshti, H., Oghazi, P., & Mostaghel. (2014). Supply Chain Integration and firm performance: An empirical study of Swedish manufacturing firms. *Compet*, 20-31.

Bell, E. B. (2022). Business research methods . *Oxford university press* .

Boon- Itt, S. &. (2010). The moderating effects of technological and demand uncertainties on the relationship between supply chain integration and customer delivery performance. *International Journal of Physical Distribution & Logistics Management* , 253-276.

Cespedes, F. (1996). Beyond teamwork: how the wise can synchronize. *Marketing Management* , 25-37.

Chang, W. E. (2016). Supply chain integration and firm financial performance . *European Management Journal*, 282-295.

Chaudhuri, A. (2018). Supply Chain Integration, risk management and manufacturing flexibility . *International Journal of Operations and production management* .

Chavez, R. Y. (2015). Customer Integation and operational performance . 83-95.

Chen, H. D. (2009). Supply chain process integration: a theoretical framework. *Journal of Business Logistics* , 27-46.

Clark, J. W. (2018). *Designing and conduting Mixed Methods research* .

Creswell, J. W. (2014). *Research Design: Qualitative, Quantitative and mixed methods approaches.*

Textile Division (2018). https://www.commerce.gov.pk/wp-content/uploads/2021/07/Year- Book-2018-19-Textile-Division.pdf

Devaraj, S. K. (2007). Impact of eBusiness technologies on operational performance . *Journal of opeartions management* , 1199-1216.

Droge, C. J. (2004). The effects of internal versus external integration practises on time-based performance and overall firm performance . *Journal of operations Management* , 557- 573.

Ellram, L. (1990). The supplier selection decision in strategic partnerships. *Journal of purchasing and materials management* , 8-14.

Ellram, L. a. (2014). Supply chain management: it's about journey not destination. *Journal of Supply chain Management* , 8-20.

Ettlie, J. R. (1992). Organizational Integration and process innovation . *Manag*, 795-827. Ettlie, J. R. (1992). Organizational Integration and Process Innovation . *Manag*, 795-827.

Feng, T. a. (2013). External involvement and operational performance: The mediating role of internal

integration . *Chinese Management Studies* , Vol.7 No.3, pp.488-507.

Fisher, M. H. (1994). Making Supply meet Demand in an uncertain world. *Harward business review.*

Flynn, B. a. (2010). The impact of supply chain integration on performance: a contigency and configuration approach. *Journal of operations Management.*, Vol.28 No. 1, pp. 58-71.

Flynn, B. H. (2010). The impact of Supply Chain Integration on performance. *Journal of Operations Management*, 58-71.

Flynn, B. H. (2010). The impact of supply chain integration on performance. . *Journal of Operations Management* , 58-71.

Flynn, B. K. (2016). On theory in supply chain uncertainty and its implications for supply chain integration. *Journal of Supply chain management* , 3-27.

Flynn, B.B. (2010). The impact of supply chain integration on performance . *Manag*, 28,58- 71.

Flynn, H. a. (2010). Impact of supply chain Integration on performance . *Journal of opeartions management*, 58-71.

Geary, s. C. (2002). Uncertainty and seamless supply chain. *Supply chain management review* , 52-61.

Germain, R. a. (2006). The interaction of internal and downstream integration and its association with performance. *Journal of business Logistics* , 29-52.

Hammer, M. (2001). The Supereffiicient Company. *Harward Business Review* , 82-91. Handfield, R. R. (1999). Involving Suppliers in new product development. *California Management Review*, 59-82.

Handfield, R. R. (1999). Involving Suppliers in new product development . *California Management Review*, 59-82.

Huang, M. Y. (2014). Re-examining supply chain integration and the supplier's performance relationships under uncertainty. *Supply chain management: An International Journal* , 64-78.

Huo, B. H. (2014). The effect of of ISO 9000 implementation on flow management. *International Journal of Production Research, Online.*

Huo, B. Q. (2014). The impact of supply chain integration on firm performance . *An international Journal*, 369-384.

Huo, J. &. (2012). The impact of demand uncertainty on decisions of sourcing strategies under supply disruption risks. *International Journal of computing and control*, 5775-5785.

Hussein Zolait, A. R. (2010). Supply chain integration. *Journal of systems and information technology* , Vol.12 No. 3, pp.210-221.

Javed, O. (2019). Textile sector of Pakistan. *Global Village Space Retrieved* .

Kafetzopoulos, D. P. (2015). The impact of innovation capability on the performance of manufacturing companies. *The greek case. J. Manuf. Technol. Manag*, 104-130.

Kafetzpoulos, D. P. (2015). The impact of innovation capability on the performance of manufacturing companies. *Manag*, 104-130.

Kahn, K. &. (1996). Logistics and interdepartmental integration. *international journal of Physical*

Distribution & Logistics Management, 6-14.

Kazmi, S. H. (2018). Pakistan Textile Industry: Challenges and opportunities. . *Pakistan Economist* .

Kim, S. (2009). An investigation on the direct and indirect effect of supply chain integration on firm performance. *International journal of production economies*, Vol.119 No. 2. pp328-346.

Kothari, C. (2004). Research methodology: Methods and techniques . *New age International*.

Koufteros, X. C. (2007). Black- box and gray- box supplier integration in product development. *Journal of operations management* , 847-870.

Koufteros, X. C. (2007). Block-box and gray-box supplier integration in product in product development . *Manag*, 847-870.

Koufteros, X. V. (2005). Internal and external integration for product development . *Decision Sciences* , 97-133.

Li, N. (2015). The impact of upply chain integration on operation performance. *Managemen Science and Engineering*, 40-45.

Liao, Y. H. (2010). Supply management, supply flexibility and performance outcomes. *Journal of supply chain management* , 6-22.

M.beheshti, H. O. (2014). Supply chain Integration and firm performance. Vol.24 No. 1, pp.20- 31.

Nini. (2019). Textile Industry In Pakistan an open example of resistance economy. *Nation.com*.

Panayides, M. (2017). Global supply chain integration and competitiveness of port terminls, in ports, cities, and global supply chains . *Routledge* , 43-56.

Quesada, G. a. (2008). Linking order winning and external supply chain integration strategies, *Supply chain management* , Vol. 13 No. 4, pp. 296-303.

Reaidy, P. L.-M. (2020). Consumer Integration in supply chain management: A taxonomy . *An international Journal*, 1-16.

Rosenzweig, E. R. (2003). Influence of an integration strategy on competitive capabilities and business performance . *Journal of Operations Management* , 437-456.

Schoenherr, T. S. (2012). Revisiting the arcs of integration . *Journal of operations Management*, 99-115.

Sekaran, U. B. (2016). *Research methods for business: A skill building approach.* John Wiley and sons .

Swink, M. N. (2007). Managing beyond the factory walls . *Journal of operations management*, 148-164.

Ta, H. T. (2015). Business to consumer collaboration: Rethinking the role of consumers in supply chain management. *Journal of business management*, 133-134.

Tracey, M., & Vonderembse. (2000). M.A. Building Supply Chains: A key to enhanced Manufacturing Performance . *Am.J.*, 11-20.

Wiles, R. ,. (2011). Innovation in qualitative research methods . *Qualitative research*, 587-604.

Wong, C. b.-I. (2011). The contingency effects of enviromental uncertainty on the relationship between supply chain integration and operational performance . *Manag*, 604-615.

Wong, C. S.-I. (2011). The contingency effects of enviromental uncertainty on the relationship between supply chain Integrationand Operational performance. . *Journal of operations management* , 604-615.

Yamin, S. G. (1999). Relationship between generic strategies, competitive advantage and organizational performance . *Technovation*, 507-518.

Yamn, S. G. (1999). Relationship between generic strategies, competitive advantage and organizational performance . *Technovation*, 507-518.

Yang, D. W. (2020). Market orientation, strategic flexibility and business model innovation. *Journal of Business & Industrial Marketing* , 771-784.

Zailani, S. R. (2005). Supply chain integration and performance . *Supply chain manag. Int. J.*, 379-393.

Zhao, L. H. (2013). The impact of supply chain risk on supply chain integration and company performance. *An internaional journal* , 115-131.

Zhao, X. H. (2011). The impact of internal integration and relationship commitment on external integration, *Journal of Operations Management* , 17-32.