



EFFECTS OF SUPPLY CHAIN RISK ON LOGISTICS PERFORMANCE HAVING MODERATING IMPACT OF SUPPLY CHAIN RESILIENCE IN COURIER INDUSTRY OF PAKISTAN

BY

FAIZA GUL (KUBS, UNIVERSITY OF KARACHI)

faizak747@gmail.com

DR. SARAH ANJUM (KUBS, UNIVERSITY OF KARACHI)

anjum.sar@uok.edu.pk

ABSTRACT

In today's increasingly globalized and competitive business environment, supply chain uncertainty has globally impacted on the overall business, specially logistics performance. The study investigates the effects of supply chain risk on logistics performance. The purpose of this paper is to present an empirical study on the supply chain risk (SCR) impact on logistics performance (LP) in courier industry of Pakistan.

The three main components of supply chain risk discussed in this paper are risk form company side, customer side, and environmental side risk.

The paper presents supply chain resilience elements of robustness (RB), flexibility (FX) and agility (AG) for mitigating supply chain risks.

The study focuses on the connections between supply chain risk and logistics performance. By realistically analyzing survey data, the partial least squares (PLS SEM) approach for structural equation modeling is employed to validate the study model. The empirical findings show the significant relationship between supply chain risk and logistics performance and no significant relationship found between supply chain robustness and logistics performance.

Keywords: supply chain risk, logistics performance, supply chain resilience, courier industry, SEM.

Introduction

Background of the study:

Businesses are getting riskier as increasing importance of supply chain due to outsourcing and international scale dealings and life process of products are short (Zhao et al., 2013). As logistics and transportation performances are increasingly more competitive in the market now and firms are trying to obtain operational excellence as it connects companies to their customers and enable to achieve customer satisfaction and to gain market share as well. The prime responsibility and role of transportation required to be done by managers for the integration of supply chain (Sanchez-Rodrigues, 2010a). An unexpected event occurs, and normal plans and process get disturb by these risks is a major fear to managers (Wang, 2018a). It is a noticeable fact that disturbance in the supply chain due to risks and uncertainty make logistics performance weak. Moreover, Supply chain must be design in a manner that can provide quick response after the disruptive event and is capable of quick recovering and putting it back to original state or even in better position. The resilience derive comes from Latin word *resilire* and specify as the ability to get back in original state after disruptive event. In constructing resilience and achieving strategies of firms, supply chain management plays an important role (Wang et al., 2018). (Wang, 2018a) Wang et al (2014) Asserts that mainly supply chain risks divided into three categories overall and these are risks and uncertainty related to firm, client and environmental.

The concept "resilience" is frequently used to define the distinctive qualities of a network that are linked to durability in the quickly growing field of study on natural ecosystems and the people who rely on them (Carpenter et al., 2001). The paper evaluates the impacts of supply chain risks from company, customer and environmental on logistics performance having moderating effects of supply chain resilience. It has a vast indicator and we have carried three elements of supply chain resilience: supply chain agility, supply chain flexibility and supply chain robustness. When creating and managing its supply and demand, an organization needs elasticity as a reactive response (Alshahrani & Salam, 2022a)

Problem Statement

There's few research on reducing supply chain risk through supply chain resilience.

Assessment and categorization of supply chain risks have been studied many times in research papers (Manuj & Mentzer, 2008) (Wang et al.,2020). However, the need of commitment to the risk in the supply chain is an issue and is taken into consideration in much research (Wang et al.,2020).

As logistics performance got disturbed by many factors. Wang (2018a) express that when managers are unable to recognize the variations and unable to get the measure of probability and their occurrence in the business is uncertainty. Increasing customers' related risk such as delays due to customer's mistakes or higher customer expectations and risks from company related like poor communication between drivers and company and environmental risks like unstable fuel prices ultimately all these risks affect logistics performance, and these uncertainty and risks can be mitigated by effective and resilient supply chain. In addition to this mostly managers wish to deal with these supply chain risks and uncertainty closely in a practical work environment (Wang, 2018a) so that firm can bounce back to original position or better than that. Many management theories rely on events that bring radical affects and have minimum chance of occurrence but have major significance (Wang et al., 2018) but routine operational risks facing by managers are greater risks as well. Resilient supply chain has the ability to respond quickly and face disaster risks. Similarly, the study looks into the importance of supply chain resilience in mitigating the supply chain risks that affect logistics performance.

Objective of the study

In this paper, the study will investigate the impact of supply chain risks on logistics activities, as well as the function of supply chain resilience elements of robustness, flexibility, and agility in reducing supply chain risks. Following are the objectives:

- To understand the influence of supply chain risks on logistics activities.
- To grasp the ideas of a resilient supply chain and how to use it to mitigate supply chain risks.

Research Questions

The questions of the study

- What are the effects of supply chain risk on logistics performance?

- What is the concept of resilient supply chain for reducing supply chain risks?
- What effects of robustness, flexibility and agility do if a company adopts these factors?

© GSJ

Significance of study

Current study focused on mitigating the effect of risks on logistics activities, since there's few research on supply chain risk and uncertainty minimization through supply chain resilience. Furthermore, the necessity for commitment to supply chain risk is a subject that has been addressed in numerous research. (Wang et al.,2020), therefore, this study can be significant as it focused on the mitigation of supply chain risks and uncertainty impacts on logistics performance. This study can be helpful for those who wish to research how logistics performance can be effective by mitigating risks from customer side, company side and environment. We suggest in this paper that supply chain resilience can assist businesses minimize supply chain risks by designing supply chain in a manner of quick response against disruptive events and can gain excellent logistics performance. The results can help supply chain managers develop methods for reducing supply chain hazards (Wang et al., 2020). Logistics performance has a negative impact of supply chain risks, like damage, late delivery, and waste. (Wang et al., 2020) (Sanchez-Rodrigues,2010b). In this paper, we examine the relevancy of supply chain resilience for reducing supply chain threats and uncertainty in enhancing the efficiency and effectiveness of logistics

Literature review

Supply chain risk

Supply chain risks increased more due to globalization and hence create major vulnerabilities in supply chain management (Gurtu & Johny, 2021) and according to (B. Fugate et al., 2006) that whole supply chain consist of interchanging of information, products and its value against it, as any disruptive event arise in flow of these factors it would disturb the whole supply chain as the whole supply chain get disturb by variations due to the disruptive events (Gurtu & Johny, 2021), these studies revealed that supply chain risk is a great impact and threat to an organization and affect logistics performance. Thus, it is important to take risks factors into consideration as (Manuj & Mentzer, 2008) and (Wang et al.,2020) stated that the assessment and categorization of supply chain risks has been examined extensively in research articles, but the requirement for commitment to supply chain risk remains a challenge and has taken in consideration in many studies (Wang et al.,2020). The study focuses on how supply chain risks affect service delivery and how supply chain resilience might help mitigate those risks.

There are so many supply chain risks and uncertainty that affect logistics performance that can be delays, loss, cargo theft, damages etc.,but in this study we mainly focus on as (Wang, 2018a) and

Wang et al (2014) asserts that mainly Overall, there seem to be three categories of supply chain risks and uncertainty: risks and uncertainty from the company, risks and uncertainty from the consumer, and risks and uncertainty from the environment. Normally in delivering the product these three parties are mainly involved and can affect logistics performance. All the above studies have discussed supply risk as a negative impact on logistics performance. Further discussed by (Akram & Siddiqui, 2019) that the risk affects both our work and home life.

Company side risks

According to (Ellegaard, 2008), the variations to the flow of products and information can be mainly classified as a company-side risk, such as poor pickup and delivery delays, inadequate operational strength, poor information sharing within the organization, and warehousing or storage concerns, it includes of logistical risks and information risks. Any flaws, errors, loss or damage are logistical risks or any disruptive event that vary logistics performance. (Wang et al., 2020), (Simangunsong et al., 2012), asserts that delays in delivering the products are one of the variables of logistical treats discussed in the study, and control of transportation network (Sanchez Rodrigues et al., 2008), some logistical hazards include space issues, carrier strength, and freight transportation operations.. These may cause difficulties and disturb routine operations (Simangunsong et al., 2012). Late receiving information and other reporting issues (Sanchez-Rodrigues et al., 2010) are also company side risks and can be mitigate by implementing proper planning. All of the above studies reveal the findings that companies face risk regarding information sharing and storage issues and these risks can be mitigate by proper designing of supply chain.

Customer side risks

These risks are from customer side such as inquiry and order reception, order processing and dispatch details are the most common sources of customer side risk, customer errors, greater consumer expectations, incorrect customer concern volume forecasting, and changing customer preferences are all examples of customer side risks. Risks related to customer side, a sort of supply chain internal risk that stems mostly from customer not from company is discussed in this study. Because of the nature of logistics service, both the buyer and the shipper play an equal part in the delivery process. (Wang et al., 2020) then it is essential to review buyer and shipper both together, as customer side risk are not controllable by companies and can be reduce if firm deliver proper

logistics service and effective logistics service in a risk environment can be achieved through resilient supply chain. There are many customer side risks in supply chain context such as customer disappointments, reputational damage, forecasting errors, customer delays, and receivables risks (Manuj & Mentzer, 2008). Therefore, customer related risk variables also impact on logistics performance. And it is difficult to cope with customer side risk as it arises from external and managers should have to be resilient and agile for external risks.

Environment side risks

These risks involve unstable fuel price, weather condition, natural disaster, strikes and availability of labor have an adverse influence on the performance (Simangunsong et al., 2012). As it is stated by (Manuj & Mentzer, 2008) and (Simangunsong et al., 2012) that environment side risk has significance that it has been discussed in extensively in prior research.

Supply Chain Resilience

As the whole process of supply chain becomes more flexible to response to changes in consumer demands while setting cost low and time of complete flow. The concept "resilience" is frequently used to define the distinctive qualities of a network that are linked to durability in the quickly growing field of study on natural ecosystems and the people who rely on them (Carpenter et al., 2001). The concept of resilience introduced for the very first time by (Holling, 1973a) that the concept of "resilience" as a particular word first appeared in the study of ecology by him. To become a resilient a company or industry should have to make their supply chain agile, flexible and robust. Resilience is characterised as far as power or competence of adapting from an organizational point of view more over the ability to alter and sustain desired functioning under difficult or stressful situations (Ponomarov & Holcomb, 2009). Supply chain resilient mitigates the supply chain risks and uncertainties and makes logistics performance effective. Effective logistics performance can be achieved if there are few chances of risk occurrence and the impact of risks of operations management can be mitigate by resilient activities supply chain's resilience is represented by the three characteristics in this paper, agility, flexibility, and robustness. (Alshahrani & Salam, 2022a) asserts that the ability of businesses to promptly resume normal operations after a disruption is the first definition of supply chain resilience.

Supply Chain Robustness

(Alshahrani & Salam, 2022a) stated that the resilience of the supply chain for contemporary businesses can be shown in their capacity to tolerate both external and internal disturbances and shocks. It is possible to analyse the supply chain's robustness under various risks, such as catastrophic, supply-side, and demand-oriented threats (Ji et al., 2020). As the strength of supply networks to withstand internal and external interruptions and disturbances, or their robustness, is becoming increasingly important in modern society. According to the short- and long- term challenges that various market disruptions pose to organisational performance, businesses recognise the need to establish robustness (Brandon-Jones et al., 2014). (Alshahrani & Salam, 2022a) asserts Supply Chain Resilience is intended to lessen vulnerabilities to productivity activities, such as market and infrastructure program, as contrasted to resilience. Supply chain robustness has been discussed by many researchers, but the perspective of mitigating supply chain risk by using robustness is very limited discussed.

Supply Chain Flexibility

According to (Siagian et al., 2021) flexibility refers to a company's supply chain's capacity to alter its potential options and vary the amount of variation in response to various market situations. As flexible supply chain can improve overall performance of the company. According to (Olivares-Aguila & Vital-Soto, 2021) because it can avoid situations that would make certain operations difficult, a company with flexibility is better able to withstand market upheavals. As it is stated in (Alshahrani & Salam, 2022a) changes in the source of materials or the method of collecting resources are feasible with flexibility. The study of (Gružasuskas & Vilkas, 2017) reveals that support the theory that inadequate supply chain resilience is primarily caused by poor collaboration, a lack of overcapacity, and a low level of flexibility. Supply chain flexibility has been discussed by many researchers, but the perspective of mitigating supply chain risk by using flexibility is very limited discussed.

Supply Chain Agility

The speed at which a supply chain can respond to disruptions is referred to as agility (Alshahrani & Salam, 2022a). In a stock market full of obstacles, supply chain agility measures how flexible and adaptable a company's supply network is (Alshahrani & Salam, 2022a). (Gružasuskas & Vilkas, 2017) has also adds his words about agility that utilizing market expertise and a virtual firm to grasp lucrative chances in a changing situation needs adaptability. The skills of the merchant play a larger

role in how soon meaningful actions may be taken after a disturbance to market situation (Bakshi & Kleindorfer, 2009). As the notion of supply chain resilience and concentrated on the capacity of the supply chain to manage risk by encouraging flexibility and agility stated by (Christopher & Peck, 2004). Agility has been discussed by many researchers, but the perspective of mitigating supply chain risk using agility is very limited discussed.

© GSJ

Logistics Performance

The primary goal of logistics in supply chain is to enhance the overall impact of each delivery, as defined by customer satisfaction. This means that workforce resource minimization and efficiency must be linked to maintaining a particular degree of customer satisfaction. Logistics, often regarded as an economic bottleneck, has become a strategic area for business. According to (Griffis et al., 2007) Logistics performance assessment has become a primary concern, (B. S. Fugate et al., 2010) With a greater understanding of the long term significance of logistics, as well as the advantages of utilizing logistics to boost customer satisfaction. Therefore, achieving customer satisfaction is the primary objective of any firm and effective logistics performance required to mitigate supply chain risks and uncertainty. Logistics performance has some factors which can impact it sometimes negatively if not handle on time, that are operating costs, frequency of disruptions and delays if timely managed and chances of no delays, damaged or lost freight if not handled by efficiency then rate of customer complaint will be increase, on time and accurate delivery must be done for no more complaints and then customer satisfaction will be achieved, customer response time, reputation in industry and accurate billing and delivery information impact logistics performance directly.

An efficient supply chain must focus on lead time to improve logistics performance, which, in turn, results in improved organizational performance as well, the literature also stated that logistics is a significant part of production network the executives (Bogataj & Bogataj, 2007), without focusing on resilient supply chain to mitigate supply chain risks that can influence logistics directly is a threat to organization performance, as it is further defined by (B.S. Fugate et al., 2010) that to firm performance.

All of the discussed studies display the findings that logistics performance has an effective part in an organization which can be achieved by resilient supply chain strategy.

A courier service is a 3rd logistics carrier that transports smaller than truckloads. 3PLs work with a variety of businesses, such as freight forwarders, delivery companies, and other businesses that integrate and provide outsourced transportation and logistical services. Due to numerous problems in Pakistan, including political unrest, poor road conditions, crumbling buildings, etc., it can be difficult for these courier services to deliver packages on time in various regions of the country, as stated by (Akram & Siddiqui, 2019) that today's parcel delivery is different from conventional rail, sea, road, or air transport since it enables quick door- to-door delivery and allows clients to participate actively in the delivery procedures.

Conceptual Model and Hypothesis

The study focuses on the connection between logistics performance in the courier industry and supply chain risk having moderating effect of supply chain resilience. The study's findings offer a foundation for understanding supply risk in the courier sector. The research data makes an effort to analyze the relationship using the structural equation modeling method between supply chain risk and logistics performance with moderating effect of supply chain resilience in courier industry of Pakistan. The detailed assessment of the literature and earlier studies shown that supply chain risks are related to logistics performance (Wang, 2018b). Different researches have different measurement tool for calculation or assessment of risk. For accurate results the scale for measurement of supply chain risk and logistics performance has been adopted from (Wang et al., 2015);(Wang, 2018b), scale of supply chain resilience has been adopted from (Alshahrani & Salam, 2022b). Poor logistics performance could be caused by risk in supply chain argued by (Christopher & Lee, 2004), (Simangunsong et al., 2012). Then (Sanchez-Rodrigues et al., 2010) gave example of logistics related risks like delays, shortages of drivers, poor communication between driver and company, customer demand varies. The conceptual approach is then put to the test in courier sector of Pakistan.

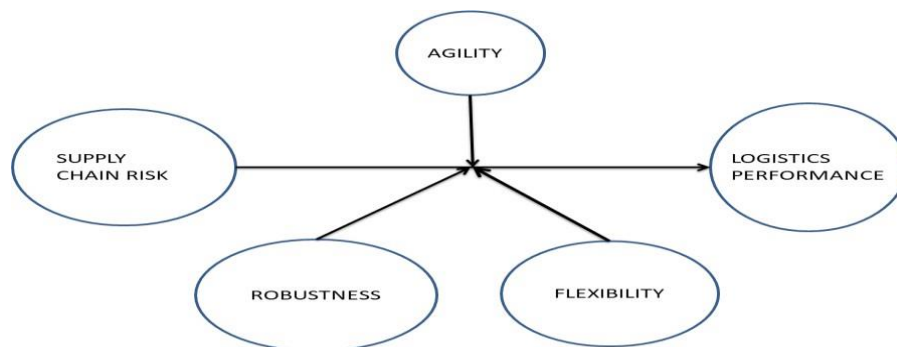
H1: A significant correlation exists between supply chain risks on logistics performance.

H2: A significant correlation exists between supply chain agility that mitigates SCR on logistics performance.

H3: A significant correlation exists between supply chain flexibility that mitigates SCR on logistics performance.

H4: A significant correlation exists between supply chain robustness that mitigates SCR on logistics performance

Fig 1. Conceptual Framework



© GSJ

Methodology

Research Approach

This study has used quantitative research as its method of inquiry. Data is quantified, converted to numbers, and empirically examined in quantitative research to ascertain the link between variables.

Questionnaire and Measurement Instrument

The sample design, data collection, and measurement methods utilized to perform the research are presented in this section. The partial least squares approach for structural equation modeling is applied. The study has a quantitative focus. In this strategy, the survey has been a key tool for data collecting in order to produce the statistical data needed to verify the hypothesis. The people who are recognized as supervisors, employees, and staff members in Pakistan's courier sector have filled the questionnaire. The study of the instruments is centered on the courier sector to guarantee the validity and dependability of the instruments. To pinpoint supply chain risk factors, a thorough literature analysis is done. According to past studies, logistics performance has impacts of supply chain risks and previous studies have shown that by adopting residence factors risk can be mitigated. 5-point Likert Scale is used to determine the severity of the effects of supply chain risk. Altogether 32 items have been used for the variables of supply chain risk having its dimension of company side risk, customer side risk and risk from environment and their impact on logistics performance has adopted from (Wang, 2018b), items of robustness, flexibility and agility has adopted from (Alshahrani & Salam, 2022a).

Data Collection

This study has used quantitative method and data has been collected through purposive sampling from courier industry of Pakistan. 110 appropriate respondents were contacted during the data gathering procedure by being sent the completed questionnaire online via email, whatsapp and LinkedIn. Out of the 110 distributed surveys, only 85 respondents successfully finished the survey, yielding a response rate of 93.5%. These 85 responses underwent a data screening process since it is essential to do so before using any statistical analysis tools on the data that have been gathered. For the purpose of data running, filtering and purification, PLS SEM software was employed. All of the questions on the survey were marked as being required to be answered in order to continue, and it was created using Google Forms so that no missing values data were collected. After completing all data purification tests, a final sample size of 77 was reached, on which additional statistical analysis was conducted. The courier companies in Pakistan are the source of the empirical data. The primary data gathering tool for the study was a web-based survey, which was used to boost the effectiveness and efficiency of data collection.

Data Analysis

Demographics:

	Demographics	Frequency	Percent
	Top Management	2	2.6
Current Position	Senior Management	21	28.2
	Middle Management	32	41
	Junior Management	22	28.2
	Less than 1 year	28	35.9
Work Experience	1 – 3 years	32	41
	4 – 7 years	3	5.1
	8–10 years	4	5.2
	More Than 10 years	10	12.8
	Procurement and purchasing	10	12.8
	General Management	0	0
	Business Development & sales	2	2.6
	Marketing	2	2.6
	Research, Analysis and Strategy	2	2.6
Department	Operations and Logistics	53	69.2
	Human resource	0	0
	ICT	2	2.6
	Accounting and Finance	6	7.6

Gender

	Frequency	Percent	Valid Percent	Cumulative Percent
--	------------------	----------------	----------------------	---------------------------

Male	57	74.4	74.4	74.4
Female	20	25.6	25.6	100.0
Total	77	100.0	100.0	

It is to be observed through the data among 77 participants in which male are 57 participants extracted the 74.4 % of the data and there were 20 female participants which extracted the 25.6% of the data collected.

Results

This section presents the survey and research model findings. The purpose of the questionnaire is to evaluate the various supply chain risks.

High level supply-chain risks:

The descriptive data shows that the top supply chain risks fall into three categories: customer- and company-side, as well as environmental risk. For example, storage issue is the top risk considered in company side in courier industry of Pakistan. In terms of their effects on the logistics performance in the courier business, we ultimately selected the top supply chain risks. They include mistakes made by consumers, traffic jams or road closures, increased customer expectations, fluctuating fuel prices, delays in picking up and delivery, a lack of drivers, inaccurate delivery information, and delays in or non-availability of delivery information. The highest average mean value was 2.62 for environmental uncertainty and risk, and 2.58 for customer-related risk. From the results it is observed that in the courier business of Pakistan, the biggest impact is from environment side. The understanding we obtained from these results that company can deal and tries to manage if risk has seem inside the organization and chances of their impact on logistics performance can be minimize by proper planning and by obtaining supply chain resilient strategy.

Factor Loading Significance, Validity and Reliability

Tables below has mentioned loadings, mean, St-deviation and t values, PLS SEM 4 program used to measure dependability, content validity, and convergent validity. Average variance (AVE) composite reliability (CR) and Cronbach's alpha values were extracted for the constructs as well. There are two reliability test methods including test-retest and reliability coefficient, Significant correlation are necessary to guarantee convergent validity; a level of satisfaction greater than 0.7 is taken into

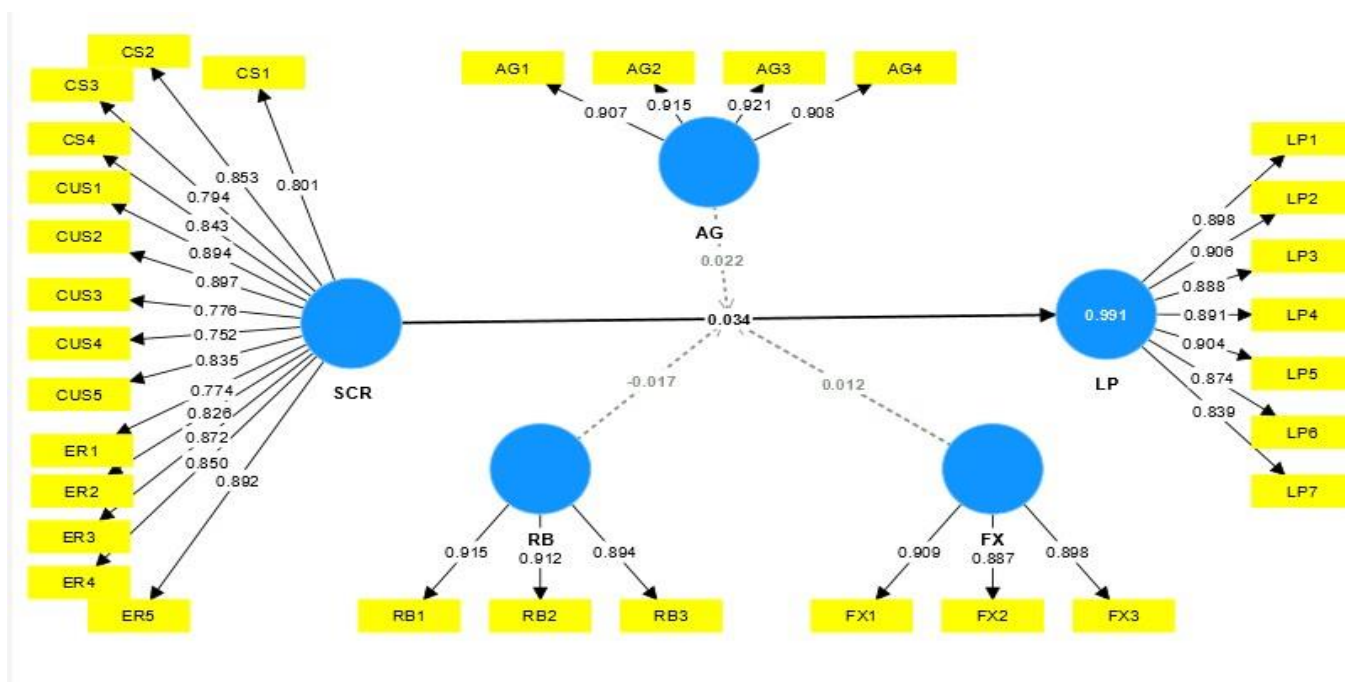
consideration (Wang, 2018b). Composite reliability is signified if greater than 7.00. Results of this study show CR values are greater than 0.8. Cronbach's alpha values are also above 0.8 and above results show the strong confidence interval.

© GSJ

Items (statistics, reliability, validity)				
	Factor loading	Mean	St. deviation	Tvalue
COMPANY SIDE(APLPHA 0.966, CR 0.968, AVE 0.696)				
CS1	0.801	2.434	1.311	12.36
CS2	0.853	2.263	1.418	17.06
CS3	0.794	2.408	1.31	11.03
CS4	0.843	2.395	1.247	19.66
CUSTOMER SIDE(APLPHA 0.966, CR 0.968, AVE 0.696)				
CUS1	0.894	2.368	1.403	19.78
CUS2	0.897	2.592	1.349	15.43
CUS3	0.776	2.645	1.374	15.05
CUS4	0.752	2.829	1.418	12.01
CUSS	0.835	2.711	1.286	20.7
ENVIRONMENTAL RISK(ALPHA 0.90, CR 0.93, AVE 0.67)				
ER1	0.774	2.868	1.37	13.73
ER2	0.826	2.645	1.364	13.02
ER3	0.872	2.605	1.159	16.72
ER4	0.85	2.5	1.372	14.47
ER5	0.892	2.632	1.212	18.12
LOGISTICS PERFORMANCE (ALPHA 0.954, CR 0.955, AVE 0.785)				
LP1	0.898	2.474	1.391	26.72
LP2	0.906	2.526	1.186	26.12
LP3	0.888	2.382	1.376	28.51
LP4	0.891	2.368	1.296	25.56
LP5	0.904	2.487	1.293	25.73
LP6	0.874	2.5	1.262	26.91
LP7	0.839	2.539	1.312	27.2
SUPPLY CHAIN ROBUSTNESS(ALPHA 0.892, CR 0.893, AVE 0.823)				
RBI	0.915	2.368	1.296	28.1
RB2	0.912	2.487	1.293	27.88
RB3	0.894	2.5	1.262	36.78
SUPPLY CHAIN FLEXILIBILITY (ALPHA 0.880, CR 0.882, AVE 0.806)				
FX1	0.909	2.539	1.312	29.96
FX2	0.887	2.671	1.281	31.21
FX3	0.898	2.513	1.262	20.89
SUPPLY CHAIN AGILITY(ALPHA 0.933, CR 0.933, AVE 0.833)				
AG1	0.907	2.513	1.262	42.08

AG2	0.915	2.474	1.319	35.813
AG3	0.921	2.526	1.186	33.276
AG4	0.908	2.382	1.376	47.92

Fig; Path model Algorithm



A confidence level shows the degree of dependability of survey results. Confidence intervals are often presented with a 95% confidence level ($p < 0.05$ for $t > 1.96$) in applied practice (Wang, 2018b). A bootstrap procedure with 1,000 iterations was used to estimate the structural relationships in the model. The relevance of beta suggests that bootstrapping can be used to determine whether a link in PLS exists (Wang, 2018b). Positive values show significant relationship between variables and negative shows negative relationship and value should not be more than 1 in path coefficient.

Table 5. Path Coefficient

PATH COEFFICIENT	
AG -> LP	0.410
FX -> LP	0.062
AB -> LP	0501

SCR -> LP	0.034
AG x SCR -> LP	0.022
R6 x SCR -> LP	-0.017
FX x SCR -> LP	0.012

The significance of path coefficient above showed that supply chain risk has influenced on logistics performance and by adopting flexibility and agility risk can be mitigate in the courier industry of Pakistan. Supply chain robustness showed a negative value which indicates negative or no significance impact on logistics performance.

Hypothesis Testing

Table 6. Hypothesis

	Standard deviation (STDEV)	T statistics	P values	DECISION
AG -> LP	0.043	9.483	0.000	Supported
FX -> LP	0.034	1.805	0.036	Supported
RB -> LP	0.037	13.608	0.000	Supported
SCR -> LP	0.020	1.654	0.049	Supported
AG x SCR -> LP	0.081	1.276	0.021	Supported
RB x SCR -> LP	0.048	0.353	0.362	Not Supported
FX x SCR -> LP	0.056	1.207	0.035	Supported

The above hypothesis testing shows the relationship between the variables that all the variables have significant impact on the performance of logistics as the P value of all the variable are less than significant level except supply chain robustness as its value is above 0.05 and shows no significant impact between supply chain risks and logistics performance. Therefore, the hypothesis of the study has been accepted and shows significant impact of supply chain risks on logistics performance and study also concludes that agility and flexibility can mitigate the impact of supply chain risk on

logistics performance. The hypothesis for supply chain robustness has not been accepted as its value was in negative and above the level of significance.

Discriminant validity

The table of these criteria for evaluating discriminant validity, which was introduced by Fornell & Larcker (1981). It is possible to use a statistical technique called item cross-loading analysis to make sure the data is discriminant. The cross loading of each item within its own construct should be greater than the cross loading of any other item (Henseler & Fassott, 2010).

Table. 7 Fornell-Larcker criterion

	AG	FX	LP	RB	SCR
AG	0.913				
FX	0.887	0.898			
LP	0.974	0.922	0.886		
RB	0.930	0.910	0.981	0.907	
SCR	0.883	0.850	0.887	0.853	0.834

Discussion

Present paper represents the study of impacts of supply chain risk on logistics performance having moderating effects of supply chain resilience in courier industry of Pakistan. The results reveal clearly that supply chain risks have a significant impact on logistics performance and by adopting resilience strategy elements of agility and flexibility a company can mitigate supply chain risk. As logistics performance is an essential element in any courier organization and can bring an organization’s profit graph upwards. Managers should be resilient and agile so that they can give fruitful results in an organization. Previous studies discussed in literature review reveals that logistics plays a vital role in courier companies. Environmental side risk factor is most difficult to cater to as it is external and cannot handle internally like company side risk which can be tackle by proper forecasting.

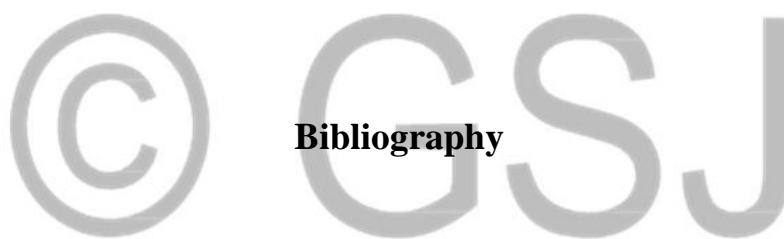
The results show the significant relationship between supply chain risk and logistics performance of the company. If a supply chain risk occurs the logistics performance will face problems and issues like late delivery. Result also reveals that by adopting the indicators of supply chain resilience like agility and flexibility companies can make themselves aware of supply chain risk prior and can mitigate risk if occurs. The Hypothesis has been rejected in case of supply chain robustness that reveals that it has no significance impact on logistics performance.

Conclusion

The study has discussed in detail the supply chain risk from the company side, customer side and environmental side and their impact on logistics performance which has proved that logistics performance has an impact of several supply chain risks. The descriptive data shows that the top supply chain risks fall into three categories: customer- and company-side, as well as environmental risk. For example, storage issue is the top risk considered in company side in courier industry of Pakistan. Fast door-to-door delivery, the ability for customers to participate directly in the delivery process, and other distinctive features make the courier sector stand out. This is distinct from conventional logistics and transportation companies. Therefore, it is important to investigate how supply chain risk and uncertainty affect the courier business (Wang, 2018b). As in courier companies, logistics performance plays a vital role, and the company should be focused mainly on logistics and try to sort out every obstacle like driver shortage and poor information or communication gap. According to the discussion, it has also been mentioned that the logistics infrastructure tends to play a significant part in producing long-term impacts for the business. To strengthen the system and relationships between the departments, the courier sector must concentrate on both national and international logistics (Akram & Siddiqui, 2019). It has notable from the research that by adopting supply chain agility and flexibility a company can be aware of the risk which does not occur, in short agile and flexible factors make a company's logistics performance well as Pakistan does not have proper infrastructure it is a difficult and challenging for managers to keep planning and forecasting of routes. Moreover, the conclusions offer guidance for putting methods into practice that will reduce supply chain risk and uncertainty while enhancing logistical performance (Wang, 2018b). Finally, the study has taken for courier industry of Pakistan and focused on the supply chain risk influenced the logistics performance while moderating impact of agility and flexibility mitigates risk factors.

Limitations and Future Recommendations:

Considering the complete research, the data has purely gathered of Pakistan and taken online in which mostly responses received are from Karachi and the study has a limitation of location wise. Moreover, supply chain risk does not just impact logistics part as in this paper purely reveal the study that supply chain risk impacts on logistics performance. Supply chain risk has vast impact on different areas so researchers advise further for future research should be carried out the impact of supply chain risk on other areas of the organization.



Bibliography

Akram, S., & Siddiqui, D. A. (2019). Impact of Customer, Environment and Company Side Uncertainty and Risk on Logistical Performance: An Analysis on Pakistan Courier Industry. *Global Disclosure of Economics and Business*, 8(1), 17–32.
<https://doi.org/10.18034/gdeb.v8i1.95>

Alshahrani, M. A., & Salam, M. A. (2022a). The Role of Supply Chain Resilience on SMEs' Performance: The Case of an Emerging Economy. *Logistics*, 6(3), 47.
<https://doi.org/10.3390/logistics6030047>

Alshahrani, M. A., & Salam, M. A. (2022b). The Role of Supply Chain Resilience on SMEs' Performance: The Case of an Emerging Economy. *Logistics*, 6(3), 47.
<https://doi.org/10.3390/logistics6030047>

Bakshi, N., & Kleindorfer, P. (2009). Co-opetition and Investment for Supply-Chain Resilience.

Production and Operations Management, 21.

Bogataj, D., & Bogataj, M. (2007). Measuring the supply chain risk and vulnerability in frequency space. *International Journal of Production Economics*, 108(1–2), 291–301. <https://doi.org/10.1016/j.ijpe.2006.12.017>

Brandon-Jones, E., Squire, B., Autry, C. W., & Petersen, K. J. (2014). A Contingent Resource-Based Perspective of Supply Chain Resilience and Robustness. *Journal of Supply Chain Management*, 50(3), 55–73. <https://doi.org/10.1111/jscm.12050>

Carpenter, S., Walker, B., Anderies, J. M., & Abel, N. (2001). From Metaphor to Measurement: Resilience of What to What? *Ecosystems*, 4(8), 765–781. <https://doi.org/10.1007/s10021-001-0045-9>



Christopher, M., & Lee, H. (2004). Mitigating supply chain risk through improved confidence.

International Journal of Physical Distribution & Logistics Management, 34(5), 388–396.

<https://doi.org/10.1108/09600030410545436>

Christopher, M., & Peck, H. (2004). Building the Resilient Supply Chain. *The International Journal of Logistics Management*, 15(2), 1–14.

<https://doi.org/10.1108/09574090410700275>

Ellegaard, C. (2008). Supply risk management in a small company perspective. *Supply Chain Management: An International Journal*, 13(6), 425–434.

<https://doi.org/10.1108/13598540810905688>

Flynn, B. B., Koufteros, X., & Lu, G. (2016). On Theory in Supply Chain Uncertainty and its Implications for Supply Chain Integration. *Journal of Supply Chain Management*, 52(3), 3–27. <https://doi.org/10.1111/jscm.12106>

Fugate, B. S., Mentzer, J. T., & Stank, T. P. (2010). LOGISTICS PERFORMANCE:

EFFICIENCY, EFFECTIVENESS, AND DIFFERENTIATION. *Journal of Business*

Logistics, 31(1), 43–62. <https://doi.org/10.1002/j.2158-1592.2010.tb00127.x>

Fugate, B., Sahin, F., & Mentzer, J. T. (2006). SUPPLY CHAIN MANAGEMENT COORDINATION MECHANISMS. *Journal of Business Logistics*, 27(2), 129–161.

<https://doi.org/10.1002/j.2158-1592.2006.tb00220.x>

Griffis, S. E., Cooper, M., Goldsby, T. J., & Closs, D. J. (2004). PERFORMANCE MEASUREMENT: MEASURE SELECTION BASED UPON FIRM GOALS AND INFORMATION REPORTING NEEDS. *Journal of Business Logistics*, 25(2), 95–118.

<https://doi.org/10.1002/j.2158-1592.2004.tb00183.x>

Griffis, S. E., Goldsby, T. J., Cooper, M., & Closs, D. J. (2007). ALIGNING LOGISTICS PERFORMANCE MEASURES TO THE INFORMATION NEEDS OF THE FIRM.

Journal of Business Logistics, 28(2), 35–56. <https://doi.org/10.1002/j.2158-1592.2007.tb00057.x>

Gružauskas, V., & Vilkas, M. (2017). Managing Capabilities for Supply Chain Resilience Through it Integration. *Economics and Business*, 31(1), 30–43.

<https://doi.org/10.1515/eb-2017-0016>

Gurtu, A., & Johny, J. (2021). Supply Chain Risk Management: Literature Review. *Risks*, 9(1), 16. <https://doi.org/10.3390/risks9010016>

Hachicha, W., & Elmsalmi, M. (2014). An integrated approach based-structural modeling for risk prioritization in supply network management. *Journal of Risk Research*, 17(10), 1301–

1324. <https://doi.org/10.1080/13669877.2013.841734>

Henseler, J., & Fassott, G. (2010). Testing Moderating Effects in PLS Path Models: An

Illustration of Available Procedures. In V. Esposito Vinzi, W. W. Chin, J. Henseler, & H. Wang (Eds.), *Handbook of Partial Least Squares* (pp. 713–735). Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-540-32827-8_31

Holling, C. S. (1973a). Resilience and Stability of Ecological Systems. *Annual Review of Ecology and Systematics*, 4(1), 1–23.

<https://doi.org/10.1146/annurev.es.04.110173.000245>

Holling, C. S. (1973b). Resilience and Stability of Ecological Systems. *Annual Review of Ecology and Systematics*, 4(1), 1–23.

<https://doi.org/10.1146/annurev.es.04.110173.000245>

- Ji, L., Yuan, C., Feng, T., & Wang, C. (2020). Achieving the environmental profits of green supplier integration: The roles of supply chain resilience and knowledge combination. *Sustainable Development*, 28(4), 978–989. <https://doi.org/10.1002/sd.2050>
- Lambert, D. M., & Burduroglu, R. (2000). Measuring and Selling the Value of Logistics. *The International Journal of Logistics Management*, 11(1), 1–18. <https://doi.org/10.1108/09574090010806038>
- Logan, D. C. (2009). Known knowns, known unknowns, unknown unknowns and the propagation of scientific enquiry. *Journal of Experimental Botany*, 60(3), 712–714. <https://doi.org/10.1093/jxb/erp043>
- Ludwig, D. (1996). Barriers and bridges to the renewal of ecosystems and institutions. *Ecological Economics*, 19(2), 185–188. [https://doi.org/10.1016/0921-8009\(96\)84161-9](https://doi.org/10.1016/0921-8009(96)84161-9)
- Manuj, I., & Mentzer, J. T. (2008). Global supply chain risk management strategies. *International Journal of Physical Distribution & Logistics Management*, 38(3), 192–223. <https://doi.org/10.1108/09600030810866986>
- Miller, K. D. (1992). A Framework for Integrated Risk Management in International Business. *Journal of International Business Studies*, 23(2), 311–331. <https://doi.org/10.1057/palgrave.jibs.8490270>
- Olivares-Aguila, J., & Vital-Soto, A. (2021). Supply Chain Resilience Roadmaps for Major Disruptions. *Logistics*, 5(4), 78. <https://doi.org/10.3390/logistics5040078>
- Ponomarov, S. Y., & Holcomb, M. C. (2009). Understanding the concept of supply chain resilience. *The International Journal of Logistics Management*, 20(1), 124–143. <https://doi.org/10.1108/09574090910954873>

Sanchez Rodrigues, V., Stantchev, D., Potter, A., Naim, M., & Whiteing, A. (2008). Establishing a transport operation focused uncertainty model for the supply chain. *International Journal of Physical Distribution & Logistics Management*, 38(5), 388–411.

<https://doi.org/10.1108/09600030810882807>

Sanchez-Rodrigues, V. (2010a). Evaluating the causes of uncertainty in logistics operations. *The International Journal of Logistics Management*, 21(1), 45–64.

<https://doi.org/10.1108/09574091011042179>

Sanchez-Rodrigues, V. (2010b). Evaluating the causes of uncertainty in logistics operations. *The International Journal of Logistics Management*, 21(1), 45–64.

<https://doi.org/10.1108/09574091011042179>

Sanchez-Rodrigues, V., Potter, A., & Naim, M. M. (2010). The impact of logistics uncertainty on sustainable transport operations. *International Journal of Physical Distribution & Logistics Management*, 40(1/2), 61–83. <https://doi.org/10.1108/09600031011018046>

Siagian, H., Tarigan, Z. J. H., & Jie, F. (2021). Supply Chain Integration Enables Resilience, Flexibility, and Innovation to Improve Business Performance in COVID-19 Era.

Sustainability, 13(9), 4669. <https://doi.org/10.3390/su13094669>

Simangunsong, E., Hendry, L. C., & Stevenson, M. (2012). Supply-chain uncertainty: A review and theoretical foundation for future research. *International Journal of Production Research*, 50(16), 4493–4523. <https://doi.org/10.1080/00207543.2011.613864>

Venu, U. S., Gupta, S. G., & Mehta, Y. (2020). SUPPLY CHAIN MANAGEMENT RISKS IMPACT ON LOGISTICS PERFORMANCE IN BICYCLE INDUSTRY: ASSESSMENT THROUGH BUSINESS PROCESS REENGINEERING.

INTERNATIONAL JOURNAL OF MANAGEMENT, 11(12).

<https://doi.org/10.34218/IJM.11.12.2020.005>

Wang, M. (2018a). Impacts of supply chain uncertainty and risk on the logistics performance.

Asia Pacific Journal of Marketing and Logistics, 30(3), 689–704.

<https://doi.org/10.1108/APJML-04-2017-0065>

Wang, M. (2018b). Impacts of supply chain uncertainty and risk on the logistics performance.

Asia Pacific Journal of Marketing and Logistics, 30(3), 689–704.

<https://doi.org/10.1108/APJML-04-2017-0065>

Wang, M., Asian, S., Wood, L. C., & Wang, B. (2020). Logistics innovation capability and its impacts on the supply chain risks in the Industry 4.0 era. *Modern Supply Chain Research and Applications, 2(2), 83–98.* <https://doi.org/10.1108/MS CRA-07-2019-0015>

Wang, M., Jie, F., & Abareshi, A. (2014). The Measurement Model of Supply Chain Uncertainty and Risk in the Australian Courier Industry. *Operations and Supply Chain Management: An International Journal, 89–96.* <https://doi.org/10.31387/oscm0180114>

Wang, M., Jie, F., & Abareshi, A. (2015). Evaluating logistics capability for mitigation of supply chain uncertainty and risk in the Australian courier firms. *Asia Pacific Journal of Marketing and Logistics, 27(3), 486–498.* <https://doi.org/10.1108/APJML-11-2014-0157>

Wang, M., Jie, F., & Abareshi, A. (2018). Logistics Capability, Supply Chain Uncertainty and Risk, and Logistics Performance: An Empirical Analysis of Australian Courier Industry. *Operations and Supply Chain Management: An International Journal, 45–54.* <https://doi.org/10.31387/oscm0300200>

Wieland, A., & Wallenburg, C. M. (2012). Dealing with supply chain risks: Linking risk management practices and strategies to performance. *International Journal of Physical*

Distribution & Logistics Management, 42(10), 887–905.

<https://doi.org/10.1108/09600031211281411>

Zhao, L., Huo, B., Sun, L., & Zhao, X. (2013). The impact of supply chain risk on supply chain integration and company performance: A global investigation. *Supply Chain Management: An International Journal*, 18(2), 115–131.

<https://doi.org/10.1108/135>

© GSJ

© GSJ