

Managing supply chains in time of crisis : an overview

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Abstract

This paper aims to explain the management of supply chains in exceptional times mainly marked by surviving a crisis or a given risk, thus, it identifies firstly the concept of risk and risk management by a qualitative approach relying on literature review in order to highlight the role of a resilient supply chain to remedy the impact of this latter. And hence provide some clarity for today's business to survive the current crisis due to COVID-19 pandemic.

Keywords

Risk, Risk management, Supply chain resilience, Supply chain Agility, Crisis, Disruption, covid-19

Introduction

The outcome of most of the disasters in the world is generally severe, and catastrophic on so many aspects. The consequences are of loss for people, drastic changes in social norms and economies are troubled, where companies are unable to pursue their activities because of the damages on the nations (Stephane Hallegatte, 2019). Speaking of disasters holds within all types of crises, the natural ones, but also, economic crisis or any given uncertain event that interrupts the normal life as a whole, and supply chains more precisely. In fact, the aftermath of these crises has developed more intense and complex with time, because of the increasing complexity of supply chain itself (Stephane Hallegatte, 2019), Where supply chains are more depending on fewer specialized suppliers, smaller inventories in order to implement the quick response, JIT approaches and on demand production.

It is noteworthy to highlight that the post-crisis consequences may hit supply chains at different levels. For example, in 2000, a fire at PHILIPS caused the disruption of a component supply for NOKIA and ERICSON, thus, the companies received the disruption distinctively; thanks to Nokia's quick adaptability, it managed to source from alternative suppliers. Whereas the production of Ericson was paralyzed, this induced a loss of approximately \$400 million (Latour, 2001). The answer for such distinctive impacts in the case of these firms may be represented by an important concept "supply chain resilience". Although there are not many significant contrasts on what supply chain resilience designates in the present literatures -for example, see these papers of Peck, 2005; Ponomarov and Holcomb, 2009; Sheffi and Rice, 2005- (Scholten, 2014), the elements that determine the formative components needed to secure the flexible capability of resilience are presented unequally (Jüttner and Maklan, 2011).

In this research paper, we target the management of the supply chain but in time of crisis, a time of disruptions, where the management may take exceptional forms. For this matter, and as an attempt to provide some guided answers for this issue, the paper presents firstly a comprehensive definition of crisis or uncertain events as risk and risk management in order to tackle any misunderstanding of the concept, and hence, these concepts are introduced through some vital examples of supply chain disruptions through the lenses of different companies in different sectors as a consequence of multiple events over time. Secondly, we shall present the concept of a resilient supply chain, as this concept plays a distinctive role, because supply chain resilience may be the answer why some companies handle crisis better than others, for this we rely on some perspectives already presented by researches of Christopher and Peck (2004).

1. Methodology:

This article is based on literatures review, but in a non-systematic way due to the time frame constraint. In this research we have used scientific papers from 9 journals that have studied common concepts as the ones presented by this paper. Table 1, presents the different concepts of the research used in the data collection as well as the number of the articles referring to each research subject.

Table N°1: classification of the articles used based on the research subject

Subject	Number of articles
Risk/ risk management	4
Supply chain resilience/agility	10
Supply chain and disasters	5

Source: Elaborated by the authors for this paper

The purely qualitative data were collected from the above cited articles namely using these keywords in the data collection process.

The framework of their presentation insisted on clarifying the actual meaning of ‘risk’ as an important keyword in this study, and also its management, empowering this section with some real examples of different types of risk that were lived by different supply chains in different timeframes, which helps transit to the concept of supply chain resilience: a concept that we suggest its increased likelihood of being an answer why supply chains handle risk quite distinctively.

2. Results:

2.1. RISK MANAGEMENT:

As a system, supply chains are exposed to different types of risks, that may happen upstream or downstream of the chain, thus, these risks are likely the result of either external origins (i.e., natural disasters, economic crisis, terrorist attacks...etc.) Or internal ones (i.e. supply disruption, security risks...etc.), they are all sudden events that could cause disruptions of different flows within the supply chain (Waters, 2007).for this, a research based on a systematic literature review, elaborated by Prakash, Ajay, Rathore , (2017), revealed that there is a preference of external risks by researchers i.e. environmental risk(about 98 articles about environmental category of risks), The reason behind such attention toward this type of risk can

be explained by the vulnerability of the supply chains' operations toward external, uncontrollable entities, and hence, there are many attempt of researchers to minimize its impact on the supply chain (Prakash 2017).

It is noteworthy to highlight that there are many definitions of risk itself, for example, Juttner et al. (2003) consider supply chain risks as “the variation in the distribution of possible supply chain outcomes, their likelihoods, and their subjective values”, whereas, Hetland (2003) defines risk as when a given phenomenon becomes uncertain (Prakash, 2017). Furthermore, there might be there some slight difference between risk and uncertainty as Waters, 2007; Khan and Burnes, 2007 explain that the main difference between risk and uncertainty is that risk can be quantified for future events, while uncertainty doesn't (Prakash, 2017).

However, in this research paper, we consider any uncertain event as risk, as we are going to illustrate in the next part.

2.2. RISK MANAGEMENT ILLUSTRATION: CASES OF SOME SUPPLY CHAIN DISRUPTION

This part presents some vital examples of supply chain disruption due to different type of risks (external or internal) that many companies in different sectors had either to successfully manage or bear its consequences, the following examples are proof of how each company can receive a certain risk distinctively and how a very coherent, well implemented approach of risk management impacts these chains:

2.2.1. Nando's restaurant chain:

In 2014, the famous South African restaurant chain Nando's runs out of chicken during New Year's bank holiday, a shortage that caused disruption which resulted as major customer dissatisfaction, thing that triggered a furious tweet storm, and was covered in the newspapers, which eventually had impacted the overall reputation of the chain (JONES, 2017). The way Nando's handled this risk says a lot about the risk management importance, The Company used smartly its public relations and boosted its reputation by keeping stocks fresh and keeping its supply chain ready for occasional risks of shortages.

2.2.2. Yodel delivery:

In 2014 again, Yodel was considered as one of the biggest parcel deliveries in the UK, the company grew even bigger when it acquired business from DHL back in 2010, Yodel became

an e-commerce specialist with an enormous supply chain to handle, yet, at a time of rush back in 2014, the company simply couldn't keep up with the demand. It stopped picking up parcels from retailers as it struggled under the weight of demand (JONES, 2017). This illustrates a perfect example of being a victim of your own success, and running the risk of biting off an intense demand without an actual capability of adapting and the lack of managing this kind of risk.

2.2.3. Boeing Dreamliner, airliner manufacturer:

2007, with the launching of the twin-engine-787's production, the company had an objective of setting record production time, however, some very small supply chain issues and pretty miniscule risks that were not managed, like running out of fasteners delayed the construction phase. These small delays have escalated into years (JONES, 2017). It is a case that describes best how crucial it might be to have a very strict systematic approach of managing risks and also how importing this approach is for the reduction of time which translates in the business language as ultimate costs.

2.2.4. Sony, electronic:

Sony's 2004 campaign was about to launch the PlayStation 2 is a great example of supply chains being paralyzed due to an oil tanker stuck in the Suez Canal, which was preventing other ships from china (carrying the festive consignment of consoles) to pass, this caused a total shut down in the Sales that they fell 90 per cent in the run up to Christmas. Although Sony addressed other Russian cargo planes, but this action was a bit late and disappointed to so many customers across the world. This is typically an example of logistics related risks which is purely physical, in the sense that there is no software as to rescue a ship stuck in a canal (JONES, 2017).

2.2.5. Nyetimber, wine production:

It was a natural risk that faced Nyetimber an English rival to champagne company. In 2012 the rain never stopped tipping down, so its manager declared that the company wouldn't be producing any vintage that year, yet, that wasn't pretty much the case for some rivals, those companies were sourcing grapes outside the country and ferment them in-house, however they were still being called "British vino" (JONES, 2017).

As we examine the decision made by Nyetimber, by not adapting its supply the way its competitors did, the research showed later that the decision was made not due to the supply chain non flexibility, but it was a decision that's being taking differently and had imposed trading off in order to save the company integrity of maintaining the production of pure British vino based on pure British grapes. The sales have soared ever since.

Looking to all of these cases mentioned above, each company –though experienced different events- has either used its capabilities to brilliantly deal with the expected event or these risks pushed the company into far disruption and even worse as in the case of Sony into losing a valuable market share and customers. In fact, the companies who made it through these disruptions were flexible enough to adapt to these sudden risks. Hence, the following part explore a concept that was judged to help companies overcome uncertainties: supply chain resilience (Christopher and Peck, 2004; Sheffi and Rice Jr, 2005)

2.3. SUPPLY CHAIN RESILIENCE:

A resilient supply chain is a concept that has been discussed by multiple researches in the last decade, where businesses are faced with monumental challenges, in a non-stop changing environment, product life cycles becoming shorter, and the increase of customer requirement which create more uncertainty of the demand (Christopher, 2000; Gligor, 2015). Facing these myriad challenges, the supply chain is expected to runs in an adaptive way it is supposed to be resilient, thus, the concept of supply chain resilience (SCRES) has conceptually emerged from the term ‘resilience’ that is found in many disciplines such as sociology, ecology, psychology, economics, sustainable development and organizational studies (Ponomarov & Holcomb, 2009). Where some authors explain that the concept of resilience has emerged from psychology literature, in the sense of the relevant behavior of people toward their life span (gligor 2019). It is a concept that has being designated by many authors through some different abilities see table 2.

Table 2: most common abilities in the supply chain resilience concept:

Ability to resist/survive disruptions	Fiksel (2006), McCubbin et al. (1998), Pettit et al. (2013), Ponomarov and Holcomb (2009), Sawik (2013), Valentine and Feinauer (1993)
Ability to avoid the shock altogether	Briguglio et al. (2006), Cabral et al. (2012), Hofmann (2011), Kleindorfer and Saad (2005), Thomsett (2011)
Ability to recover/return to original form following disruption	Briguglio et al. (2006), Rose (2004), Valentine and Feinauer (1993), Westman (1986), Wieland (2013), Wu et al. (2013)
Ability to adjust tactics and operations (flexibility)	Christopher and Peck (2004), Fiksel (2006), Carpenter et al. (2001), Hamel and Valikangas (2003), McCubbin et al. (1998), Ponomarov and Holcomb (2009), Walker et al. (2004), Westman (1986)
Ability to speed/accelerate operations	Briguglio et al. (2006), Christopher and Peck (2004), Iakovou et al. (2010), Pereira (2009), Rose (2004), Westman (1986)
Ability to scan the environment/anticipate	Christopher and Peck (2004), Grötsch et al. (2013), Hohenstein et al. (2015), Ponomarov and Holcomb (2009)

Source: Gligor, D., Gligor, N., Holcomb, M., & Bozkurt, S. (2019). Distinguishing between the concepts of supply chain agility and resilience

A resilient supply chain is likely determined as an ability to manage survive resist...etc. (see table 2) and at some other extend it can be seen as a capability that the companies can develop,

as Christopher and Peck (2004) suggest that to develop a resilient supply chain, it is mandatory to develop in hand four important capabilities (scholten, 2014):

2.3.1. Supply chain (re-)engineering:

It suggests having well implemented structures and processes to be more reactive as when a disruption arises (scholten, 2014), thus, this approach prevent the detrimental impact of the risks without an actual change in the chain's primary configuration (Wieland and Wallenburg, 2012) because the chain has initially been engineered to handle risks and it is anticipating any sudden disruption. This on the other hand impose an important awareness of the whole network (Christopher and Peck, 2004; Ponis and Koronis, 2012; Ponomarov and Holcomb, 2009) in order to line up with the disruption events (Ju'ttner and Maklan, 2011).

2.3.2. Collaboration:

Because of the nature of the supply chain as being considered as a network the collaboration is what brings it all together and create an integrated approach which is mandatory to build supply chain resilience (Sheffi, 2001, Scholten, 2014).

2.3.3. Agility:

Resilience involves agility (scholten, 2014), the reason why is because agility implies the on-going examination of the most suitable solution and response to the business environment volatility, furthermore, the agility holds within the practices of visibility, velocity and flexibility that are on their turn crucial to build a resilient supply chain (scholten, 2014).

2.3.4. Risk awareness:

It implies that firms must prepare for future risk by providing training to their shareholders about risks and security and therefore raise awareness and boost supply chain resilience (scholten, 2014).

All in all, these four capabilities describe best the resilience of the supply chain in the literature and based on that it is notably suggested that a supply chain that is resilient contribute to the preparedness of this latter for the future risks and unpredictable events. And with a living proof of a global pandemic pushing nations to impose public health emergencies and many control measures. Min, S., Zhang, X. and Li, G. (2020)., these control measures may have profound and significant negative effects on society and the economy (Foddai et al., 2020).

Many businesses and supply chains are on the edge, facing one of the most critical risks ever seen in the last decade. While the COVID-19 pandemic is primarily considered mainly as a public health risk, after all, its broader impacts on global economy are of wide concern to policymakers and economists as highlighted by Gong et al., 2020; Zhang et al., (2020)

To illustrate that, a study elaborated by MIN, S. et., al which has as a research subject the Wuhan food chain, indicated that the preventive measures executed because of the Coronavirus Pandemic have negatively affecting the food network in Wuhan: around 53% of food providers who were just getting started between January 23, 2020 and February 23, 2020 needed more food sources when contrasted with similar period in earlier years, where also 83.1 % of food providers' income has diminished when contrasted with the same period of time in the latest years. (MIN, S., Zhang. X. and LI, G. 2020).

The actual situation shows the need of today businesses to implement and add coherent measures and approaches in their managerial skills and to include also in its core strategies the risk management and supply chain resilience concepts, as a way to remedy the long-lasting foot prints of this massive crisis. Where this paper presents earlier, real cases of supply chain risk management as a way to provide some guided and inspired solutions of today's living emergency and the ones that are yet to come.

Conclusion

This present paper is a summary about a major issue faced by every single business in any given sector, which is risk. In this research we have explored the concept of risk through the lenses of many similar concepts such as sudden events, crisis, and uncertainty, and we have shown through a non-systemic literature review approach the very significant meaning of managing these risks, while illustrating some of the examples of this latter on different companies and chains in order to emphasize the real impacts of these disruptions and to embed the role of practicing risk management and how it saved the performance and the reputation of many businesses belonging to diverse sectors. The paper therefore suggests that the distinctive impact of these risks based on the given examples can be concluded by an understanding of supply chain resilience (SCRES) concept, and hence, a definition of this latter was exposed by an identification of the merely important capabilities to develop a resilient supply chain, which was presented based on some researches mostly of Christopher and Peck (2004) and Scholten, 2014.

The purpose behind this paper is to explicitly show the critical role of understanding one's relative risks and to have a comprehensive idea about the very needed resilient in a supply chain to prevent the impact of this risk, this paper therefore may come handy in the current time where the entire world is living under one massive unpredictable event of COVID-19 that showed out of the blue and has caused many disruptions or even significant bankruptcies and complete shutdowns specially for small businesses.

This research is rather incomplete because there are many aspects in which they need further research and discussion such as other types of risk, using different classification criteria, benchmarking the presented solutions and resilience concepts in other sectors or from the perspectives of different crises such as the current case of the pandemic of COVID-19 and a development of these concepts of resilience into more vital practices, that get along with the intelligent aspect of today's supply chains, which may also be a significant add to this research.

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