

Theoretical Framework Development for Supply Chain Risk Management for Malaysian Manufacturing

Muhammad Saeed Shahbaz*¹, Raja Zuraidah RM Rasi², Mohd Hafiz Zulfakar³, Md Fauzi Bin Ahmad⁴, Engr Muhammad Mujtaba Asad⁵

^{1,2,4}*Faculty of Technology Management and Business, Universiti Tun Hussein Onn Malaysia*

*¹msaeed.shahbaz@gmail.com

²zuraida@uthm.edu.my

⁴mohdfauzi@uthm.edu.my

³*Faculty of Business and Management, Universiti Teknologi Mara Malaysia*

³mohdhafiz@salam.uitm.edu.my

⁵*Faculty of Technical and Vocational Education, Universiti Tun Hussein Onn Malaysia*

⁵mujtabaasad11@gmail.com

Abstract— Globalization, rapid technological changes, and growing competition not only facilitate but also make the supply chain more complex and fragile. Any disruption can disturb many organizations and even the whole system. There are many theories and frameworks that present a solution but no study is available that theoretically development framework for supply chain risk management. The focus of this study is to develop a novel framework for identifying the potential risks and assessment of their effects on supply chain performance. Additionally, evaluate the role of supply chain interaction in risk mitigation and performance improvement in Malaysian manufacturing. This is a conceptual paper, systematic as well as content analysis have been done for the literature review. For future study, there is a need to empirically verification of this theoretical framework. The proposed methodology to achieve this framework is; a questionnaire will be developed from a pool and will be validated by exploratory view for risk identification. This questionnaire will be distributed among Malaysian manufacturing and data will be analyzed through Structural Equation Modelling (SEM) for risk assessment and mitigation. The theoretical contribution of this study is support of the theory of swift, even flow as underpinning theory and information processing theory as supportive theory.

Keywords— Supply chain risk management, Theoretical framework development, risk identification, risk assessment, supply chain interaction

1. Introduction

1.1 Background Research

Risk or disruption of risk can be anytime, anywhere and to anyone but it does not mean to halt, life has

to move on. Meanwhile, if someone has noteworthy planning or contingencies, the loss can be avoided, mitigated or minimized [1]. Any disruption either natural or non-natural has become the highest risk for business [2]–[4]. In an interview, about 67% of managers agree that risk management is more important than before and 89% of companies accept that after financial crises their main concern is natural disasters [2]. Supply chain risk management (SCRM) is full of challenges that can result in higher cost, wasted materials and production error. It has become even more complex and vulnerable than in past. In an investigation on more than 60% of the companies revealed that their performance indicators had decreased by 3% or more due to supply chain disruptions [5]. In another study, it has been revealed that supply chain disruption caused the decline in shareholders' value about 11% and 40% decline in their share price [6], [7].

Massive literature is available on the effects of risks on performance, it has been evidenced in different countries and sectors that risk sources negatively affect the performance [8]–[13]. In a global survey, it has been revealed that political uncertainties, natural disasters, and economic issues would be among top risks. In the same survey, it is exposed that loss of income has been increased from 28% to 42% in just two years [4]. There are many examples in the history that add the value of supply chain risk management (SCRM) like a fire in New Mexico electronic chip manufacturing plant stop supply to Ericsson, as a result, company has to bear a loss of \$2.34 billion

[14]. Every single company is a crucial chip of complex Supply Chain system. Now it is above board that if any fragment of the Supply Chain disturbs, it will directly disturb the entire structure. According to ref. [15] supply chain risks are interconnected, any problem can disrupt whole. It can be observed from Tsunami and earthquake in Japan when a single disruption disturbed many elements of global supply chain and harmed many businesses in other countries, overall economic loss was 210 billion dollar [16].

Malaysia has faced many supply chain issues that not only have affected the organizations but also to the overall economy like in 2008 airport closure in Thailand, hard-disks and other electronics now need to send through the Malaysian and Singapore airports by trucks, as a result, long lead time and high transportation cost occurred [4]. Maritime piracies in Straits of Malacca, currency fluctuation, import/export regulations [17]. Delay in the physical distribution of electronic and electric [18]. Rapid technological changes [19] and increase outsourcing, product variation, and suppliers defaults [20]. Oil prices, China economic slowdown and foreign capital outflow [21], loss of Malaysia Airlines 370, the crash of Flight 8501 of AirAsia, the devastation of Malaysia Airline over Ukraine and floods [22]. Additionally, the Malaysian palm oil company IOI, World's largest palm oil producers and traders, has been blocked for their operations by Greenpeace because of forest demolition and child labor [23]. From the supply chain viewpoint these disruptions not only affect the organizational performance but also disturb the other elements of the supply chain.

It is impossible to eliminate the risk from human life the only solution is its maximum mitigation. Many researchers have tested the positive effects of supply chain interaction approaches influence by multiple ways, some direct or indirect relationship with performance while the influence on other strategies [24]–[28]. Although above mention studies are quite a detail and comprehensive still there are many limitations that are being discussed in the next problem statement. When an organization develops a risk mitigate program it can be its competitive advantage. It has been revealed that in Malaysia major concern is supply chain issues after the manufacturing [29]. Many steps have been taken by authorities of Malaysia like the initiative of Integrated Logistics

Services incentives. The aim of this program was to improve the logistics sector. Numerous other measures have been taken in third industrial plan to boost up supply chain [30]. This research gap is also validated because according to the prediction of global risk management survey in 2013 conducted form 1400 organizations economic slowdown, natural disasters, political uncertainty should be among top ten risks. This has also been supported that prediction in 2015 survey among top ten risks there are regulation and increase competition risks [22].

1.2 Problem Statement

In Malaysia, supply chain has gained the status of the strategic industry from the supportive industry [30]. Additionally, by managing supply chain well, Malaysian companies can get not only a competitive advantage but also can serve their customers proactively [31]. Moreover, in Malaysia, a major concern is supply chain issues after the manufacturing [29]. Furthermore, [32] indicated that disruptions or risk of disruption in the supply chain have an instant effect on performance and affect capability that fulfills customer requirements. Many steps have been taken by authorities of Malaysia like the initiative of Integrated Logistics Services incentives. The aim of this program was to improve the logistics sector. Numerous other measures have been taken in third industrial plan to boost up supply chain [30]. It has been revealed that the study of quantitative disruptions and models of risk management is very limited and expressly few studies are available that consider multiple risks and their effects [33]. There are various approaches to deal with different types of risk sources like proactive, accommodation, defensive and reactive strategies [19].

There are many factors that can reduce the uncertainty and enhance the performance of the organization. Ref. [34] stated that supply chain interaction should not be undervalued. All stakeholders have a strong interest in the performance of the organization. There is a direct relationship between supply chain interaction and the performance of the organizations [35]. According to the Freeman [36], who is a pioneer of stakeholder theory, a stakeholder is any individual or group who can influence or can be influenced by activities of the organization [37]. Because shareholders can also affect negatively that is why

stakeholders must communicate with the firm to enforce better supply chain management strategies. Although, Mattel had a strong relationship with its suppliers still they had to face a negative reputation when a supplier was exposed to use lead-based paint in few toy products. While, Mattel was appreciated before for having strong management relationship with its suppliers, still public blamed that they fail to keep a strong eye on their stakeholders, they must need to collaborate their supplier to stop lead-based paint [35]. Conclusively, interaction through Information processing has become crucial in highly uncertain environments [38].

Although, massive literature is available in supply chain risk management but still impact of supply chain risk sources on supply chain performance in Malaysian organizations is pitchy. This is also supported by [8], according to him, “the influence of risk management strategies on the relationship between supply chain risk sources and supply chain performance has neither been thoroughly underpinned with theory nor analyzed through conceptual study and empirical findings”. There is only a handful work is available that evaluate risk in supply chain Malaysia, except few comparative studies [13], [39].

1.3 Aim of the study

The aim of this study is to provide managers with a better understanding of risks and present a better view of supply chain interaction. This study develops a framework with the help of two theories; theory of swift even flow and information processing theory. This framework will present two relationships one is between supply chain risk sources and supply chain performance and the second is the moderating effect of supply chain interaction on the relationship between supply chain risk sources and supply chain performance. The relationship between supply chain risk sources and supply chain performance is negative and has two stages first is risk identification and second is a risk assessment. The second relationship is positive, that is moderation effects of supply chain interaction on the relationship between supply chain risk sources and supply chain performance that is basically the third stage of supply chain process and it will help manufacturing organization to risk mitigation.

1.4 Scope of study

The main focus of our research is on the manufacturing sector of Malaysia because according to index position of “High-value manufacturing - Malaysia’s next frontier” (2014) Malaysia is a the top location for manufacturing business. They stated that Malaysia should more focus on their manufacturing, it can increase their export, revenue and most important for the growth of country the employability. The department of statistics in December 2015 revealed that the Malaysian manufacturing sector is growing at the rate of 4%, which is a second growing sector in Malaysia and its share in the economy is 24.9%. Likewise, Malaysia Productivity Corporation (2016) reported that the manufacturing sector, with productivity growth 7.1, has the highest growth rate in productivity. This situation creates enough pressure on Malaysia’s manufacturing sector to be more efficient and effective in their production and supply chain in order to be globally competitive. According to [42] most of the research related to supplier integration resulted that logistical issues are top factors behind the manufacturing industry success.

Numerous sectors have been studies in supply chain risk context in Malaysia like the food industry [43]. Electronic [27], Electrical [44], Automobile industry [29], Pharmaceutical industry [45]. Telecommunication industry [25], small & medium enterprises [19-20]. Individual sectors have been studies but the overall study is less reported. According to Ali et al. (2008) in Malaysia, supply chain has gained the status of the strategic industry from the supportive industry. It is revealed that by managing supply chain well, Malaysian companies can get not only a competitive advantage but also can serve their customers proactively [31]. It has been reported that in high economic contribution sectors in Malaysia, manufacturing sectors is second after services [25]. Concluding all, this study is be being applied in all sectors as the aim is to evaluate the supply chain risk sources and supply chain interaction on Malaysian organizations.

2 Literature review

2.1 Supply chain risk sources

Effective risk management can only be made possible if risks are properly identified, whether it

is dealing with quality or safety challenges, supply shortages, legal issues, security problems, regulatory and environmental compliance, natural disasters, or terrorism. According to [46] risk sources are “any variables which cannot be predicted with certainty and from which disruptions can emerge” and finding of this research discovered, by consensus, that risk sources have become more essentials as supply chain become more complex and modern. Supply chain risk management can be categories according to its risk sources [10]. Broadly supply chain risks also known as supply chain risk sources [8] can be divided into two categories internal risks/ operational risks and external risks/ disruption risks [47] Furthermore internal risk divided into operational activities like information risks and capacity related problem, customer demand, quality related issues and etc. Whereas, external risks can be divided into competition, economic issues, political instability, natural disasters, terrorist attacks etc. [48], [49]. This study analyses articles from 2000 to 2016 and revealed that most of the studies use either operational risks, disruption risks or risks as general. Ref. [11] have studied 90 articles on supply chain risk sources and conclude that 25% articles have used only operational risks, very few studies have applied disruption risks and the study that covers all dimensions of risks were very limited.

Supply chain risks come from three major sides namely supply side, process side and demand side [11]. Infect environmental risk cannot be neglected as a natural disaster, political instability or etc. [12]. Additionally, globalization has changed the business now interaction among partners is considered essential for any organization. Globalization not only offers opportunity but bring various uncertainties like partners bankruptcy, information leakage or etc. [50]. In addition, the financial aspect of any organization cannot be ignored like problems in cash flow, currency exchange risk, price fluctuation [51], any disruption from the financial side can have a high negative impact on performance [17]. Lastly, the supply chain is not complete without flow, so the flow of material also has some uncertainties like accidents, delays or etc. [52]. Conclusively, an overall supply chain risk must consider all above dimension seven dimensions of risks namely supply side risks, process side risks, demand side risks, environmental side risks,

logistic side risks, collaborative side risks and financial side risks.

The study of [53] divided the supply chain risk into six sources namely supply side risk, process side risks, demand side risks, logistic side risks, information side risks, and environmental risks but this study did not evaluate financial risk separately and comprehensively. Meanwhile, ref. [54] categories overall supply chain risk into six namely source, make, deliver, financial, information flow and environment. There is no single study available that cover all seven aspects. There are many methods in the literature to identify the potential risks; the current study will follow [53]. First this study will identify the major risk sources on the basis of detail literature review. Secondly, generate an initial pool of all sub-dimensions under the risk sources. The generated pool will be validated by the exploratory view. As a result, a questionnaire will be developed. This questionnaire will be distributed in Malaysian manufacturing.

Additionally, from the operational definitions of this study, the supply chain not only deal internal operations but essentially considered an external relationship with their partners. Therefore, most of the researcher's categories overall supply chain risks into three internal to the organization also called organizational factors, external to the organization but internal to the network also known as industry factors and lastly external risk sources also called environmental factors [10], [51], [55]–[58]. Lastly, detail on all three types is given below in figure 1.

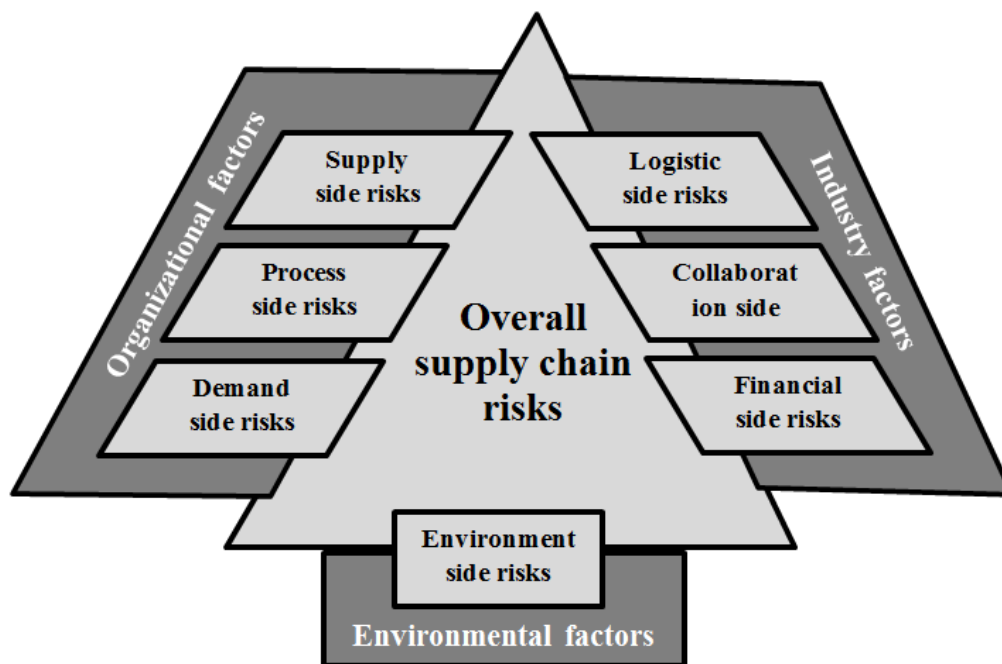


Figure 1: Supply chain risk sources

2.2 Supply chain performance

Deciding for an appropriate combination of performance indicators for measuring supply chain performance is always challenging [59]. Performance measures should have some characteristics like sustainability, relevance, effectiveness, coherence, efficiency, and robustness [60]. In this study risk sources and supply chain, risk mitigation approaches have been adapted from different studies, that adapted work had used multiple ways to measure the performance according to their situation. Current study adopts the indicators of performance measure from [61] that are product quality, order fill capacity, delivery dependability, delivery speed, and customers satisfaction. This study has discussed that how risk sources and interaction effect the performance. This study also discussed numerous problems of current performance measures and has also mentioned their solutions in detail in its thesis. This study is closest, updated and comprehensive, that is why current study adopts indicators from this. But still, the cost is missing in this as it is an essential part of risk management. So, this study adds cost reduction as an additional item that has been used for supply chain risk measurement and supply chain performance improvement [13], [24], [26], [27], [62]–[64].

2.3 Risk Mitigation Practices

After a clear understanding of risk, the organization needs to take appropriate measures to mitigate it. There are numerous approaches to deal with risks, which one to adopt it depends upon the situation. The rapid growth in the global supply chain requires interconnectedness among stakeholders. As a result, a high level of interdependency and complexity develop in the supply chain [65]–[67]. Empirical studies have been proved that supply chain interaction increased performance [68]. Likewise, another example will add the importance of interaction, [69] the policy of dove chemical company is proposing a plan with the partners. Like Dow with their logistics providers in North America, who deal 90% of Dow's shipment, develop a highway security network that shares intelligence information, discuss best approaches and generate a mutual security plan for safe shipment. The study of [61] has been revealed that supply chain interaction reduces the supply chain risks.

Current scenario more organizations are depending on their fellows in a supply chain network, now the competition is not among organizations but among networks [17]. Consequently, huge literature available on supply

chain mitigation approaches. We limit our study to the interaction approach. A commonly accepted definition of interaction narrated by [70] in its book, integration is “an activity pursued jointly by two or more entities to achieve a common objective. It can mean anything from exchanging raw data by the most basic means to the periodic sharing of information through technology-based tools to the structuring of real-time architectures capable of leveraging highly interdependent infrastructures in the pursuit of complex, tightly integrated functions ensuring planning, execution, and information synchronization”. In this study, integration with external partners will be discussed.

2.4 Effect of integration as a moderator

Moderator is defined as “A variable that affects the relationship between an independent variable and a dependent variable” [71]. In addition, “moderator variable is that which influences the strength and/or direction of the relationship between the independent and dependent variables” [72]. Three variables are being used in this study first risk sources as an independent variable, second supply chain performance as the dependent variable and the last one is integration approaches as moderator. As in this study, SCRM approaches are influencing the relationship of risk sources and performance. There are three ways to measure the moderation, the impact of the predictor (risk sources) on the outcome variable (performance), second is the impact of the moderator variable (supply chain integration) on the outcome (performance), and last is the impact of product of the predictor variable (I.V.) and the moderator variable on outcome (performance) [72].

Many previous studies has been done on supply chain integration before like; supply chain integration as an independent variable [11], [26], [27], [62], [63], [73], [74]. Supply chain integration as a mediator [25], [27] supply chain integration as moderator [74]–[78] and lastly supply chain integration as control variable [8]. In many studies multiple approaches or strategies have been applied as a moderator between risk sources and performance [8], [9], [79], it is clearly mentioned in the future direction of Wagner & Bode [8] that supply chain management practices should be further studied as moderator between risk sources and performance empirically and with underpinning theory.

2.5 Theoretical foundation

The study of SCRM consists both conceptual and empirical investigation. Empirical research has two types, theory-based and non-theory based. Theory base research is very limited [9]. Ref. [61] conduct detail literature review from 2000 to 2011 and revealed that only 4 studies out of 56 are theory based empirical studies. Particularly, theoretical underpinning for risk, integration and performance relationship is scarce. This study has two main hypotheses these are supported by two theories. This study will utilize the theory of swift, even flow (TSEF) to justify the relationship between risk sources, supply chain integration with supply chain performance. Beside this information processing theory will further explore the relationship between risk sources, integration and performance. These two theories are also present justify for integration role as moderator.

Different theories have been narrated for effect of supply chain risks and performance relationships like agency theory [80], institutional theory [81], contingency theory [8], normal accidental theory [82], cost transaction theory [83] and most importantly theory of swift, even flow [61]. These theories have been tested multiple concepts, some for supply side risks only, some have limited risk sources and few are generally not specific to supply chain risk effects. On the basis of literature review, the background theory of this study is theory of swift, even flow, this theory had been already verified but there are still some flaws that need to test like, this theory had applied in Australian manufacturing only, Ref. [61] applied to test supply, demand and operational risks only not cover other risk sources, furthermore this study check the relationship between risk sources and performance, not cover integration and lastly this study will examine this theory on different performance indicators.

2.5.1 Theory of swift event flow

According to ref. [84] the theory of swift, even flow is “the more swift and even the flow of materials through a process, the more productive that process is”. This theory presents three concepts.

- First, operations have two types of value-add or non-value add if any process or work convert raw material to goods or products it is

considered as a value-add and all other processor works are non-value add. Examples of non-value add are accounts, finance, inventory, transportation, quality control or etc. The flow will be more smooth/swift and productivity will be high if non-value add activates minimize or removed.

- Second, raw materials, finished products or even work in process material can move swiftly if there are no bottlenecks/other impediments to flow during the way. Extension of this concept is that flow can be measured by throughput time.
- Third, variability can decrease the evenness of the operations. The swiftness of the system and variability has a negative relationship means higher the variability in time or demands lower the performance.

The aim of this theory, in this study, is twofold. First, justify that risk sources negatively affect the performance and secondly, supply chain integration reduce the risks and enhance the performance.

This theory had been applied to justify the relationship between suppliers and customers integration with operational performance. The major findings were; first, better coordination between suppliers and customers reduce uncertainties. Secondly, manufacturers having less coordination will have a higher rate of uncertainty and less chance for smooth/swift flow in operations, ultimately decline in performance [85]. Ref. [86] also validates this theory and proves that any disruption or vulnerability can discard the firm ability to meet customer demand. Meanwhile, ref. [87] is an extension of a previous study [85], according to this study integration with suppliers and customers have a positive impact on performance. Furthermore, the theory of swift, event flow had been proved the foundation for integration (through e-business) and operational performance. In this study, it has been revealed that e-business can enhance the integration with suppliers and customers that ultimately result in the swift even flow of material and information, as a result of higher performance [88]. It can be concluded that higher the risk sources will decrease the performance and higher the supply chain integration will not only decrease the chance of uncertainty but also increase the performance, means supply chain integration affect the relationship between risk sources and performance.

Lastly, it can be concluded that this theory has applied in many ways in multiple studies but there is no study that uses this for risk sources and integration in a single study.

Now a question arises that how to make the integration with suppliers and customers. Information processing theory (IPT) presents the solution. According to IPT, in high uncertain environment, operational performance can be improved by improving information exchange with external partners [89]. Further detail is given below.

2.5.2 *Information processing theory*

The pioneer of the information processing theory (IPT) states that the capability of the organization in coordination successful operations depend upon its ability to efficiently and effectively process required information. There are two ways for better coordination. First, reduce the need for information and second, enhance the ability to process the information. The aim of the theory is to develop an optimum position between these two ways, best fit between information need and organizational ability [90]. Ref. [91] explain IPT as; There are three aspects of information processing theory, (1) as uncertainty increase, organizations need more information to achieve the desired performance (2) in order to process more information, organizations need appropriate information processing capabilities, means adequately collect, disperse, and synthesize information to effectively handle the issue (3) there must be a fit between required information and information processing capabilities, so it can be concluded that when an organization's capability of information processing best match with required information, they can get superior performance. Ref. [13] explains two strategies of information processing theory (1) reduce the need of required information by buffer approach like excess inventory, multiple sources or backup suppliers and (2) enhance the information processing capabilities. In today's global and dynamic environment buffering strategies are not cost effective, now increase organizational capabilities is essential especially control over outside the boundaries of the organization [46], [48]. These external relations referees as external integration and its approaches are integration with external partners [87]. Below are some studies are

explaining integration and risk with information processing theory point of view.

According to Wang, Tai, & Wei [92] as uncertainty increase, it needs more integration with partners also with better information processing and communication capabilities, as well as control and feedback system integration with partners, can be enhanced that is considered a good strategy to reduce uncertainty and increase performance. Ref. [77] underpin information-processing model to test the relationship of information sharing strategies and supply chain management approaches with firm performance and supply chain performance. Ref. [93] study the partnership (long-term relationship with other companies) that negatively affects risks sources, which ultimately enhance the performance. It is expressed in this study that partnership can increase overall performance by sharing, mitigation and transferring information about risks among partners, means supply chain risks works as a mediator between partnership and performance. This study takes help from information processing theory and revealed that integration from communication and information exchange point can not only reduce the negative effects of risks but also can increase the performance. Meanwhile, this study takes communication and information exchange for long-term integration. Ref. [94] mentions in its book that organizations with high uncertain environment need more integration to share information to make the situation certain. Ref. [95] studies the impact of information distortion and material distortion on abnormal inventory and profit margin. Ref. [96] investigate "The moderating role of information technology capability in the relationship between supply chain integration and organizational responsiveness: evidence from China" and revealed that sharing information and knowledge through information technology, integration can enhance firm's performance. Information processing has become essential in a highly uncertain environment, it must be considered in suppliers and customers integration [38]. Improper information processing is a big challenge that is creating many uncertainties like source uncertainty, task uncertainty, and supply chain uncertainty [97].

From above literature, it can be concluded that information processing theory (as supportive theory) justify that by enhancing information sharing capabilities cannot only decrease

uncertainty but also enhance performance. It has been revealed by the ref. [76], where communication (formal communication; meetings, ERP and automated messages, informal communication; telephones, email and etc.) with external partners moderator the relationship between risk sources and performance but this study is limited to cross-sectional meeting and communication only. Information processing theory has also been tested the effects of different supply chain integration approaches on multiple performance measures. Lastly, from the above discussion, it can be concluded that information processing theory has been tested in my ways with uncertainty and supply chain management approaches but with very limited approaches only. Secondly, there is only a handful of work available on supply chain integration and risk that is being supported by information processing theory.

This study's underpinning the theory of swift, even flow and use information processing theory as supportive. The aim of this study is how organizations deal with uncertainty and how this response to the performance. Conclusively, foundation theories of the current study are two; theory of swift, even flow, that justify that supply chain integration can not only reduce risk sources and but also increase the performance and now there is need to test both theories with both variables in the same study. Whereas, information processing theory rationalizes that supply chain integration through information sharing and joint decision making can affect the relationship between risk sources and performance. This also offers a justification for the moderation role of supply chain integration on risk sources and performance. On the bases on these theories following framework has been drawled and two hypotheses have been developed.

2.6 Conceptual framework

According to Ref. [66], most of the organizations are using informal ways to manage risks in their supply chain and most of the organization unable to establish a planned supply chain risk management structure. This study presents a new framework for empirical verification that comprises an independent variable, a dependent variable, and a moderator. Below figure is describing that risk sources have a negative relationship with organization performance. It has been empirically

verified in Australia, Germany, USA and many other countries with multiple approaches, some constructs significantly affect while others not [7], [8], [10], [12], [13], [61], [76], [79] but these studies present the old methodologies and verifies the previous instrument. This study will develop its own instrument. Second relationship supply chain integration and supply chain performance, this is also verified before in different sectors and

countries. Third relationship is effect supply chain integration on risk sources and performance, this relation is positive [12], [61], [74], [76], [89], [92], [93]. Numerous studies are available that deal multiple strategies and approaches to deal with different kinds of risks but supply chain integration is missing. Only a few studies are available that verify communication as moderation.

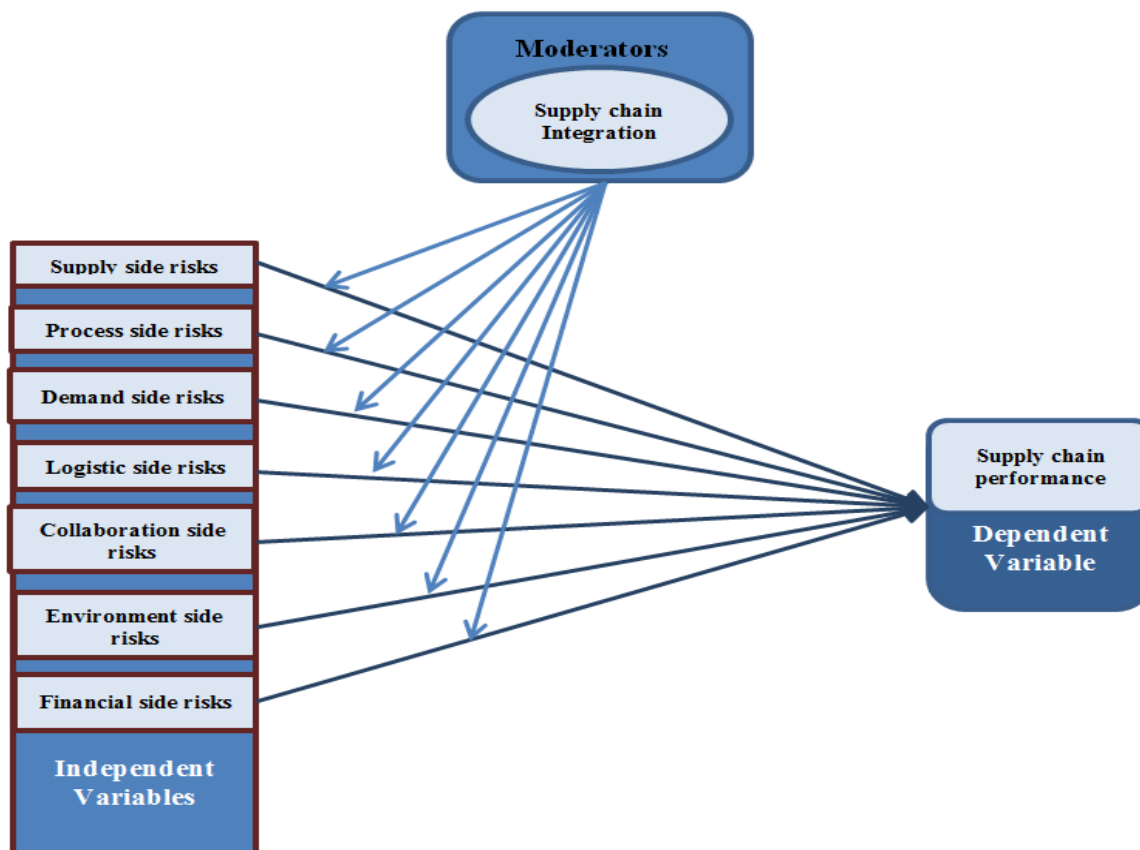


Figure 1: A Research framework

3. Methodology

A systematic content analysis technique has been used to retrieve articles. Ref. [98] mention the criteria for systemic content analysis that is; (1) selection of appropriate computerized database (2) identification of appropriate keywords (3) review of abstracts and (4) comprehensive review of selected articles. Current article adapts the same process. First, well-known publishers like Emerald, Elsevier, Springer, Taylor & Francis, and Sage publications have been searches with related keywords. Second, all ISI journals names with supply chain or logistics have also been examined. For filtration of relevant articles criteria by [99]-

[105] has been adopted. The criterion of selection was “Search for papers published in peer-reviewed scientific journals in English, Search for papers published in the last 15 years, selected articles contain at least one keyword in their title or abstract, excluding papers related to very narrow aspects or contexts, reading all remaining abstracts and reading all remaining articles in their entirety”. After the selection of most relevant articles, a detail and comprehensive bibliographic analysis have been done.

The current study has developed a theoretical framework and presented a structured supply chain risk management system that covers

almost process of supply chain risk management process. It covers risk identification, risk assessment, and risk mitigation. Ref. [11] Studied 90 articles on supply chain risk management and revealed that empirical investigation is very limited. Now there is a need for empirical verification of this framework and also need to go in detail for each phase of this framework. This study is going to present the proposed methodology for empirical verification of the current theoretical framework.

4. Conclusion

The main objective of SCRM is to minimize any uncertain situation that may arise in a supply chain, as well as provide appropriate solutions in order to handle and manage the situation effectively. In other words, the function of SCRM is to recognize the potential sources of risk and implement appropriate strategies to prevent the supply chain exposure to risk. To cope with us this situation organizations need a comprehensive structure supply chain risk management system. The current study has developed a theoretical framework for the successful implementation of SCRM. From the literature review, it is above board that risk sources have negative effects on supply chain performance and through supply chain integration organization cannot improve their performance but also can reduce their risks. Current study presented a framework for risk identification, assessment, and mitigation. After detail literature review it has been revealed that theory-based empirical research is very limited. Second, although huge literature is available that deal specific sector or industries there is no study available that deal overall manufacturing. Last one most of the studies few aspects of risk, this study covered all dimensions. This study has developed a theoretical framework on literature base data. Now there is a need to further empirically verifying this framework. This study will imply all phase of SCRM, firstly risk sources will be identified, secondly these risks will be assessed data collection and analysis and lastly, risk mitigation approaches will be suggested.

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