

Conceptualizing a Model for Demand –Side Risk in Supply Chain

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Abstract

With growing competition and dynamicity in the tastes and preferences of customers, there is a recent growth in the number of supply chain disruptions as well; for e.g. the recent flood in Thailand affecting the global operations of hard-disk manufacturers like Seagate, Western Digital to car makers Honda and Toyota. Thus an increased need is felt by these firms to adopt effective risk mitigation strategies which have further increased the necessity of studying several types of risk inherent in the supply chains and corresponding significant variables affecting each of them. Till date, there is no study conceptualizing a framework for measuring exclusively each of the risk types inherent in the supply chain. The present study attempts to formulate a framework for managing demand side risk from a supply chain perspective for a focal firm through structured literature review and have contributed by adding important predictors like trust towards customer, trust towards suppliers, and relationship quality with suppliers, relationship quality with customers and information sharing with suppliers with the existing ones like supplier dependence, customer dependence, supplier concentration, single sourcing and global sourcing.

Keywords: *Demand Side Risk, Supply Chain Risk, Trust towards suppliers, and Trust towards Customers.*

1. Introduction

Last year 2011 saw the paralysis of global supply chain operations of electronic firms like Western Digital, Seagate etc. which houses a significant portion of their manufacturing units in Thailand; mainly because of the recent flood disrupting the important supply activities of component parts to and fro from these manufacturing hubs in Thailand. This has consequently led the disturbance in the timely supply of finished products to their local as well as overseas market thereby having a significant bearing on their sales and market share in the concerned markets. On the contrary their competitor firms who do not have its manufacturing hub in Thailand are not faced with such a crisis and hence this has worsened the situation for companies like Western Digital and Seagate. This incident lately has led to the growing importance of understanding the different types of risk inherent in the supply chain operations of today's firms. Investigating the established literature on the supply chain risk types it was observed that there exists several classification of risk for e.g. [1] classifies risk into nine types, [2] classifies risk into three types, [3] considers supply chain risk into five types etc. But it is observed that on a general level to facilitate understanding all the risk types can be better classified into Supply –side risk, Demand-side risk and Catastrophic Risk. This is also supported in the literature [4]. So in this study the above classification was adopted in order to describe supply chain risk types. Considering the current scenario of ever increasing importance of analyzing the different types of risk and associated mitigating strategies; it's imperative to identify from the established literature what are the contingent variables that are responsible for the different types of risk. With this background, the following study embarks

on a journey of conceiving a framework for the demand-side risk with appropriate tenets drawn from Resource Based View (RBV), Relational Capital Theory and TCE literature.

2. Theoretical Background

Resources may be defined as inventory of available factors that belonged to or controlled by a firm [5]. Studies [6] are there that suggests that different firms have a different stock of resources which results in different performances. Relationship with customers and suppliers are in fact a relational resource for any firm [7]. Trust serves as a key component of any partnership particularly among supply chain members [8] and hence a firm's trust towards customers and suppliers can be posited as important relational components. TCE literature suggests that in increasingly uncertain environments firms find it difficult to evaluate their supplier's performance as well as making new relationships and contracts. Based on the above tenets and reasoning, the study posits that trust towards customers, trust towards suppliers, relationship quality with suppliers and relationship with customers can serve as important relational resource for any focal firm and influence a firm in mitigating any demand side risk occurring for the focal firm.

2.1 Supply Chain Risk

Within the supply chain management literature, the word "risk" is itself highly debated. According to some [9, 10] the word derives its origin from the Italian "risicare" meaning to dare. On the contrary some [11] traces its origin to the Arabic Word *risq* meaning "gift from god". Hence quite accordingly one [12] noted risk to be an elusive construct with a great variability in its meanings and interpretations. There exists a large body of literature on risk for e.g. [13] attempted to define risk in decision sciences, [14] in insurance, [15] in finance, [16] in marketing, [17] in management and [18] in psychology.

Within the supply chain management literature there has been continuous debate on how to perceive risk. It may be purely danger or may be both danger and opportunity [19]. While other [20] defines risk as the potential for unwanted negative consequences to arise from an event or activity. Others publishes it as the measure of the probability and severity of adverse effects [21]. Again [17] refers to risk as the negative variation in business outcome variables such as revenues, costs, profits, etc. Thus risk can be seen as the possibility of loss [22], or a subjective construct that deals with the possibility of loss [23]. Again it refers to the variance in outcomes or performance that cannot be forecasted ex-ante [24], as a subjectively determined expectation of loss [25], or it occurs when there is exposure to a premise and the outcome is uncertain [26].

The classical decision theory as well as disciplines like Finance considers risk as the fluctuations around the expected value of a certain performance measure and therefore it's equated with variance. Thus risk may include a negative side definition as well as a positive side conceptualization. Quite in line with the above, a popular source [17] defines risk as the "variation in the distribution of possible outcomes, their likelihoods, and their subjective values". Similarly, another popular literature [27] define supply chain risk as a "variation in the distribution of possible supply chain outcomes, their likelihood, and their subjective value". A popular dictionary defines risk as the chance of injury, damage or loss [28]. Since in business world, it is the loss that the firms should be prepared to minimize and hence devise strategies to mitigate the same; hence the following study adopts risk as the loss incurred by the focal firm when faced with a disruption.

2.2 Demand Side Risk

Literature considered supply chain uncertainty to be posed in two perspectives viz. supply side and demand side [29]. The demand side operations are also called as downstream operations. In a similar way, the operations on the supply side are known as upstream operations. Following this, another [30] depicts the possible originating points of demand side risk as the varied downstream operations. Now there can be a disruption in physical distribution of finished goods to their respective customers. This may happen due to a transportation problem as such disturbance may be due to a truck driver strike [31]. Another problem may be due to a mishap in the warehouse such as fire in the warehouse which will disrupt the timely outbound logistics from the concerned warehouse. In current days due to tough competition in the market, improved technology leading to innovative products in every category has led to high dynamism in the tastes and preferences of the consumers [32]. This highlights the wide availability of the necessary products both in terms of price range as well as with comprehensive features thereby meaning to suit the taste and needs of every segment of the customer. This has heightened the competition in the market.

In the downstream operations regime, another reason of possible disruption exists a mismatch often occurs between a company's projected demand and actual demand. Often this accentuated with problems arising from poor coordination across the entire supply chain. All these have its own costs in terms of shortages, obsolescence and inefficient capacity utilization [3].

Sometimes an increment of demand volatility in the supplier's network i.e., along the upstream of the supply chain has a vital role in the affecting the forecast quality and hence the demand side disruptions. This is also known as the bullwhip effect. A study investigated this consequential effect and identified a list of potential causes which are delayed and distorted information, sales promotions, order batching, price fluctuations and rationing, or shortage gaming [33]. Another study contributed to the above list by identifying some more potential causes like are over-reactions, unnecessary interventions, second guessing, and mistrust [34].

Since the importance of demand-side risk management cannot be undermined in the sense that unless there is some demand; the entire business operations would have hardly any reason for existence. Therefore demand side risk management can be said to form the "heart" of supply chain management. A popular example in this regard is the citation of Cisco Systems Inc. that wrote off US\$ 2.5 billion in inventory in 2001 due to a lack of communication among its downstream supply chain partners [35].

A study [36] defines demand side risk as any risk that is attached to the outbound logistics flows and product demand and which can be caused either by disruptions in the inbound logistic operations or due to several other contributing factors like seasonality, volatility of fads, new product adoptions or short product life cycles.

2.3. Supplier Dependence & Customer Dependence

There have been numerous studies in buyer-supplier relationships and as found in [37]; dependence is something that can be attributed to this relationship. Supplier dependence has been conceptualized as the depth to which a firm procures raw materials or any inputs from a supplier or suppliers; the inputs are such that there a few alternative sources in the market [38]. In such a scenario, the supplier holds considerable power in the market and the adjacent customer has very limited choices to switch [39]. In such markets when there is fault on the supplier side in supplying the component parts (either a delay or complete failure); the firm finds it really difficult to find some other sources of supply for time being. Such sources are also known as contingent sources [2]. Sometimes the nature of item procured also lands the

focal firm into severe trouble. If the item is a critical and scarce one, then this adds to the increasing anxiety for the focal firm [40]. In fact supplier dependence is all about the upstream operations for a focal firm.

In similar lines, customer dependence is the situation when a focal firm is dependent for a major portion of its sales revenue on some of its customers. In such a situation when there is disruption from the upstream operations, the focal firm has to bear the maximum impact of the situation on its self as because there is only a small chunk of customers contributing to a major portion of its revenue; hence the focal firm has to take great care in maintaining them. As a result it cannot pass some of its burden to its customers.

Thus this gives rise to the following hypotheses:

H1. The greater the customer dependence, greater is the demand side risk experienced by the firm.

H2. The greater the supplier dependence, greater is the demand side risk experienced by the firm.

2.4. Supplier Concentration

Literature [2] defines supplier concentration as the situation where “the buying firm has only a small number of suppliers”. Recent years has seen a trend of reducing the number of suppliers simultaneously efforts directed to strengthen the ties with them. Benefits are such that since there exists a small no of suppliers hence monitoring and maintain a cordial and transparent relationship with them becomes easy. Naturally when the number of suppliers is more, maintaining them with the same care and attention becomes a daunting task for focal firms. A source highlights [41] one advantage of reducing the supply base is the improved product quality and features. This might be due to the fact that lesser no of suppliers feel responsible for timely supplies in such a scenario may be due to a sense of belongingness to the focal firm and its associated operations. Due to continuous efforts from the focal firm side to develop intra-relationship as well as supplier development, there develops a close collaboration and efficient coordination between the focal firm and its supply base. As a result of which errors and omissions in the product also reduces. This development in firm–supplier relationship quality is also supported in [42]. Apart from benefits, there are sudden negatives too. Extreme reliance on a small number of sourcing options reduces the firm’s ability and capacity to form relationships with other players in the relevant market. Whenever any disruption occurs, the firms finds itself in a very tough situation as it stands in a situation of organizational holdup and unable to find contingent sources of supply. This reasoning enables us to hypothesize:

H3. The greater the supplier concentration, greater is the demand side risk experienced by the firm.

2.5. Single Sourcing & Global Sourcing

When the number of suppliers reduces to a single unit in the supply base, the situation arrives at what is called single sourcing, as the name implies. In fact, in this way it can also be called to be an extreme point case of supplier concentration. For a single supplier, the focal firm has to find and make arrangement for contingent suppliers so that in case of any disruption on that particular supplier, there are alternate routes. This doesn’t comes free and quite often the focal firm has to bear a significant investment for making such contingent contracts for availability of alternate options [43]. Also many firms are noting the seriousness of such contingencies in the face of tough competition existing in the market. Also it is

customary that the consequences of risk arising from such a situation should be evaluated before considering diversification [34].

Global sourcing is the case when a focal firm has its suppliers spread across different geographic regions or across the globe. In fact the full benefits of global sourcing largely depend on geographic location of the suppliers, the product purchased, or the mode of transportation [2]. But there problems as well. For the firm having its supplier base scattered across different parts of the globe, visibility reduces and coordination often becomes difficulty leading to greater uncertainty. This further negatively aggravates the trust between supply chain partners. In fact it is becoming challenging for the firms to manage trust and transparency as well as coordination in spite of the great distances existing in case of global sourcing. Though information technology has helped a bit but not enough because every technology has its own loopholes as well. Information security has become a cause of concern and has its own cost [44]. In fact there exists several problems that deserves attention as [45] rightly points out transportation routes increasing lead times, dependence on infrastructures like ports and communication systems,taxes,duties and variability in exchange rates. Already heightened competition and increased variety of products has intensified supply chain operations complexity .Global sourcing contributes more to it [46]. Accordingly we hypothesize:

H4.The greater the single sourcing strategy followed, greater is the demand side risk experienced by the firm.

H5.The greater the global sourcing strategy followed, greater is the demand side risk experienced by the firm.

2.6. Trust towards Customers & Suppliers

The nature of the construct trust has been multidimensional since its inception [47] in the sense that it is constituted of various other dimensions in its conceptualization. There has been a wide range of literature conceiving several definitions of the construct for e.g. [48] indicated the meaning of trust as an "ability"; [49] included the presence of "altruism";[50] indicated the dimensions like "business sense and judgment" as well as "character" to be indicative of trust; [51] indicated the presence of "confidence"; [52] indicated the presence of "congruence"; [53] included "integrity" & "fairness" as another important dimensions of trust; [54] symbolized "loyalty" as a significant dimension. It seems that the above mentioned dimensions of trust conceived by several researchers are quite interrelated. The conceptual framework of trust developed in [55] founds ground in this study. Their proposed framework is based on the following five dimensions:

- (a) Dependability/reliability
- (b) Honesty
- (c) Competence
- (d) Customer orientation
- (e) Friendliness

In fact an attempt to operationalize trust using the above framework and allied definitions of trust spread over the relevant literature; there has been several items to measure the perceived trust towards customers and perceived trust towards suppliers [56].

In fact in a tough market scenario, it's necessary that the focal firm maintains a cordial relationship based on mutual trust and coordination with its suppliers else the benefits of

collaboration may not be fully realized. For some firms there might exist few customers who contribute a large chunk of its revenue. It is necessary for the firms to pay due attention and consideration and direct efforts to maintain those customers through improved CRM (customer relationship management) and better service. This will nourish the relationship between the focal firm and its customers through enhanced trust and commitment. In fact these will enable the firm to obtain correct and necessary but relevant feedback from its customers which in turn will help the focal firm to implement the necessary changes (if any) in its product portfolio so as to suit the requirements of its customers. Literature on transaction cost economies suggest that trust and commitment based on transactions alone may not be sufficient enough so as to warrant necessary motivation from the supplier to continue with its partner (its focal firm)[57]. So when there is any disruption in the downstream side e.g. changing tastes and preferences of customers, volatility in demand etc, without the presence of a good level of trust between the focal firm and its suppliers complemented by positive efforts from the focal firm to an all round supplier development, enhancement of supplier knowledge; it might be difficult for the focal firm to continue its partnership with its suppliers thereby leading to a grave risk of smooth supply of the necessary component parts or raw materials. So this establishes the necessity of the presence of trust towards suppliers and customers might have a bearing on the demand side risk for the focal firm. Accordingly our next hypotheses stand as:

H6. The greater the trust towards suppliers, lesser is the demand side risk experienced by the firm.

H7. The greater the trust towards customers, greater is the demand side risk experienced by the firm.

2.7. Relationship Quality with Customers and Suppliers

Past researches have investigated the role of several relationship components for example, trust, commitment [58] and mutual adaptation [59] in several dimensions. Except the work of a few However, with the exception of a few [60] insignificant attention has been paid on the relationship quality of the focal firm with its suppliers. To the best of the author's knowledge, scant attention has also been paid to explain the relationship between relationship quality of the focal firm with its customers and demand side risk. As [8] defines the relationship quality with the supplier as "the perceived realization of expected outcomes arising out of interorganizational relationship between the focal firm and its supplier". As [61] highlights that a good partnership between the focal firm and its suppliers if based on mutual trust can foster long lasting relationships and also help to reduce complicated and lengthy contracts that are both tough to monitor and enforce. A good relationship with the suppliers and customers together might help better to predict the unexpected changes in the near future and hence would help both the focal firm and its suppliers to make arrangements and plan accordingly.

A good relationship with the customers often helps the firm to have a better ability to forecast correctly, getting the necessary feedback about its products, monitor competitor movements and other similar benefits. Consequently firms are better prepared for market changes and hence can plan mitigating strategies for any contingencies. A good relationship with the suppliers assures the focal firm of continued support from the suppliers even in times of crisis characterized by lost sales, market fluctuations, customer switching to competitors etc and hence can remain better prepared for fighting contingencies arising from the downstream side.

Also the relationship quality of the focal firm with its suppliers and customers may not be same under all conditions. There might be several contingent variables affecting this relationship. So it's imperative for the focal firm to take care of these relationships under varied conditions if it has to carry with its operations optimally. Thus an efficient relationship of the focal firm both with its suppliers and customers can help it to mitigate any risk occurring from the downstream operations.

H8. The more positive relationship quality with suppliers, lesser is the demand side risk experienced by the firm.

H9. The more positive relationship quality with customers, lesser is the demand side risk experienced by the firm.

2.8. Information Sharing with Suppliers

A substantial number of firms have embarked on numerous efforts directed to improve the efficiency of their supply chains. As some [62] pointed the ultimate objective of these programs as to match supply with demand there by reducing the costs of inventory and stock outs. A study [63] estimated the cost from such savings could fluctuate around \$14 billion for the food service industry. A consultancy [64] estimated the same to be \$30 billion for the grocery industry. One of such efforts is the information sharing between the focal firm and its suppliers. In supply chain regime, the distortion of information also called as "the bullwhip effect" exists heavily even with the emergence and implementation of relevant technologies that facilitate faster and efficient information sharing. To mitigate this, the sales information sharing has been found to be a significant strategy [33]. The bullwhip effect is basically the process of amplification of demand along the several nodal points of the supply chain I.e., at the retailers, distributors, manufacturer, and the manufacturers' suppliers, and so on. [33] describes the process as "demand distortion" that could create problems for the suppliers from grossly inaccurate demand forecasts, low capacity utilization, excessive inventory, and poor customer service [62]. If the suppliers have information of the sales data, this negative and dangerous effect of demand distortion can be mitigated. Literature [65] highlights a good example of information sharing: Wal-Mart's Retail Link pro-gram, which provides on-line summary of point-of-sales data to suppliers such as Johnson and Johnson, and Lever Brothers. Thus if information sharing is done efficiently and effectively; the same could complement the firm in its effort to reduce the firm's exposure to demand side risk.

Accordingly we hypothesize:

H10. The greater the information sharing with suppliers, lesser is the demand side risk experienced by the firm.

3. Conceptual Model

Thus the above backdrop formulates that supplier dependence, customer dependence, supplier concentration, single sourcing, global sourcing, trust towards customer, trust towards suppliers, and relationship quality with suppliers, relationship quality with customers and information sharing with suppliers all are having a significant impact on demand side risk for any focal firm. This gives the conceptual model:

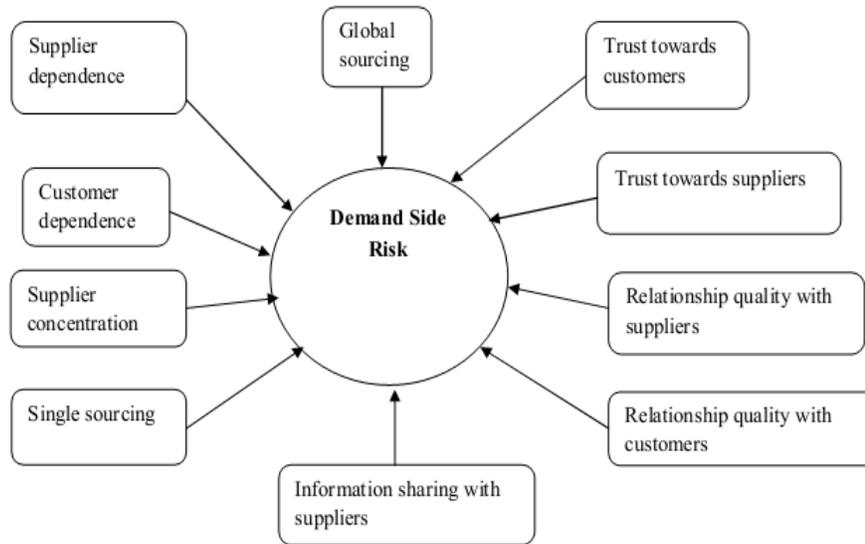


Figure 1. Conceptual Model

4. Conclusion

The present study discusses and attempts to formulate a framework/model for the demand side risk from the supply chain perspective for a focal firm. Though a study [2] have conceptualized five variables viz. supplier dependence, customer dependence, supplier concentration, single sourcing and global sourcing as predictors of demand side risk in their empirical study on supply chain vulnerability; but the findings stipulate only supplier dependence and customer dependence as the significant predictors. The present study contributes to the existing body of knowledge on demand side risk in two ways. Firstly, by further including single sourcing, global sourcing and supplier concentration in the framing of the model, the study highlights the importance of these variables in impacting demand side risk through a structured literature review. Secondly, the present study with the help of literature survey enforces the logical inclusion of five other factors viz. trust towards customer, trust towards suppliers, and relationship quality with suppliers, relationship quality with customers and information sharing with suppliers as other important predictors of demand –side risk. With these there exist significant avenues for further research .Firstly, the model is in the conceptual stage and hence calls for an empirical testing through large scale survey. Secondly, further survey is needed throughout the existing literature for singling out other factors that may impact or serve as important predictors of demand side risk from a supply chain perspective.

5. Managerial Implications

The study holds several implications both for supply chain managers as well as for the marketing managers. Firstly, the importance of understanding customers tastes and preferences is stressed through this study in the sense that if firms want to suffer less from risks emanating due to demand side factors; they must make a periodic monitoring of the dynamic tastes and preferences of consumers. So this calls for continuous market research studies to be undertaken by the firms. Secondly, by providing several factors that may lead to demand side risk; the study indicates the supply chain managers to incorporate the above

factors in their operational, tactical and operational planning. Thirdly, the study in accordance with [55, 56] reinforces the undeniable importance of trust in mitigating most of the risks. Fourthly, the study highlights the importance of relationship quality in conformity with [4] in forming strong bonds and ties across the supply chain members thereby collaboratively working in risk mitigation. This suggests the supply chain members to form strong partnerships based on mutual trust and helping each and other to develop skills and capabilities that can reduce risk at several nodes of the supply chain.

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