

Impact Of Sustainable Supply Chain Risk On The Performance Of The Companies With Moderating Impact Of Sustainable Supply Integration In Manufacturing Companies Of Pakistan

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ABSTRACT

The major objective of this study is to examine the impact of supply chain risks management on performance of the firm with moderating impact of supply chain integrations. In the current study, five supply chain risk management practices were taken as independent variables, whereas sustainable supply integration used as moderation and performance of firms consider as dependent variable. The research uses quantitative approaches for enhancing the validity of the research. The study hypotheses were developed by using the deducted approach. There are 450 plus manufacturing companies registered at PSX companies, 263 responses were received from eighteen firms, so the sample size of this study is 263 respondents. The scale was adopted from different studies and validity and reliability were tested using SPSS and AMOS software. Hypotheses of the study were also tested by using SEM in AMOS. Most of the hypotheses are accepted as per previous studies. It is recommended by the study to the supply chain managers to apply the supply chain practice integration by which a cooperative system can be developed through customer-supplier relationship to mitigate risks, which leads to the increase in a firm's performance.

Keywords: supply chain risks management, supply chain integrations, performance, manufacturing sector.

INTRODUCTION

The researchers in the past have categorized the supply chain risk in different ways. Tang and Musa (2011) suggested that there are two types of supply chain risks i.e., technological, and strategic risks. Thun and Hoenig (2013) described that there are five areas where the supply chain risk may originate. Ho et al., (2015) studied the association of supply chain risks sources on the performance of supply chain. There are several studies available in the past literature that suggest

different classifications of the supply chain and supply chain risk management. Wilding et al., (2014) discussed the relation of supply chain with supply chain integration, and found that the internal mismanagement leads to risk exposures that can be sorted out with the help of supply chain integration.

There is very limited evidence related to the supply chain risks on the performance of the organization in the presence of supply chain integration, particularly in the manufacturing sector of Pakistan. Consequently, this study will subsidize to fiction in several aspects. First, this research will be the first one to empirically test the influence of supply chain risk on the performance of the manufacturing sector in Pakistan, considering the supply chain integration as moderator.

Second, this study will present the relationship of two dimensions of supply chain integration i.e. internal integration and supplier integration as a moderator on firms' performance. Third, this research work proposes the association amid SSCR, SCI, and organization's performance over survey data of manufacturing corporations in Pakistan. Finally, this research work suggests administrative inferences for the manufacturing companies operating in South-Asian countries since this is the first study that talks the matters related to SSCR, SCI, and FFP through a large sample of manufacturing companies from a South-Asian country.

Although there have been several good studies with guiding principles in the literature with the discussion of sustainable supply chain risk on the performance of firms, however, this study identifies few research gaps that will be consider to make this research work unique. The study of Syed et al., (2019), considers three dimensions while this study will include the environmental risk and social risk and work along with total five dimensions. Secondly, studies in the past have included all the manufacturing firms while this study will include the data from manufacturing companies in Pakistan only to make more precise and accurate estimations. In addition, the research will also benefit the manufacturing companies in other South Asian countries.

The general and main aim of the research is to test the impact of supply chain risk management on the performance of the firm with moderating impact of supply chain integration. The further objectives of this study are:

1. To investigate the impact of sustainable supply chain risk management on the performance of the manufacturing firms in Pakistan.
2. To investigate the role of sustainable supply integration as moderator between supply chain risk and performance of companies in Pakistan.

LITERATURE REVIEW

The word "risks" has been originated from the Italian language from a word 'risicare', which means to dare. In the early 19th century, the word risk was used for gambling which resulted in the development of the theory of probability. Although, the topic of risk management in the supply chain is new for research but the literature on the risk and the risk management in different areas of the business is available in huge amount which can be studied to get an insight onto the risk management in supply chain (Kotzab, 2009).

The risks in the business have a component of bringing the negative outcome for the business or to get the profits in the business. However, the organizations are more interested in minimizing the negative impact of risks on the business than the positive aspects as they find that the reduction of loss is more important in the business than the profits. Some researchers argue that risk is measured subjectively because it has an interaction between the alternatives and the decision maker. The royal societies also agree with the above statement that the risks have a subjective construct which depends upon the persons and the context (Seuring & Muller, 2008).

Sustainable Supply Chain Risks

The demand side risks occur due to the uncertainty about the consumer behavior of buying the finished goods. Sometimes the sales of a particular product are high due to some external factors where the sometimes there is no sale of same product in certain conditions. Sometimes, the actual sales are higher than the targeted sales whereas sometimes the actual sales are lower than the targeted sales. There is a positive relationship between the demand side risks with the supply side risks (Carter & Easton, 2011).

There are many companies that are facing the risks in their supply chain. They supply side risks are due to the suppliers, the products to be transported by the suppliers or the risks in purchasing the raw materials. The supplier risks may include the business supplier risks, production capacity risks, problems in the quality of the raw material and use of traditional technology by the supplier. Therefore, it is highly important to choose the best suppliers for the business who can deliver the quality products to the company. The shortage of raw material for production and the poor-quality raw materials are also major risk (Bagozzi & Yi, 1988).

Another important type of risks in the supply chain of a company is the environmental risks. The environmental risks may include the political instability of the government, immediate changes made in the governmental policies and procedures, sudden change in the laws of government, uncertainties due to the social and natural events (Miller, 1991). The changes in the government policies may include the reforms in the fiscal and monetary policy of the country, price variations, changes in the minimum wages or making a company private or public. These policies do not usually change suddenly, the firms are usually aware of the changes to be incurred in these policies in the coming years and this is how during such time, they can take precautionary steps or measures to deal with the environmental risks in the supply chain (Thun & Hoenig, 2011).

Supply Chain Integration

The supply chain risks have become critical in the rapidly changing environment for the maintenance of the competitive advantage. Hence it is necessary to have close coordination between various partners of the supply chain in all stages. The literature on supply chain shows that the close collaboration and coordination between different partners in the supply chain and the management processes is termed as the supply chain integration. There are various definitions given by researchers for the supply chain integration.

The extent to which an organization has a collaboration with all the partners in its supply chain and the way company managers its internal and external processes for the purpose of efficient achievement of the flow in production of finished goods of the company and better formation of the decisions for the provision of the maximum value to the customer with less prices and high speed (Jabbour, de Oliveira, & Jabbour, 2015).

Linking the Sustainable Supply Chain Risk to Sustainable Supply Chain Integration

The Sustainable Supply chain risks are the barriers in practicing the sustainable supply chain integration, there are three dimensions of sustainable supply chain integration which are considered as the enablers in the improvement of the performance of the company. in order to investigate the theoretical and practical relationship between the concept of sustainable supply chain risk and the sustainable supply chain integration, a theoretical framework is used to follow the previous literature (Hasan, 2013).

The risks in the supply chain are basically due to the globalization of the supply chains, reduction in the product life cycle, the complex networks in the industrial partners and the non-predictable supply and demands of the products of the company. The companies try to figure different ways which can be used for avoiding the disruptions in the supply chain and which can also result in the improvement of the performance of the companies by managing the relevant risks that have raised in the supply chain. The elements of the sustainable supply chain which are the social, economic, and environmental are usually independent from each other and they focus on the separate elements of the supply chain (Haddoud, Jones & Newbery, 2017).

The labor cost is very less in the Asian countries like Bangladesh, Pakistan, and India etc. Due to which most of the brand try to use the labor from these countries. The reason for the availability of cheap labor is the high rates of unemployment in the developing countries. When all the elements in the supply chain are properly working then there are very less risks in the supply chain. However, the management of the risks in the sustainable supply chain of a company for the process of continuous development of the business is one of the most important tasks (Gold, Seuring & Beske, 2010).

There had been many research studies that have been done on the topic of supply chain risk management, however, the recent research studies have given huge stress on this topic. The risks are found in almost all the business activities within an organization and they can be studies from many perspectives which includes the strategy, finance, production, accounting, and marketing etc.

However, recently there is another perspective of risks has also been originated in the literature studies which is the risks in the sustainable supply chain. This is an area of business where the risks are present and which cannot be ignored because ignoring the risks can cause disruptions in the supply chain (Rao & Goldsby, 2009). The supply chain risk management is a new area of study among the researchers and they have mentioned that the supply chain risk management is the identification and management of the risk that are associated with the supply chain of an organization by making use of a coordinated approach between various members in a supply chain

and which also results in an increase in the vulnerability of the chain. Other researchers have given their view on supply chain risk management that it is a set of activities which includes the identification of the risks that may incur in the supply chain and implementing the proper strategies for the reduction of the vulnerability of the supply chain by making use of a coordinated system in the supply chain members. However, these researchers have only focused on the parts and functions of the supply chain and do not extend their research on the overall supply chain. The recent literature shows some work done on the element of supply chain risk management. The supply risk is usually a short term. The second term which is the supply chain risk is more associated with the long-term strategic establishment of the supply chain and the risks in the supply chain usually flow between the partners in the supply chain (Khan & Burnes, 2007).

Extension of Sustainability to Suppliers

The extension of sustainability to the other elements in the supply chain is a challenging task. The companies are considered responsible not only for their own actions but for the damages made by the suppliers as well. The poor environmental management by supplier can influence the firm who is buying the products from that supplier and it can harm that firm's environment as well. This is very true in the case of issues in the society. The child labor or the old age people are used by the clothing brands in the production process in order to reduce the labor cost which is an unethical practice. This kind of practices must not be appreciated by the companies in the society and they buying firms of such products should not buy their products in order to discourage them to follow such practices. In the process of supply chain management, there are some practices being used by the companies for bringing an improvement in the performance of the supplier which may be termed as the supplier development.

This can help in reducing the supply chain risk which may incur in the supply chain. Some buying companies make use of the supplier development strategies like supplier assessment procedures, provision of the incentives to the suppliers and investigation of the competition among the suppliers in order to improve the performance of the suppliers. In the topic of sustainable supply chain management, there are basically two areas of study which are the assessment of the supplier and their collaboration with the suppliers (Colicchia & Strozzi, 2012).

The risk in the supply chain is quite prominent and they directly affect the performance of the buying company due to which the risk aspect in the supply chain cannot be ignored and the companies must adopt various strategies to remove these risks from the supply chain. Hence, there is a need of hour to research different ways to deal with the social and environmental aspects of the risk management in the supply chains. Many proactive companies also implement such strategic system to deal with the risks in the supply chain as a proactive approach in the sustainable supply chain management.

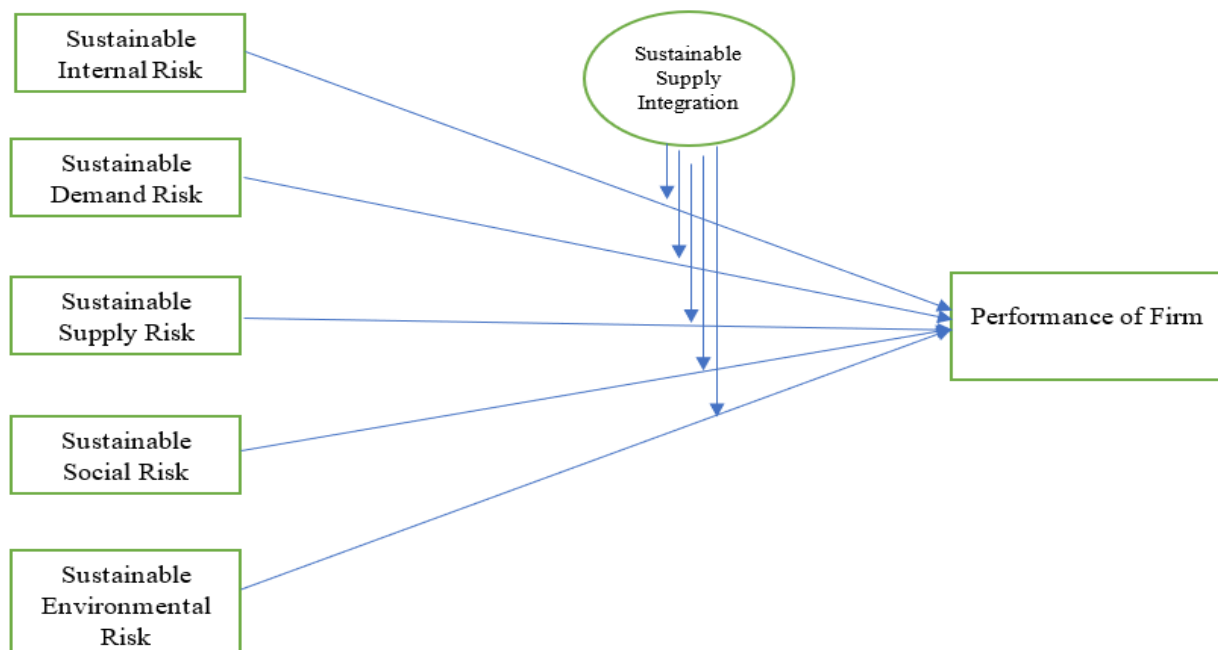
It is the common opinion of many researchers that the risk management is required in environmental and social areas of the supply chain of each company. However, there is no evidence that how does the companies cope with such factors of environmental and social issues in the supply chain. Each company has their individual strategy, there is no set rules or regulation

to this (Baskaran, Nachiappan & Rahman, 2012). The sustainable supply chain follows the directions of the environmental management systems (EMS). The natural resource-based view can be used to practice the environmental management systems of the sustainable supply chain. This system advocates that the companies should focus on the use of environmentally friendly raw materials (Tang, 2006).

There is some ISO (International Organization Standards) which must be followed by all the companies who are trying to conduct trade internationally and in open their branches in different countries of the world. These international standards guide the organizations to do the business and manage their supply chains by providing them various tools which must be used by these organizations. The firms which are ISO certified must follow all the rules and regulations given by the ISO standards and they behave differently from the non-ISO certified firms (Kleindorfer & Saad, 2005). The implementation process of sustainable supply chain is very complicated task which includes procurement, operations and many other processes involved in it. The risks involved in the sustainable supply chains may involve the quality of the raw material supplied or the delays in the delivery of the supplier (Pfohl, Kohler, & Thomas, 2010).

The companies need to develop various strategies and approaches for the management of the risks in the supply chain such as risk avoidance, risk mitigation or risk acceptance etc. The agile practices can refer to the reactive approaches that allow the companies to adjust the supply chain back to its regular state (Manuj & Mentzer, 2008).

Theoretical Framework



Hypotheses Development

Following are the hypotheses of the study based on literature review.

H1: Supply chain risk management has significant impact on the performance of the textile firms in Pakistan.

H2: Sustainable demand risk has impact on the performance of the firm.

H3: Sustainable supply risk has impact on the performance of the firm.

H4: Sustainable internal risk has impact on the performance of the firm.

H4: Sustainable environmental risk has impact on the performance of the firm.

H5: Sustainable social risk has impact on the performance of the firm.

H6: Sustainable supply integration moderates the relation of supply chain risk impact on performance of textile companies in Pakistan.

METHODOLOGY

The focus of the study is to develop and validate the implication about the hypotheses and based on evidence reject or accept the hypotheses. To see the variables and empirical relationship between them correlational designs are used and these designs are mentioned in hypothesis. Variables are verified and proposed relationship among them is checked based on literature and evidence and then a statement is made whether the hypothesis is accepted or rejected.

In this study supply chain management professionals belonging to manufacturing sector of Pakistan are the target population. This study aims to assess the role of supply chain management professionals on the level of firm performance.

Total 263 responses were received from employees working in different manufacturing companies, so the sample size of this study is 263 respondents. The current study is cross sectional and the data is collected form professionals. Survey technique in the form of questionnaire was used for data collection. The questionnaire has two parts, the first comprised of participant' demographic profile, their gender, age, qualification, job experience, designation and sector was asked. The second part contains the study variables. The variables used in this study were measured at individual level.

DATA ANALYSIS

Reliability Analysis

Cronbach's alpha is reliability coefficient that indicates how well the items in a set are positively correlated to one another", as stated by Sekaran (2003, p. 307). After analysis he reliability statistics of SIR, SSR, SDR, SER and SBSR produce significantly high values of 0.745, 0.802, 0.748, 0.866 and 0.766 respectively. The reliability values of SSI and FPF are above acceptable range of 0.70.

Correlation Analysis

The correlation between the variables is given in table 10. The strength, significance, and the direction of relationship of all the variables is highlighted in the table. The values of correlation lie with the range of -1 and +1. A correlation score of near to 1 with significance value of less than

0.05 may present good connection between the two variables. The linear relationships between the variables of the model were observed from the values of correlation table.

Table 4.1: Correlations

	SIR	SDR	SSR	SBSR	SER	SSI	FPF
SIR	1						
SDR	.382**	1					
SSR	.155*	.201**	1				
SBSR	.300**	.142*	.162**	1			
SER	.119*	.166**	.199*	.215**	1		
SSI	.136*	.155*	.134*	.105*	.252**	1	
FPF	.181*	.317**	.297**	.247**	.298**	.257**	1

**Correlation is significant at the 0.01 level (2-tailed)

*Correlation is significant at the 0.05 level (2-tailed)

The results in the above table shows that SIR has positive and significant relation with SDR with r value of .382, r value of .155 with SSR, .300 with SBSR, .119 with SER, .136 with SSI and .181 with FPF. It also shows the positive and significant relation of SDR with SSR, SBSR, SER, SSI and FPF with r values of .201, .142, .166, .206, .155 and .317 respectively. Similarly, it also shows the positive and significant relation of SSR with SBSR, SER, SSI and FPF with r values of .162, .199, .184, .134, .297 respectively. The positive and significant results of SBSR with SER, SSI and FPF with r values of .215, .192, .105 and .247 respectively are stated. It also shows the positive and significant results of SER with SSI and FPF with r values of .161, .252 and .298 respectively. Similarly, the results of positive and significant results of SSI with FPF with r value .257 has been shown.

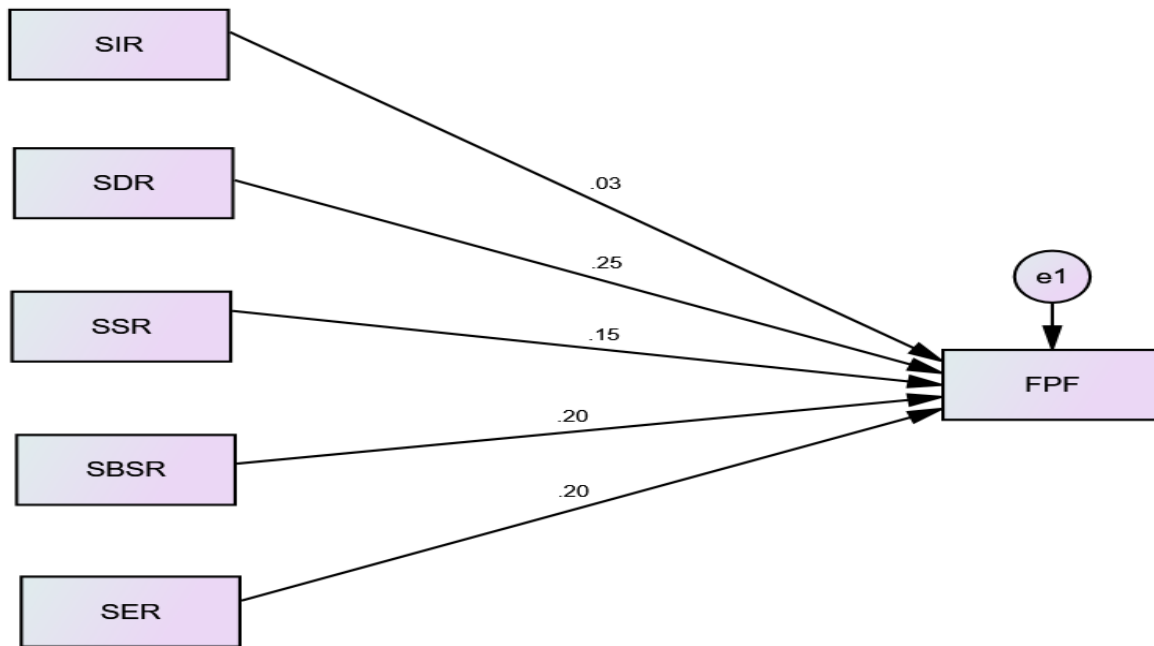
Hypotheses Testing

Multiple regression analysis can be used to measure the impact of independent variables on dependent variable. The theoretical framework is split into three models i.e., in first part independent variables (SIR, SDR, SSR, SBSR, SER) impact was tested on dependent variable (FPF), and in the second part, moderation analysis (SSI) was done to test the moderating impact between independent variables (SIR, SDR, SSR, SBSR, SER) and depend variable (FPF). Before testing the SEM at AMOS the regression assumptions were tested by using SPSS. The data has no normality or validity issue, the accuracy of results depend on the validity of all assumptions of regression analysis (Chatterjee & Hadi, 2006).

Direct Relationship

The estimate (beta) value which is reported to test the impact of each variable impact on dependent variable. Critical Ratio (CR) which is also denoted t-value is also present in the table, C.R value is acceptable if value is $> \pm 1.96$ (95% level of confidence). In the table p-value can be reported

as three asterisks (***) , <0.01 or <0.05 for significance of relationship. P-value >0.50 shows that the variable has insignificance impact of dependent variable.



The SEM result shows that SIR has positive and insignificant impact on FPF (beta= 0.03, $p > 0.05$), the estimate value 0.03 shows that if one unit increase in the SIR it will bring 3% positive impact in FPF. SDR has significant and positive impact on FPF (beta=0.246, $p < 0.001$), SSR has significant and positive impact on FPF (beta=0.154, $p < 0.01$), SBSR has significant and positive impact on FPF (beta=0.196, $p < 0.001$), whereas SER has significant impact on FPF (coefficient = .203, $p < 0.001$).

The below table show the results of SIR, SDR, SSR, SBSR, SER on FPF.

Table 4.2: Regression Weights

IV	DV	Estimate	C.R.	P
SIR →	FPF	.028	.504	.614
SDR →	FPF	.246	4.356	***
SSR →	FPF	.154	2.726	.006
SBSR →	FPF	.196	3.477	***
SER →	FPF	.203	3.587	***

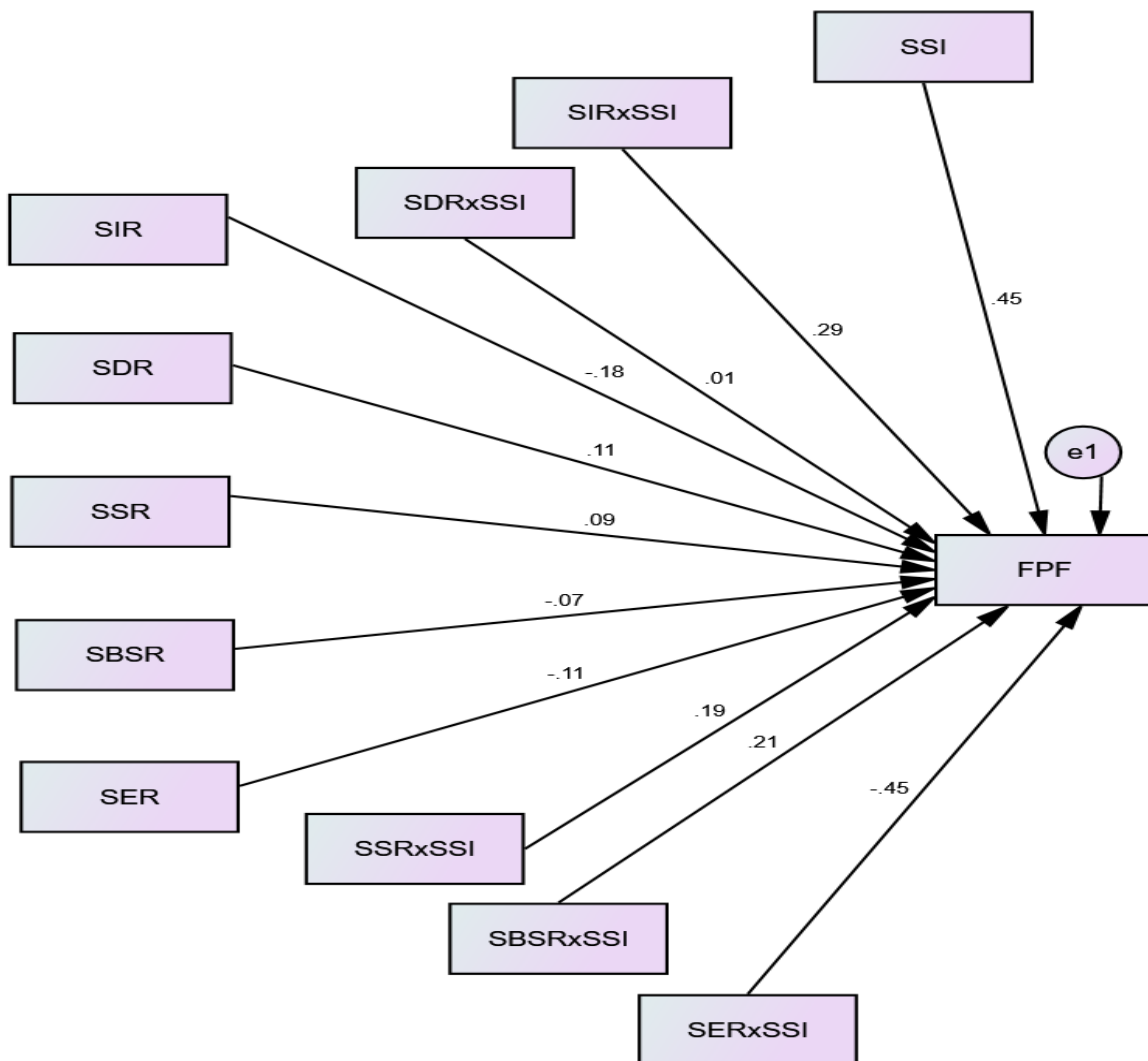
Table 4.3: Acceptance/rejection of Hypothesis

Hypothesis	Statement	Accepted/Rejected
H1	SIR has significant impact on FPF.	Rejected

H2	SDR has significant impact on FPF.	Accepted
H3	SIDR has significant impact on FPF.	Accepted
H4	SBSR has significant impact on FPF.	Accepted
H5	SER has significant impact on FPF.	Accepted

Moderation

The below figures show the results of moderation analysis by using AMOS software. In this study, SSI is used as moderator of the study and SIR, SDR, SSR, SBSR and SER are independent variables and FPF is dependent variable to test the moderation effect.



For the explanation of moderating relationship, the above table is split into different parts.

Table 4.5: Moderation

IV		DV	Estimate	C.R.	P
SIR	—————→	FPF	-.179	-4.850	***
SDR	—————→	FPF	.109	2.943	.003
SSR	—————→	FPF	.085	2.310	.021
SBSR	—————→	FPF	-.067	-1.822	.068
SER	—————→	FPF	-.105	-2.843	.004
SSI	—————→	FPF	.454	12.283	***
SIRxSSI	—————→	FPF	.293	7.915	***
SDRxSSI	—————→	FPF	.014	.385	.700
SSRxSSI	—————→	FPF	.194	5.256	***
SBSRxSSI	—————→	FPF	.206	5.576	***
SERxSSI	—————→	FPF	-.450	-12.159	***

The results shows SSI has significant impact on FPF (coefficient = .454, $p < 0.001$), however moderating effect (SIR x SSI) has significant impact on FPF (coefficient = .293, $p < 0.001$), moderating effect (SDR x SSI) has insignificant impact on FPF (coefficient = .014, $p > 0.05$), moderating effect (SSR x SSI) has significant impact on FPF (coefficient = .194, $p < 0.001$), moderating effect (SBSR x SSI) has significant impact on FPF (coefficient = .206, $p < 0.001$) and moderating effect (SER x SSI) has significant impact on FPF (coefficient = -.450, $p > 0.001$). The results show that moderating effect of SSI interaction with SIR, SSR, SBSR and SER has significant impact on dependent variable but SDR interaction with SSI has insignificant impact on dependent variable. So, because of results, we can conclude study moderator has moderation between SIR, SSR, SBSR, SER and FPF.

CONCLUSION AND RECOMMENDATIONS

Discussion

The effect of harmful consequences is mitigated by the tackling and trackability of sustainable supply chain risks through the utilization of sustainable integration practices. In addition, the results of the study lead to the conclusion that the performances of firms are inconsequentially affected by sustainable internal risk. These results are in line with those obtained by Frohlich and Westbrook (2002) and Zhao et al., (2014). Firm performances are impacted insignificantly by SIR, suggesting that managing the risks, operations and business processes are not being done adequately by the firms which further results in implementation complexity of sustainable supply integration practices.

Some of the key barriers in applying sustainable integration are weakly designed products, negating the changes in technology, increase of lead-times and machine breakdown risks. These findings are in line with those obtained by Flynn, Huo and Zhao (2014). Results obtained from the study indicate while practicing sustainable supply chain integration, the sustainable supply risks

and the firm's own internal risks are the crucial barriers. These results are in line with the studies performed by Zhao et al., (2014); Frohlich and Westbrook, (2002); Swin, Narasimham and Wang (2007).

Conclusion

The study leads us to two interconnected results, one of them being the obvious relation between performance of the firms and sustainable supply chain risks. Additionally, the results are indicative of the fact that sustainable supply integration and sustainable internal integration apply a moderative effect on the performance of firms. Furthermore, the results obtained through this study are indicative of the matter that sustainable environmental risk, sustainable demand risk, sustainable social risk and sustainable demand risk has a substantial and clear influence towards performance of firms.

Examination of the relationship between a firm's performance and sustainable supply chain integration has been done through this study which is a one of a kind since it is the first one to promote the literary information of sustainable supply chain integration, sustainable supply chain risk and a firm's performance. The results conclusively indicate that a firm's performance has a very positively defined relationship with sustainable supply integration.

This study weighs into the information of sustainable supply chain integration and sustainable supply chain risks via a practical analysis of the SEM between sustainable demand risk, sustainable social risk, sustainable environmental risk, sustainable supply integration, and sustainable internal risk as well as the firm's performance data based on the figures provided by 263 manufacturing firms within Pakistan. The outcome of the inspection reveals that a firm's performance is trivially related to the firm's internal risk.

Theoretical and Practical Implications

This investigation adds to the works on Impact of sustainable supply chain risk on the performance of the companies with moderating impact of integrated practices, a case from Pakistani Manufacturing Companies. The results which are discussed above gives directions to create and incorporate risk management practices while adhering to sustainable integration practices which in turn could undertake risks within the supply chains and lead to improvement of the firm's overall performance. Further contributions to theory are provided by this study. As a first, two separate writings on sustainable supply chain risks and performance of firms have been connected in which the outcomes portray the impact of sustainable supply risk, sustainable environmental risk, sustainable social risk, and sustainable internal risk on a firm's performance.

Hence, it is recommended by the study to the supply chain managers to apply the supply chain practice integration by which a cooperative system can be developed through customer-supplier relationship to mitigate risks, which leads to the increase in a firm's performance. Through this study various administrative implications can be deduced. Firstly, that a firm's performance is affected positively by supply chain risk resources.

Limitations and Future Implications

The investigation comprises of several suitable assumptions to be used as guidelines for utilization by the managers within an organization to achieve the increase in the firm's performance via an appropriate execution of the sustainable supply chain integration. Although, as with all other studies, there are a couple of limitations which could pave the way for further research to be done on this topic. There are multiple dimensions which are a part of the supply chain and for our study we have only considered five of them such as sustainable environmental risk, sustainable supply risk, sustainable demand risk, sustainable social risk, and sustainable internal risk.

Furthermore, only the manufacturing firms within Pakistan are considered due to which there is limitation in the implication to the other countries and their industries due to specific individualities and behavior. For further research within South-Asian countries, this study provides a good ground the reason being that comparison from western countries could not be done as there are varying differences considering behavioral singularities.

Finally, limitation on the study exists due to which the focus has been on a single industry in this study. It is suggested to the future researchers to expand the scope of the industry such as the food sector within Pakistan and considering the expansion of the study through taking reverse logistics factors in consideration amongst others.

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