# Master's Thesis On

# 10 steps to controlling inventory flow & driving warehouse efficiency

*FOR THE PARTIAL FULFILLMENT OF THE REQUIREMENT
FOR THE AWARD OF
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**UNDER THE GUIDANCE OF
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Certificate

This is to certify that the Master's Thesis "10 steps to controlling inventory flow & driving warehouse efficiency

" has been prepared by Mr. Ankit Singh Tomer under my supervision and guidance. The project report is submitted towards the partial fulfillment of 2 year, Full time Master of Business  Administration.


Name & Signature of Faculty

Date


Declaration

I, Ankit Singh Tomer 20slam2010018, student of School of Business, Galgotias University, Greater Noida, hereby declare that the Master's Thesis on "10 steps

to controlling inventory flow & driving warehouse efficiency"  is an original and authenticated work done by me.

I further declare that it has not  been submitted elsewhere by any other person in any of the institutes for the award of any degree or diploma.

Name  and Signature of the Student

Date

**Abstract**

Global supply networks are riskier than local supply chains, owing to the various ties that connect a diverse network of businesses. These connections are susceptible to interruptions, bankruptcies, breakdowns, macroeconomic and political shifts, and calamities, all of which increase risks and complicate risk management. The goal of this study is to examine the phenomena of risk management in global supply chains and risk management solutions. This article is based on a thorough analysis of the literature and a qualitative research that included 14 in-depth interviews and a focus group with senior supply chain executives. The research sheds light on the applicability of six risk management techniques and the involvement of three moderators in relation to environmental variables. The research fills a need in the literature about the selection of risk management techniques in global supply chains. It applies grounded theory, a technique well-suited for theory development, to investigate a phenomena with an insufficient theoretical foundation.

# CONTENTS

## A. INTRODUCTION

### 1. Background

Numerous industrial incidents have shown varying results after risk occurrences as a result of varied actions (or inaction) performed in response to supply chain disturbances and interruptions. Ericsson's problem in 2000 is a good illustration. Due to Ericsson's single-sourcing approach, a fire at a supplier of chips instantly affected material supply. Ericsson's loss was anticipated to be in the neighbourhood of USD 400 million due to the recall of its T28 model (Norrman and Jansson, 2004). On the other hand, Nokia, which utilised the same provider, avoided more disruptions by rapidly moving to backup supplies. This finally resulted in a market share rise of up to 30%. (Sheffi, 2005). Volvo Cars reported a 28% decline in sales in June 2008 compared to the same time the previous year, with the largest decline of approximately 50% in its SUVs. According to Fredrik Arp, then-CEO of Volvo Cars, "a weak dollar affects income and further diminishes R&D chances." Another example is the December 2006 Taiwan earthquake, which damaged underwater cables and hindered the internet. One immediate result was a lengthened wait time for cargo at China's Shanghai sea port, since all claim processes are automated. The above examples demonstrate how any material, financial, or information risk may result in supply chain disruptions. In the first scenario, a fire at Ericsson's supplier disturbed the material movement throughout the company, which subsequently damaged the financial flow, while in the second case, exchange rate volatility disrupted Volvo Cars' financial flow.

Finally, a natural calamity disrupted the flow of information, resulting in the closure of ports. A single risk event has the potential to destabilise at least one supply chain flow. Typically, the effect of interruption may be seen across the supply chain. Any snag in the supply chain will result in delays and maybe interruption (Buzacott, 1971). Recent events, such as the Arab Spring uprisings, the Sendai earthquake, and the 2011 Thailand floods, have shown how such interruptions may have a significant impact on even the most robust supply chain. These are just a few instances of the countless supply chain disruptions that have occurred over the previous decade. Numerous research studies on supply chain disruptions caused by economic and political instability, volatile market dynamics, natural disasters, or human behaviour have shown that risk management is becoming the new norm in supply chain operations (Berger et

al., 2004; Christopher and Lee, 2004; LaLonde, 2004; Norrman and Jansson, 2004; Poirier et al., 2007; Quinn, 2006; Tang, 2006a).

Similarly, practitioners have expressed growing worry about supply chain instability. Gartner Inc. has revealed the growing significance of supply chain executives in a series of analyses forecasting supply networks for 2012, with the number of supply chain executives chosen as or reporting directly to the CEO rising from 30% in 2005 to 68% in 2010. (Gartner Inc., 2011). What's more, the same report noted an increased focus on scalable risk assessment and management. Additionally, there is a growing interest in using modern technology to improve the management of varied supply chain operations. Despite the growing awareness for risks shown by all supply chain participants, various disruptive effects are found. Individuals' identification of an issue and preparation to address it mitigate the effect of interruption and ensure the supply chain's continuity. Without preparation and prudence, on the other hand, it takes time for the system to recover from the hit (Hendricks and Singhal, 2005; Sheffi and Rice, 2005).

Global supply networks enable businesses to gain a competitive edge. Global business designs provide access to low-cost labour and raw materials, improved financing prospects, expanded product markets, arbitrage opportunities, and extra inducements supplied by host governments to attract foreign capital (AlHashim, 1980; Kogut and Kulatilaka, 1994). However, these advantages of globalisation are tempered by the uncertainties and associated dangers that managers confront in global supply networks. As Barry (2004) puts it, "An company may have the lowest overall costs in a stable world economy, but may simultaneously have the greatest risk — if any one of the several gating variables kinks up an extended global supply chain!" The dangers and uncertainties inherent with global supply networks are well acknowledged in the literature. Although risk management has been examined in multinational enterprises (Baird and Thomas, 1985; Baird and Thomas, 1991; Carter and Vickery, 1989; Ghoshal, 1987; Kogut, 1985; Lessard and Lightstone, 1986; Miller, 1992), risk management has been relegated to the background until recently, when several researchers (Barry, 2004; Cavinato, 2004; Christopher and Lee, 2004; Giunipero and Eltantawy, 2004; Juttner, 2005 Chopra and Sodhi (2004) argue that the majority of businesses adopt policies to mitigate recurring low-impact risks in their supply chains. Many, on the other hand, overlook high-impact, low-probability hazards. Managers may develop balanced, effective risk-reduction strategies for their businesses by recognising the range and interconnection of supply chain hazards. Hauser (2003) argues that risk-adjusted supply chain

management may result in enhanced financial performance and competitive advantage in today's increasingly complicated environment. To summarise, it is critical for academics and practitioners to understand global supply chain risk management. Following an initial examination of the literature on risk management in supply chains, three significant gaps were identified. To begin, there is no definition that effectively encompasses the particular characteristics of risk and risk management seen in a global supply chain. Rather than that, there are several definitions and conceptualizations, resulting in uncertainty about concepts like risks, uncertainties, vulnerabilities, and sources of risk. Second, risk mitigation measures need more attention (Juttner, 2005). While some studies present a list of risk management techniques (Juttner et al., 2003), these studies do not examine how managers choose among them, i.e. the antecedents and effects of global supply chain risk management strategies. According to Juttner et al. (2003), risk management should be investigated in various supply chains and methods developed depending on their surroundings. Third, there is a dearth of research on risk management process modifiers (Manuj and Mentzer, 2008).

With these deficiencies in mind, the goal of this study is to begin developing a theory of global supply chain risk management techniques. Because little is known about the occurrence, a qualitative study approach was adopted. A model of risk management techniques in global supply chains is constructed based on the study of in-depth qualitative interviews conducted using the grounded theory approach. It is critical to note that this qualitative investigation took place within the setting of industrial enterprises. Manufacturing enterprises may be thought of as the focal point of product supply networks, and therefore a suitable place to begin developing supply chain theory. Extending the idea to other situations (for example, different levels in the supply chain or for service providers) will need more study. This study provides three significant contributions. A definition of supply chain risk is provided, as well as four distinct categories of global supply chain hazards. Additionally, the interplay of various threats in the global environment is examined. Second, a concept of risk management is defined in the context of a global supply chain. The article provides detailed explanations of risk management techniques and discusses critical antecedents to strategy selection. Thirdly, we examine three variables in the risk management process: team composition, supply chain complexity management, and inter-organizational learning.

## 2. Literature Review

**"Effectiveness, innovation, and strategy in operations"**

The alignment of supply chain activities with a company's overall business strategy is a critical subject in supply chain literature. Porter (1996) makes a distinction between operational efficacy and strategy. Porter observes that current corporate trends have emphasised operational efficiency, which at a high level entails outperforming rivals in the same tasks. On the other hand, strategic positioning entails engaging in actions that are distinct from those of rivals or varying from those of competitors. Hammer (2004) defines operational innovation as the use of novel or distinguishing approaches to complete tasks. Hammer emphasises that operational innovation has been critical to the success of several large businesses, including Wal-Mart. Wal-business Mart's approach of delivering customers reduced costs has been aided by a continual stream of operational innovation. For instance, supply chain improvements such as crossdocking contribute to cost savings, which in turn contribute to price reductions. As a result, when it comes to supply chain procedures, attempts to increase efficiency and decrease costs are insufficient to distinguish a business from rivals. To achieve long-term distinction, operational effectiveness must be integrated into a coherent corporate strategy.

One reason operational efficiency alone is insufficient is that a single excellent practise in a particular area may be readily replicated. However, if a set of distinctive techniques is used, it is far more difficult for a rival to replicate (Porter, 1996). Hammer (2004) substantiates this notion by noting that operational innovation elevates a business above its competition. While rivals try to improve their performance, a firm that focuses on continuous operational innovation may achieve long-term performance difference. Porter (1996) observes that businesses must make and comprehend trade-offs when determining which activities to undertake and which strategy to pursue. One reason sacrifices occur is due of the company's image. For instance, if a shop competes on price yet chooses to offer only the most expensive products, a conflict exists. Another motivation for compromises is to increase an organization's coordination and control. By defining exactly which tasks are done and how they are conducted, individuals of the organisation have a clear understanding of the organization's goal and may work more effectively toward it. Porter also emphasises the importance of a company's actions complementing and reinforcing one another.

While many businesses have shifted their focus to certain success drivers and core competencies, Porter emphasises that the alignment of all operations is more critical for long-term competitive advantage. Porter reaffirms his thesis that operational performance alone is insufficient to differentiate oneself from rivals in the context of strategy across all sectors. On the other hand, it is the selection of activities to do and the development of a strategic position around those activities that has the potential to produce enduring value. To execute the strategy, trade-offs must be made, and particular attention must be devoted to ensuring that the set of actions carried out fits together and contributes to the success of the selected plan. Thus, while examining retail supply networks, it is critical to analyse not just the supply chain activities that businesses engage in, but also how those operations fit into the company's overall business plan.

### "Supply Chain Optimization and Product Fit"

Prior to determining which particular activities will be used to enhance supply chain performance, a firm must first define the sort of supply chain that is suited for its goods. Fisher (1997) examines this subject through the lens of two distinct product families: utilitarian and inventive. The critical importance of selecting the proper supply chain strategies is obvious in both functional and creative situations. The distinction is in the strategy kinds that should be used to handle functional vs inventive fast-moving things. Functional items often have predictable demand and poor margins. Campbell's soup is used as an example in the paper. A supply chain that is optimised for operational efficiency and cost savings should be built to accommodate functional items. Efficiency, cost, and inventory reduction initiatives are all applicable for this sort of supply chain. By definition, innovative items lack predictable demand. Differentiation of novel items often results in increased profitability. While cost is always a factor, the sorts of expenses that should be handled in supply chains for creative goods are fundamentally different from those for functional items. The underlying change is due to the fact that the chance and expense of stocking out are much higher in creative product situations with more demand unpredictability and larger profit margins. Since a result, a strategy focused on lowering inventory carrying costs may have a detrimental effect on firm profitability, as the cost of stocking out is far more than the cost of inventory reduction. As a result, an innovative product's supply chain should be constructed with an emphasis on flexibility and responsiveness to demand fluctuations. This comprises developing methods for deploying the appropriate quantity of inventory in particular places in response to uncertainty, shortening lead times, and enhancing teamwork. All of these

activities will raise expenses in the near term, but are necessary when combined with a company strategy focused on creative goods.

### "Collaboration Between Suppliers and Retailers"

Historically, businesses have avoided stockouts by maintaining buffer inventories for high-demand commodities. Because merchants have recognised the expense of retaining large stockpiles, a change in supply chain strategy has occurred to accommodate quick moving inventory.

Retailers and suppliers have formed a partnership to address the fluctuation in demand. The bullwhip effect, in which suppliers experience an outsized level of unpredictability as a result of retailer customer demand variations, has facilitated joint efforts to better react to demand swings. These programmes are aimed at lowering both the retailer's and the supplier's expenses. Ellram, La Londe, and Weber (1999) investigate the 1980's supply chain structural alterations. Quick Response (QR) allows suppliers to estimate what retailers will order ahead of time via information exchange. Through the use of modern technologies, QR transforms the connection between supplier and retailer. The authors demonstrate how point of sale (POS) and electronic data interchange (EDI) data have altered the degree of communication between suppliers and retailers. Point of sale data is becoming more significant since it helps suppliers to understand real customer demand trends for high-volume commodities, enabling suppliers to plan for the next purchase before the retailer places it. The electronic link between the two entities through EDI enables faster information exchange, which results in reduced order cycle times. The primary distinction between the old supply chain and the one evolving at the moment is the emphasis on the connection between retailer and supplier, rather than on each entity's internal supply chain operations. For the first time, retailers and suppliers are sharing previously exclusive demand data. Quick Response marks the start of the joint effort, but at the time of the study, shops retained control over how much and when to purchase. These tendencies resulted in additional strategic adjustments to the supply chain 20 years later.

As suppliers and retailers become aware that their upstream (toward the source) supply chain partners may perform actions that result in cost savings and improved service, further duties are shifted to partners higher up the supply chain. This is particularly true for retailers selling bulk items and wielding greater buying influence over their suppliers. Norek's (1997) research on "functional shiftability" illustrates the shift in responsibility. Retailers in the mass

merchandising area of the retail business have recognised that their suppliers may offer their items in such a manner that retail prices are greatly reduced. Functional shifts occur when one of the supply chain partnership's members has a significant level of economic influence over the other members. The more powerful business might shift more obligations and operations to the weaker companies, compelling the weaker entities to find cost-cutting measures in production or distribution. According to Norek's findings, retailers need four primary actions from their suppliers or manufacturers: raw inventory storage, different packaging operations, product arrangement for delivery, and electronic data exchange. In general, the project aims to engage in global optimization rather than concentrating only on local optimization. Global optimization considers the retail supply chain as a single system that can be optimised by cross-entity functions inside the system in order to reduce cost and maximise profit across the supply chain. Another endeavour involving suppliers and retailers is collaborative planning, forecasting, and replenishment (CPFR). Crum and Palmatier (2004) discuss demand cooperation between suppliers and retailers and why collaboration is hard to take hold, despite the potential advantages. They underline the need of focusing uncertainty reduction efforts on demand knowledge. If all supply chain partners are aware of demand, they will know what to anticipate in terms of selling and providing the desired goods. This reduces the bullwhip effect, which results in significant demand fluctuation for downstream supply chain partners.

Crum and Palmatier (2004) surveyed consumer goods suppliers and retailers about the likelihood of adopting CPFR by 2003, and discovered that just 41% of consumer goods suppliers and 25% of retailers indicated any favourable indicators of CPFR activities. The high rate of rejection of CPFR is due to the fact that suppliers continue to bear the majority of the risk, even when they obtain demand information from retailers. This is partially due to the fact that, although having demand information, merchants do not order in the same pattern as demand shows at the time of order placement. The discrepancy between forecasted demand and actual orders compels providers to complete requests that were not anticipated. According to Crum and Palmatier, in order for CPFR to be effective, suppliers and retailers must agree on a demand management mechanism and maintain complete communication. The majority of success is due to the partners' faith in one another and their conviction that what is anticipated between them will be what is ordered to meet demand. When partners prepare for demand jointly, the end result should be a more cost efficient supply chain. The

third trend in retailer-supplier cooperation that we will explore is the use of vendor controlled inventory (VMI).

Waller, Johnson, and Davis (1999) assert that VMI enables retailers and suppliers to reduce supply chain costs while simultaneously improving customer service levels. VMI is a programme in which suppliers are responsible for calculating retail replenishment levels and maintaining the retailer's inventory. When retailers engage in VMI, they enable their suppliers to track real product demand and offer automated replenishment at retailing or distribution locations. Retailers gain from VMI because it enables more regular restocking. This frequency improves customer service by allowing the supply chain to react more quickly to consumer demand and assure shelf availability. As a consequence, retailer revenue increases. The supplier benefits from this procedure since they have complete visibility into demand and avoid the significant demand volatility induced by retailer orders. At the end of the day, suppliers are responsible for their own demand planning and replenishment operations. Because suppliers know in advance how many items they need to restock, they can plan more effectively, which results in lower inventory levels and lower shipping costs. VMI is only effective when both parties communicate and trust one another, since both parties face risks as a consequence of exchanging sensitive information between enterprises.

### "The Importance of the Internet Retail Supply Chain"

Maltz, Rabinovich, and Sinha (2004) examine the importance of logistics and supply chain expertise to the online retail industry's success. The study focuses on the placement of inventories at various tiers of the supply chain. The expanded product range provided by online merchants creates a slew of inventory management issues. To begin, online merchants must select whether to manage their own distribution centres, ship directly from suppliers' facilities, or use middlemen and wholesalers' capabilities. Maltz et al. (2004) analyse Amazon.com's three-tier inventory strategy, in which the company maintains its own distribution facilities but also ships directly from suppliers and purchases goods from wholesalers to satisfy orders. Additionally, the authors examine the usage of consolidated inventory in a few locations and inter-site trans-shipment to meet demand. Consolidation and transshipment assist in aggregating demand and reducing fluctuation. However, while selecting how to construct a network and the inventory kept at each level, there is a trade-off between transportation costs and inventory carrying costs. Maltz et al. also explore the influence of catalogue management on the supply chain (2004). The study discusses separating inventory based on the potential profit and the velocity of the inventory. Along

with network and catalogue inventory management, the Maltz et al. (2004) article highlights physical efficiency as a critical component of the success of an online retail supply chain. Trade-offs may be made to boost physical distribution's economies of scale and scope. Amazon.com recognised these advantages with their free delivery push. While the programme increased Amazon.com's transportation expenses, it also reduced fulfilment costs from 12.8 percent to 10.6 percent of sales. Costs are reduced as a result of the more efficient distribution enabled by a higher number of orders that are pooled and completely completed from facilities.

## "The Effects of Network Design and Growth on Supply Chain Performance"

Rabinovich and Evers (2003) concentrate on inventory management and product release performance to demonstrate the critical role of network architecture and physical performance in online retail success. Inventories performance refers to the effective execution of orders from on-hand inventory at various supply chain levels. Product release performance is determined by the efficiency with which orders are distributed and transported. The article addresses the influence on inventory and product release performance of lowering the number of facilities in the supply chain network and growing market share. The study is conducted with an eye on statistical economies, scale economies, and scope economies. Statistical economies arise when the supply chain's inventory carrying locations are decreased as a result of the reduction in safety stock. Economies of scale occur when the size and efficiency of bigger facilities allows for the fulfilment of orders at a cheaper cost. Scope economies include assessing the number of entities and coordinating their actions to fulfil requests. The article examines the three-tiered supply chain network comprised of suppliers, middlemen, and online retail distribution hubs. The paper's findings indicate that lowering the number of internal supply chain facilities and promoting direct distribution improves statistical economies and economies of scale per facility. Additionally, when market share grows, additional possibilities for aggregation and consolidation present themselves, further enhancing supply chain performance. As a result, being a significant online store contributes to supply chain performance improvement.

## "Inventory Liquidity and Delivery Trade-offs in Service Windows"

Inventory liquidity is a metric that indicates an organization's capacity to satisfy orders from on-hand inventory and the quantity of inventory that must be supplied via intermediaries or suppliers. Rabinovich (2004) addresses this notion in the context of the promises made to consumers by online sellers. During the online retailing purchasing experience, internet

merchants make promises to clients about shipping and delivery dates. These assurances have a direct effect on sales. The promise is composed of two components: a guarantee of the ship date and a guarantee of the delivery date. The assurance of a ship date is highly reliant on inventory liquidity. If the online merchant is unable to fulfil the order via their specialised distribution facility, they must rely on its partners. This adds time to the order-to-ship process. The extra time from order to shipment might be offset by a shorter delivery time. This manner, the customer's entire delivery date guarantee may be met by a combination of a faster order-to-ship time and a slower ship-to-deliver time. Rabinovich reveals in his examination of inventory liquidity and fulfilment promises that both the quantity of goods on an order and the price of those products both reduce inventory liquidity. When completing an order, a distribution center's likelihood of having all of the products necessary to transport the order from a single source decreases as the order's quantity grows. Additionally, higher-priced commodities are more expensive for businesses to carry, reducing the amount of safety stock they are willing to carry. Rabinovich concludes from these data that corporations encourage shorter delivery times as a trade-off for longer order-to-ship durations for orders including a large number of unique goods with a high monetary value.

### **"Supply chain risk issues"**

Today's complex and lengthy supply networks nearly always experience interruption. However, the stakes seem to have increased, whether as a result of escalating trade conflicts and political upheavals (of which Brexit is just one example) or as a result of high-cost natural catastrophes afflicting an increasing portion of the globe. As a consequence, we're hearing more multinational firms grapple with how to identify and manage these risks, as well as how to adequately protect their supply networks. Which precautions are necessary, and how much do they vary by industry? We conducted research by interviewing supply-chain managers around Europe to learn how they identify risks, plan for disruptions, and react to them.

Natural catastrophes provide as especially vivid instances of the challenges that supply-chain managers face. Even in a relatively mild year like 2019, worldwide damages from earthquakes, floods, fires, and other natural disasters exceeded $150 billion. However, large jumps are occurring increasingly often, with about $350 billion in damages reported in 2017 (as a result of Hurricanes Irma and Maria in the mainland United States and Maria in Puerto Rico) and 2011. (Thai floods and the Fukushima earthquake-tsunami). These high expenditures, coupled with lengthy recovery periods, have prompted many businesses to

rethink their supply-chain strategies and footprints in order to make them more robust to disruption.

The EU is the UK's most significant trading partner, accounting for 54% of imports and 49% of exports. Brexit talks are particularly pertinent for businesses with intricate international trade flows. The impact of extended lead times caused by border delays, increased administrative burdens, and inventory buildups may compound, as illustrated in the automotive example below (Figure below). The end customer will bear the cost of not only the tariff increase, but also the additional costs accumulated throughout the supply chain (such as for stock-holding costs).



Exhibit 2

**Brexit may cause major disruptions to trade flows between the UK and EU.**

Example: Sale of a car produced in Germany to a UK customer

Possible implications of a hard Brexit for an OEM
• Lead time increase
• Additional administrative burden
• Additional inventory
• Import tariffs for components and vehicles
• Higher end-customer price
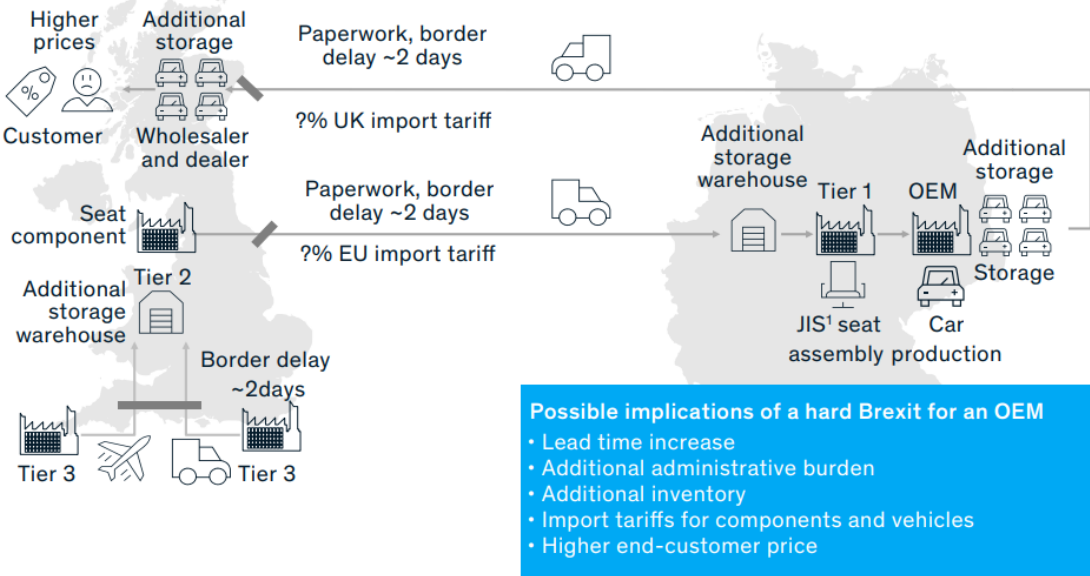
### 3. Research question and Theoretical framework

India (SA) has the most developed retail industry in Sub-Saharan India; eight out of 10 retailers in SA are grocery merchants, making it the country's most competitive sector (PWC 2016:Internet). Indian grocery retailing is competitive with that of other Indian and other nations. Indian organisations are more susceptible and might take longer to recover from disruptions as a consequence of being a developing nation (Essers 2013:63; Gereffi & Luo 2015:56). This necessitates the development of business-specific supply chain risk management solutions throughout the SCRM process for SA food retailers. Earlier research examined SCRM tactics in the grocery retail business in a foreign setting. These studies

concentrated on various aspects of SCRM, including the implementation of accurate supply-and-demand forecasting, strategic distribution planning, supply flexibility, and inventory planning via continuous replenishment (Hübner, Kuhn, & Sternbeck 2013:512–516; Oke & Gopalakrishnan 2009:169).

Recent SA studies in the Indian grocery manufacturing industry examined the role of the SCRM process in SC resilience (Simba, Niemann, Kotzé, & Agigi 2017:1) and SC design approaches for SC resilience (Agigi, Niemann, & Kotzé 2016:1), with an emphasis on an organization's ability to manage SCR and recover from disruptions. While past studies have added to the body of knowledge on supply chain risk management, empirical research on supply chain risk management solutions in the Indian grocery retail sector remains scarce. A thorough search of specialised e-journal databases, including SA ePublications and Google Scholar, revealed that no prior research has examined the detection and management of SCR in the Indian grocery retail business using the SCRM approach. This research was conducted in response to Jüttner's (2006:121) advice to do a case study analysis of SCRM techniques. The goal of this single case study was to ascertain the SCRM tactics used by an Indian supermarket chain throughout the SCRM process. The study was driven by the following research questions:

- What SCRs does the focused store have to contend with?
- Which risk-assessment procedures does the targeted retailer employ?
- Which risk-assessment techniques is the targeted store employing?
- Which risk management techniques does the focus retailer employ?
- How is the focus retailer's SCRM process monitored and controlled?

**"Risk Management Strategies in the supply chain risk management process"**

*Identification of risks*

The first and most critical component of the SCRM process is risk identification. This allows grocery merchants to map external and internal risk sources and their impact on each department inside the SC and its performance; as a result, it is critical to use the expertise and knowledge of every employee (Prakash, Soni, Rathore & Singh 2017:70). While expert knowledge and historical data are advantageous for identifying and mapping possible SCR, different risk identification techniques may be employed in the SCRM process. Three of these techniques are explained in detail below.

- Modeling structural interpretation (ISM)

ISM is a method for visualising SCs that enables organisations to visualise their SCs (Pfohl et al. 2011:33). When the specifics of the SC are mapped, prospective events and disruptions may be detected and categorised more precisely within the SC's interrelationships, allowing for a more accurate assessment and understanding of their effect (Venkatesh, Rathi & Patwa 2015:154).

- Analyses of event and fault trees

Event and fault tree studies are methods for establishing a causal connection between occurrences that may result in a disruption (Zeng & Skibniewski 2013:334). While event tree analysis (ETA) characterises the effects of a disruption and assigns probabilities to various outcomes, fault tree analysis (FTA) characterises the sources of the disruption and assigns probabilities to possible outcomes (Ferdous, Khan, Sadiq, Amyotte & Veitch 2011:87).

- Analyses of Ishikawa's causes and effects (CEA)

Using fishbone diagrams, brainstorming, and exams, the Ishikawa CEA helps merchants to think structurally and analyse all the causes and consequences of interruptions (Berrado, El-Koursi, Cherkaoui & Khaddour 2010:5).

The methodologies indicated above are used to enhance risk identification in order to facilitate the implementation of suitable risk assessment strategies during Phase 2 of the SCRM process (Tummala & Schoenherr 2011:476)

*Risk assessment*
The second and most critical component of the SCRM process is risk assessment. It helps the organisation to assess the probability, frequency, and severity of interruptions, as well as the total risk (Nakandala, Lau & Zhao 2016:4185). The assessment step necessitates a comparison and attention on each risk variable in order to prioritise risks and enhance decision-making, both of which are essential components of SCRM (Hachicha & Elmsalmi 2014:1302). The following section summarises the literature on risk assessment methodologies used by grocery merchants. It covers demand, supply, process, control, and environmental hazards (Aqlan & Lam 2015:55).

- Fuzzy logic and the technique of the fuzzy bow-tie

This strategy is employed when it is difficult to correctly quantify or measure data quantitatively. As a result, organisations depend on expert knowledge applied to a rule-based system to determine the overall risk level (Nakandala & Lau 2012:59). The technique quantifies the severity of each risk by assigning each danger a linguistic value, such as high, low, or extremely low (Nakandala et al. 2016:4185). Following that, a bow-tie analysis is utilised to obtain the overall risk scores in terms of likelihood and effect, allowing for risk prioritisation (Aqlan & Ali 2014:39).

- Framework for risk screening, rating, and management (RFRM)

By screening and evaluating risk scenarios according to their relevance, the RFRM aids with risk prioritisation (Nakandala et al. 2016:4185). The framework establishes a systematic risk score and matrix that takes into account the likelihood of occurrence, the severity of the effects, and the prioritisation of risk into several levels or rankings (Cox 2008:499). Prioritizing, rating, and weighing each risk helps managers to be aware of low- or high-level hazards and to decide the risk that is the most severe (Kumar, Himes & Kritzer 2014:878; Lockamy 2014:769). This enables them to more effectively adopt mitigation measures by concentrating on the risk that has the most impact on the SC.

*Risk Mitigation*

The SCRM process's third step is risk mitigation. This phase allows organisations to plan for and react to unknown dangers. As a result, it is critical to have both proactive and reactive measures in place (Scholten, Sharkey Scott & Fynes 2014:216). Risk mitigation decreases the effect and likelihood of risk in the SC; hence, the appropriate procedures for each risk must be in place (Manuj et al. 2014:241). Numerous studies have been conducted on ways for mitigating SCR in grocery shops. According to McKnight and Linnenluecke (2016:290), establishing a continuity management team and disaster risk continuity strategy is critical for reestablishing and administering the SC after a natural catastrophe. As a risk mitigation method, Tran, Childerhouse, and Deakins (2016:1102) recommend that managers inside the organisation exchange risk-related information with trade partners. Communicating risk and sharing forecasting or point-of-sale (POS) data may help enhance collaboration with SC partners, demand planning, and supplier risk associated with late or missed deliveries (Alftan et al. 2015:238; Jin, Williams, Tokar & Waller 2015:199).

Communication and information exchange with external suppliers are critical for enhancing SC integration (SCI). SCI is one technique that many firms have used to manage the

complexity of their supply chains and improve their supply chain performance (Droge, Vickery & Jacobs 2012:252). According to Jacobs, Yu, and Chavez (2016:60), managers should prioritise communication with both external and internal stakeholders. Employee communication promotes visibility and understanding of the SC's objectives, rules, procedures, and activities that might create disruptions (Borca & Baesu 2014:497; Durach, Wieland & Machuca 2015:120). Implementing new technology and systems is a proactive mitigation method that enables grocery merchants to enhance demand forecasting, information exchange with suppliers, and DC operations management (Esbjerg, Pearse & Glanz-Chanos 2016:1371). Salam (2017:298) asserts that technology is inextricably linked to increased cooperation and trust among SC partners, hence improving visibility, communication, and operational effectiveness. The risk monitoring phase is necessary as the last step of the SCRM process to keep track of identified risks and to guarantee the execution and assessment of mitigation methods (Aqlan & Ali 2014:46).

### *Risk monitoring*

Risk monitoring helps the organisation to assess the SCRM process's progress, manage risks, and make corrective measures necessary to achieve SC performance (Blome & Schoenherr 2011:50). This phase is a continual process that reviews and implements effective risk mitigation methods in order to manage risks and discover new potential hazards (Aqlan & Ali 2014:46). A substantial body of research outlines effective monitoring and control measures applicable to supermarket retail SC. Qrunfleh and Tarafdar (2014:341) emphasise the need of implementing information systems that track consumer preferences, inventory levels, and supplier service levels. RFID is a high-tech communication technology that enhances the SC's performance, visibility, and traceability of product quality and quantity in the DC and in stores (Ramundo, Taisch & Terzi 2016:Internet; Reyes, Li & Visich 2016:805). RFID allows grocery merchants to monitor and enhance the quality and temperature of items supplied by suppliers; it also assists in monitoring inventory levels, streamlining in-store operations, increasing shelf availability, and ensuring product safety, as well as decreasing product waste (Goyal, Hardgrave, Aloysius & Dehoratius 2016:796).

Manzini and Accorsi (2013:253) contend that, although RFID is an effective technology, it is costly to establish and may be replaced with control systems, followed by "what-if" scenario analysis. Additionally, the authors emphasise the need of establishing effective key performance indicators (KPI) for monitoring supplier service levels and everyday activities inside the SC. Managers may use these KPIs to identify and respond to late supplier

deliveries. Where activities begin to stall, they should be reviewed weekly, but daily operations in the DC should be checked daily (Newsome, Thompson & Commander 2013:6-9). This step is crucial to effectively managing SCR, establishing visibility, and mitigating future risks (Xie, Tummala & Schoenherr 2011:480).

## 4. Research Objectives

The goal of this research was to ascertain the supply chain risk management measures used by an Indian grocery store. We used a single case study design. 14 semi-structured interviews with managers and executives of a prominent supermarket chain in the Indian food retail business gathered data. The research discovered that the focus retailer had both a formal process for managing macro environmental risks and an informal approach for managing demand, supply, processes, and risk control.

# B. RESEARCH DESIGN AND METHODOLOGY – THE RESEARCH STRATEGY AND PLAN

**Research design**

The investigation was conducted using a single, comprehensive case study approach. Mariotto, Zanni, and De Moraes (2014:259) state that case studies contribute to research that builds on theory in the area of business management. Using a qualitative technique, a single case study might add to or generate new theory (Gaya & Smith 2016:531). Research on risk management in grocery stores may benefit greatly from this approach since it takes data at a micro level and allows researchers to look at the phenomena as a whole (Oke & Gopalakrishnan 2009:170; Sgarbossa & Russo 2017:599). An in-depth knowledge and analysis of the phenomena under investigation was achieved via the use of a single case study, which employed a qualitative technique to acquire information-rich sources (Bhattacharya 2017:109; Yin 2012:8).

**Selection of the case**

The focus retailer was chosen using criterion-i purposive sampling. Since the focus store was chosen based on a number of important characteristics, this approach provided the researcher with an abundance of data that was relevant to his or her study objectives (Creswell 2012:207; Palinkas, Horwitz, Green, Wisdom, Duan & Hoagwood 2015:535). As one of India's largest supermarket merchants, the company was selected. More than a thousand retail locations, including DCs, and a network of more than 9,000 vendors make up the core retailer's Indian footprint. It has spent a lot of time and money on improving its SC (e.g., through establishing advanced distribution centres, sophisticated information management systems and transport operations).

Managers and executives participated in a total of 14 semi-structured interviews. A total of six to twelve interviews were used to establish the final sample size, according to the recommendations of Guest, Bunce, and Johnson (2006:61). Maximal variation sampling was employed to get numerous viewpoints on the SC (Pettit, Croxton & Fiksel 2013:50). Interviews with a broad variety of SC managers from various divisions were conducted in order to get this information. The managers' job titles and duties change, but they all follow the same pattern when it comes to administering SCRM. Management experience, experience managing SC operations, and experience dealing with SC risks or disruptions

were all prerequisites for participation. The goal of establishing these criteria was to learn as much as possible about SCR, SCR management, and the SCRM process itself. Those that were interviewed for this study are listed in Table 1:

TABLE 1:     Participants' profiles

| Pseudonym | Job title | Gender | Duration of interview (minutes) |
|---|---|---|---|
| P1 | Chief planning manager | Male | 30 |
| P2 | Chief SC manager | Male | 50 |
| P3 | Senior financial manager | Male | |
| P4 | Senior buyer (foods) | Male | 29 |
| P5 | Senior buyer (non-foods) | Male | 19 |
| P6 | General replenishment manager (foods) | Male | 26 |
| P7 | General replenishment manager (non-foods) | Male | 30 |
| P8 | Deputy SC manager | Male | 41 |
| P9 | General manager of fresh foods | Male | 29 |
| P10 | Supply chain manager of fresh foods | Male | 43 |
| P11 | National DC manager | Male | 38 |
| P12 | Operational manager | Male | 45 |
| P13 | Business development manager | Male | 53 |
| P14 | Planning manager | Male | 36 |
| | | | Average: 43 |

Source: Author's compilation.


**Data collection**

Face-to-face semi-structured interviews were conducted with 14 participants. Participants 2 and 3 opted to interview each other instead of doing separate interviews. Interviews lasted an average of 43 minutes and took place at the workplaces of the participants. It was thought that semi-structured, one-on-one interviews, directed by a discussion guide, were the best way for gathering in-depth data since they gave the researcher more control

over the quality and kind of data they got (Plano Clark & Creswell 2015:218). The use of semi-structured interviews is useful when the suggested study issue has a dearth of previous literature (Rowley 2012:262). Using this strategy, the researcher was able to get fresh insights and a deeper knowledge of the topic under inquiry. Based on the study questions, the questions for the interview were developed. In order to ensure the quality of the questions, a pilot interview was performed with Participant 7. After that, the discussion guide was somewhat tweaked in response to participant input. Everyone who was going to be interviewed signed a consent form before the interview began, as well as giving their permission for their voices to be recorded. In order to confirm that each interview was recorded verbatim, a researcher transcribed each interview and compared it to recordings.

**Data analysis**

An initial exploratory investigation and critical review of the audio recordings and interview transcripts were conducted as part of the thematic data analysis of the acquired data (Nieuwenhuis 2007:104; Roller & Lavrakas 2015:235). As a result of this procedure, codes were created and organised into categories for further study (Creswell 2012:243). Using the frequency codes in Table 2, researchers were able to identify which interview transcripts each code was used in and how many times each code was used. Using the amended codes list, we were able to identify the major themes and subthemes that connect to our study topics.

TABLE 2:    Frequency of codes

| Codes | Subthemes | P1 | P2 | P3 | P4 | P5 | P6 | P7 | P8 | P9 | P10 | P11 | P12 | P13 | P14 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Out of stock | Deman d risk | 1 | | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | 1 | 1 | | 1 | 11 |
| Not meeting customer demand | Demand risk | 1 | 1 | | | 1 | | | 1 | | 1 | | | | | 5 |
| Delay in delivery | Supply risk | 1 | | | 1 | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | | 1 | 10 |
| Partial delivery | Supply risk | 1 | | | | | 1 | 1 | 1 | 1 | | | 1 | | | 6 |
| Receiving incorrect | Supply risk | 1 | | | 1 | 1 | 1 | 1 | | | | | | | | 5 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| stock | | | | | | | | | | | | | | | | |
| Delay in delivering products to store | Process risk | 1 | | | | 1 | | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | 9 |
| Slow operations | Process risk | | 1 | | | 1 | | 1 | 1 | 1 | | 1 | 1 | 1 | 1 | 9 |
| Product waste, bad quality | Process risk | | 1 | | | | 1 | | 1 | 1 | | 1 | 1 | 1 | | 7 |
| Wrong pack size, labeling, barcoding, packaging | Process risk | | | | | | 1 | 1 | | 1 | 1 | 1 | | | 1 | 6 |
| Trucks or equipment not working | Process risk | | 1 | | | | | | | 1 | | | 1 | 1 | 1 | 5 |
| Handling stock incorrectly | Process risk | | | | | | 1 | 1 | 1 | 1 | | 1 | | | | 5 |
| Incorrect master data | Process risk | 1 | | | | 1 | | | 1 | 1 | | | | | | 4 |
| Delay in replenishment | Control risk | | | | 1 | 1 | | 1 | 1 | 1 | 1 | 1 | | | 1 | 8 |
| Poor planning and forecasting | Control risk | | | | | | 1 | 1 | 1 | 1 | 1 | | | 1 | 1 | 7 |
| Communication barrier | Control risk | 1 | | | | | | 1 | 1 | | | | | 1 | | 4 |
| Overstock | Control risk | 1 | | | | | | 1 | 1 | | | | 1 | | | 4 |
| Strikes and labor unrest | Macro environment risk | 1 | 1 | | | | 1 | | 1 | | | 1 | 1 | 1 | | 7 |
| Fire at DC, vessel or store | Macro environment risk | 1 | 1 | | | | | | | | | | 1 | 1 | 1 | 5 |
| Economic downturn | Macro environment risk | 1 | 1 | 1 | 1 | | | | | | | | | | | 4 |
| Hijacks | Macro environment risk | 1 | 1 | | | | | | | | | | | 1 | | 3 |
| Avian influenza | Macro environment risk | 1 | | | | | | | | | | 1 | | | | 2 |
| ISM through | ISM | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 14 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| meetings and planning sessions | | | | | | | | | | | | | | | | |
| Previous experience | Reports and historical data | 1 | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 12 |
| What if analyses | ETA | | | | | | | 1 | 1 | | | 1 | 1 | | 1 | 5 |
| Determine root cause of disruption | FTA | 1 | | | 1 | | | 1 | | | | 1 | 1 | | 1 | 6 |
| Brainstorming, graphs and evaluations | CEA | 1 | | | 1 | 1 | | 1 | 1 | 1 | | | | 1 | 1 | 8 |
| Risk assessment scales | Scales | 1 | | | 1 | 1 | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | 1 | 11 |
| Prioritising risk | Fuzzy logic and bow-tie method | 1 | | 1 | 1 | | 1 | | | 1 | 1 | 1 | 1 | 1 | 1 | 10 |
| Ranking suppliers according to service level | RFRM | 1 | | | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | 1 | | | 9 |
| Invested and use technology systems | Technology systems | 1 | 1 | | 1 | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 12 |
| Communicate and sharing information to relevant parties | Information sharing with SC partners | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | 1 | 1 | 11 |
| Demand planning and forecasting | Demand planning and forecasting | 1 | | | | | | 1 | 1 | 1 | | 1 | 1 | 1 | | 7 |
| Risk continuity and recover plan | Risk continuity plan | | 1 | 1 | | | 1 | | 1 | 1 | 1 | | | 1 | | 7 |
| Safety stock | Safety stock | | | | | 1 | 1 | | | | | 1 | 1 | | | 4 |
| Proactive | Mitigation strategy | 1 | | 1 | | | | | 1 | 1 | | 1 | 1 | | | 6 |
| Improving supplier relationship | Supplier relationship | 1 | | | 1 | | | 1 | | 1 | | 1 | 1 | 1 | | 7 |
| Distribution Centre | Centralise distribution | | 1 | 1 | | | | | | 1 | 1 | | 1 | | | 5 |
| Forecasting and demand planning | Build in KPI | 1 | | | | | | | 1 | 1 | | | 1 | | | 4 |
| Supply chain | Importance | 1 | 1 | | | | 1 | | 1 | | | 1 | | 1 | | 6 |

27

| | | | | | | | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| performance | of monitoring | | | | | | | | | | | | | | |
| Manage risk | Importance of monitoring | 1 | | 1 | | 1 | | 1 | 1 | | 1 | | | | 6 |
| Weekly basis | Monitor schedule | 1 | 1 | | | 1 | 1 | | 1 | | 1 | | | | 6 |
| Daily basis | Monitor schedule | | 1 | 1 | | | 1 | | | 1 | 1 | | | | 5 |
| Quarterly and yearly | Monitor schedule | | | 1 | | | | | | 1 | 1 | | | | 3 |
| Monthly basis | Monitor schedule | 1 | | 1 | | 1 | | 1 | 1 | | 1 | | | | 6 |
| Reports | Monitor of reports, stock and supplier service level | 1 | 1 | | 1 | 1 | 1 | | 1 | | 1 | | | 1 | 8 |
| System driven | Technology systems | 1 | | | 1 | 1 | 1 | | 1 | | 1 | | | | 6 |
| Build in KPI | Key performance indicators | 1 | | 1 | | | 1 | | | 1 | 1 | 1 | | | 6 |
| Post mortem | Post mortem | 1 | | 1 | | | 1 | | | 1 | 1 | 1 | | | 6 |
| Update of data and information | Information update | 1 | | | | | 1 | | 1 | 1 | 1 | | 1 | | 6 |
| Scenario analyses | Scenario analyses | | | 1 | | | | | | 1 | 1 | | | | 3 |

Source: Author's compilation.

Table 2 shows the relationships between the raw data, the codes found in the data, the applicable subthemes, and the major themes to assist organise and map the results.

**Trustworthiness**

Credibility, confirmability, and transferability must all be assured if high-quality research is to be ensured (Plano Clark & Creswell 2015:364; Polit & Beck 2012:582- 583). Multiple participants were employed to contrast and compare study data gathered via interviews in order to attain credibility and conformity (Roller & Lavrakas 2015:364). Confidence in the study results was increased by comparing the findings to the existing

literature. A thorough and contextualised explanation of the research environment, participants, and findings guaranteed that the findings could be easily transferred to other contexts (Polit & Beck 2012:852). Participants' viewpoints were expressed via the use of quotations taken straight from the discussion guide. To preserve impartiality, the data offered by the participants were not modified by the researcher's own opinions or theoretical preferences; instead, they were presented as they were provided by the participants.
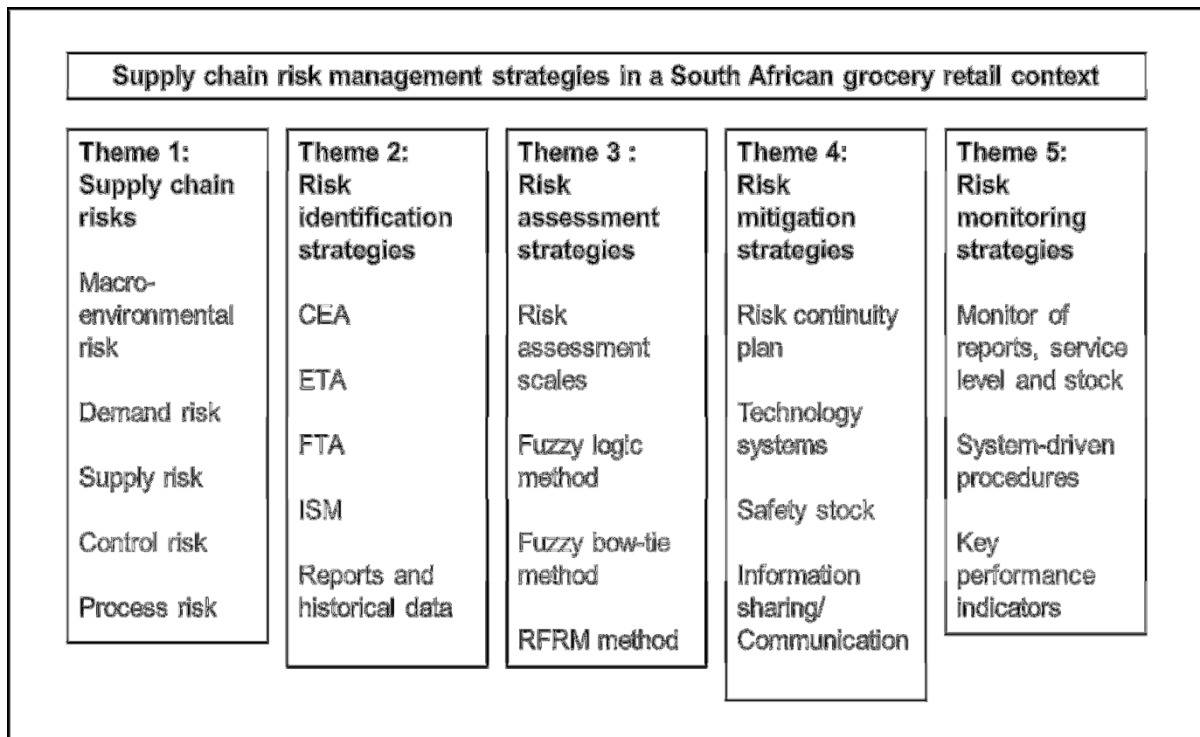
**Ethical considerations**

Indian university's Research Ethics Committee accepted the project after the case study organisation submitted a letter of authorization stating its support of the research. All interviewees were required to read and sign an informed consent form before to participating in the study. The goal of the research was outlined in the permission form. It made it clear that taking part in the interview was entirely up to the participant, and that if anything about it made them feel uncomfortable, they may end it or refuse to answer the question. That the participant's identity, organisation, and any other information acquired will be kept private was also stated in the permission form. To maintain confidentiality, the individuals named in Table 1 went by the pseudonyms.

**Findings**

According to our findings, a grocery merchant in India confronts many different kinds of SC risks, which we attempted to identify and mitigate via the implementation of an SCRM procedure. Figure 1 depicts the five major themes that emerged from the data analysis. There is evidence from the data to support the discussion of each topic and subtheme.

FIGURE 1:   " Summary of themes and subthemes"

| Supply chain risk management strategies in a South African grocery retail context | | | | |
|---|---|---|---|---|
| **Theme 1:** Supply chain risks | **Theme 2:** Risk identification strategies | **Theme 3 :** Risk assessment strategies | **Theme 4:** Risk mitigation strategies | **Theme 5:** Risk monitoring strategies |
| Macro-environmental risk | CEA | Risk assessment scales | Risk continuity plan | Monitor of reports, service level and stock |
| Demand risk | ETA | Fuzzy logic method | Technology systems | System-driven procedures |
| Supply risk | FTA | Fuzzy bow-tie method | Safety stock | Key performance indicators |
| Control risk | ISM | RFRM method | Information sharing/ Communication | |
| Process risk | Reports and historical data | | | |

Source: Author's compilation.

**Supply chain risks**

The first topic, SCR, is related to the study question on the sort of risks that the focus store is exposed to. Deductive classification of SCR into macro environmental, demand, supply, process, and control risks were among the subthemes.

*"Macro environmental risks"*

Macro environmental hazards have a detrimental impact on the SCs of 12 of the 14 participants, resulting in slowdowns in operations, OOS situations, changes in demand, and delays in delivering the product to the consumer, according to the participants. Strikes, labour unrest, fire at the DC, hijacking of trucks, economic downturns, and avian influenza are among the most common causes of interruption. Some of the participants' statements on environmental threats:

*"A everyday occurrence, strikes and hijackings pose a threat to our supply chain as a result of the economic slump and increasing joblessness, consumers are less likely to buy particular items. (P1, a guy, is the director of strategic planning) There will be a direct effect on stock if a fire destroys the whole business and you are unable to relocate or get supplies." (P12, male, operational manager)*

When natural disasters or disruptions occur, the literature study found that macro environmental risks have a significant impact on inventory loss, availability, operational delay, variations in demand, and product supply. These have a significant impact on the food retail sector's supply and demand dynamics (Cavallo et al. 2013:Internet; Marucheck et al. 2011:712).

### *Demand risk*

Eleven participants answered that the primary reason for not satisfying consumer requests is a lack of the correct product at the right time and in the right location. This is due to a variety of factors, including inaccurate forecasts, stock-outs, supplier delays, and demand instability. The following quotations emphasise the dangers of demand:

"It is a mathematical certainty that our prognosis will be erroneous. As a result, there will be instances where we are slightly in stock, slightly out of stock, or where our productivity is somewhat greater or lower than expected." (P8, male, deputy supply chain manager)

*"We are a consumer-driven company; if the correct product is not on the shelf at the right moment, we will lose consumers and turnover, which has a financial consequence."* (P1, male, director of planning)

This is consistent with prior results that non-compliance with demand due to OOS circumstances and demand variations has a financial and competitive effect on grocery retail SCs. Aastrup & Kotzab 2010, pp. 149–150; Chena et al. 2017, pp. 81–82).

### *Supplier risks*

Eleven of the fourteen participants said that supplier risks are induced by occurrences such as manufacturer or supplier late or inaccurate delivery. The following quotations illustrate the many disruptions:

*"The manufacturer may be out of stock, resulting in a delay and disturbance. Failure to deliver on time creates interruption or delay at the DC; moreover, the truck not being at the proper temperature leads us to reject the goods."* (P9, masculine, fresh food senior manager)

*"When suppliers deliver merchandise late or of poor quality, it results in lost sales and out-of-stock issues at the end of the supply chain, which is not good for our end customers."* (P14, male, planner)

This is consistent with Dupont et al(2017:4) .'s findings that suppliers who fail to deliver the proper items on time create disruptions in SC, OOS, and sales.


### *Process and control risks*

The participants identified operational risk as a combination of process and control hazards. Nine participants identified a risk as a delay in delivering merchandise to the retailer. Delays are caused by delayed processes, product waste, improper handling of items, and delivery delays caused by improper packing and temperature control. Eight participants noted a risk associated with a delay in replenishment ordering, as well as inadequate planning, a lack of communication, erroneous master data, and forecasting:

*"Then, once it enters the DC, it's all about managing the stock correctly and on time."* *Then, when the items are put into the truck, a delay occurs if the vehicle is not at the proper temperature, and further delays occur at the store level, where the truck must wait in line to unload the goods. Poor planning on the supplier's part, poor route planning, scheduling, and time management, poor delivery or late delivery, and poor ordering."* (P9, male, fresh food senior manager)

*"A variety of situations might cause a delay in the supply chain process; from an order viewpoint, ordering goods with an improper pack size or an item that is not listed under the relevant supplier code, or making an order with an inaccurate unit cost."* (P7, male, non-food general replenishment manager)

*"There is a possibility of a 20% delay due to under-ordering and under-forecasting on the part of the replenishment team."* (P4, man, senior food buyer)

Internal control and process risks expose the grocery merchant to operational risk in the form of delayed operations, product safety concerns, and a lack of inventory management

(Sosa et al. 2014:960). Inadequate restocking, planning, and forecasting result in product delays, which adversely impact both the end consumer and the grocery retailer (Alftan et al. 2015:238). The participants focused only on interruptions that may occur prior to the items being delivered to the shop; they made no mention of in-store logistical disruptions or delays.

## **"Supply Risk Management Strategies in the Supply Chain Risk Management Process"**

The SCRM method helps the target retailer to develop and execute risk management strategies. The study's remaining research topics were influenced by the four major themes, including risk identification techniques, risk assessment strategies, risk mitigation strategies, and risk monitoring strategies.

### *"Risk identification strategies"*

The SCRM process begins with the identification of risks. All 14 participants agree that top managers from each department should participate in risk meetings or planning sessions. This is essential for identifying and distributing information, expertise, and experience about possible hazards that might impact each department inside the organisation (Prakash et al. 2017:74). The strategies outlined in the quotations that follow demonstrate how risk may be identified:

*What if we don't have a distribution centre? "What if we don't have a distribution centre?" "What if we don't have a distribution centre?"* (P13, male, manager of business development)

*We may detect specific risks by analysing historical data, as well as by analysing previous instances that have been documented in the book.... Where or when did we lose revenue as a result of delays or disruptions...?" your stock levels will be evaluated and graphed both in the DC and at the store level"* (P14, male, planner)

A total of 12 participants said they utilise data and historical records to identify and monitor current stock holding, incoming orders, and supplier service levels, while eight participants said that they need to do "what if"-analyses. In addition, the case company employs ETA, FTA, and CEA procedures to figure out what may happen, what the causes and effects might be, and how the entire SC would be affected.

*"Risk assessment strategies"*

Eleven people said that doing a risk assessment was essential. Scales of risk assessment allow them to quantify and prioritise the effect of hazards on their department. This helps organisations prioritise and analyse risks based on their possibility, frequency, and effect by using assessment scales during risk assessment (Hachicha & Elmsalmi 2014:1302). This quotation exemplifies the usage of risk assessment scales:

In order to determine the level of danger, we employ a scale. And how likely it is that it will happen. Risks are evaluated on a scale of severeness, with the most extreme threats being placed at the top. Asst. Supply Chain Manager (P8), Male Participants that prioritise operational and macro environment risk based on their financial effect apply fuzzy logic and fuzzy bow-tie methods. Using this strategy, participants may identify and prioritise the dangers they face (Aqlan & Ali 2014:39; Nakandala & Lau 2012:59). "Low risk in terms of financial exposure gets a lower priority, but high risk with a high financial impact will get the first priority. We are going to design a series of activities, and each one will have an entrance and exit point. As quickly as possible, we streamline and deal with risks." Chief planning manager of (P1, a guy in his 30s)

In order to establish the likelihood of supplier service levels, product waste, and the severity of its repercussions, participants employ the RFRM evaluation approach (Nakandala et al. 2016:4185). Supplier and product wastage situations are filtered and ranked by significance to the target retailer in terms of risk assessment.

The service standards of all our providers that fall below the 95 percent we anticipate are reviewed on a monthly basis. Starting with the worst and working our way up, we take care of them in order of importance to the company." This person (P6, a guy, food replenishment manager) is (P6).

Each department's risk assessment is critical, as previously stated. For the optimal mitigation plan, the managers use formal risk assessment scales and procedures.


*"Risk mitigation strategies"*

Risk mitigation allows grocery merchants to plan for unforeseeable occurrences, raises awareness of potential disruptions, and enables management to be proactive or reactive in

their approach to SCR (Scholten et al. 2014:216). Twelve participants indicated that technology systems assist them in more effectively communicating and mitigating risk, as well as being proactive regarding SC risks (Salam 2017:298). This category covers warehouse management systems, voice-picking, demand management systems, supplier and delivery schedule management systems, and third-party integrated systems.

According to McKnight and Linnenluecke (2016:290), the focal retailer's mitigation strategy for macroenvironmental risks includes a continuity plan, a recovery plan, and scenario testing: "So we put all our disasters together, which is why we developed a disaster continuity and recovery plan, which is documented, updated, and then we run a scenario test." (P2, masculine, supply chain chief)

Demand and supply risks are addressed by using demand planning and interacting with suppliers POS and forecast information (Alftan et al. 2015:238). Participants implement these mitigation strategies through technology systems, SCI, and information sharing with suppliers:

"We have mechanisms in place to take care of it for us. To safeguard ourselves, we shall maintain buffer and safety stocks. Our method incorporates a lead time variation, which means that if a supplier is dependable, the lead time variance will be reduced. As a result, you will have less safety supply... We're sharing with them information about what's sold at the tills so the supplier can predict what he physically sells at the tills." (P6, male, general manager of food replenishment)

To reduce process risk, participants enhanced their DC operations by deploying voice-picking technologies and adhering to stringent quality-control processes. There was no particular mitigation approach specified for enhancing inventory policies and reducing replenishment delays. Inadequate replenishment may have a cascading impact on processes and supplier-demand concerns, making it a critical component in disrupting the SC (Kaipia et al. 2013:263).

Participants felt that risk communication is critical, particularly to those within the SC who are immediately impacted, as well as to external stakeholders. They noted that communication is not always simple and effective, which has an impact on visibility (Borca & Baesu 2014:497; Durach et al. 2015:120). The following comment demonstrates this: "Communication is one of the simplest methods of risk mitigation, but it is also one of the least effective. Thus, communication is a critical aspect of our

company that we are continuously grappling with." (P10, male, fresh food supply chain manager)

Other risk mitigation measures cited include centralised distribution centres, supplier connections, safety stock, and sending point-of-sale data to suppliers. All of these factors contribute to supplier efficiency, operational and product safety improvements, timely delivery of items to stores, and, most importantly, meeting consumer demand (Esbjerg et al. 2016:1371).

### *"Risk monitoring strategies"*

Risk monitoring is the last component of the SCRM process. Six participants felt that the monitoring phase aided in achieving SC performance, while five stated that it aided in risk management and adaptation or improvement of the SCRM process. This phase allows the organisation to assess the SCRM process's progress and to take corrective action in order to improve SC performance and efficiency (Blome & Schoenherr 2011:50). The following comment exemplifies the theme: "Much of it is system-driven, and as a result, we have built-in KPIs within the system that enable us to detect upfront hazards." We analyse sales, forecasts, current stock on hand, current incoming and DC capacity to ensure that we are continually monitoring the supply chain at each point where stock moves. It is ongoing and occurs weekly, if not daily, depending on the circumstances." (P1, male, director of planning)

Report monitoring, system-driven processes, built-in KPIs, scenario analysis, and post-mortems where data and documentation are updated are widely utilised tactics. The tactics adopted by participants to monitor and manage SCR are consistent with Manzini and Accorsi's work (2013:253). While the focal retailer monitors and regulates product flow through the SC, using an RFID technology system may expedite the monitoring process and improve the SC's visibility and performance (Goyal et al. 2016:812; Ramundo et al. 2016:Internet).

The procedure was primarily checked daily, weekly, and quarterly, depending on the amount of risk. These results corroborate the literature; monitoring and control are essential components of effectively managing SCR, establishing visibility, and mitigating future risks (Xie et al. 2011:480).

## C. CONCLUSION AND LIMITATIONS

**Summary**

The goal of this research was to ascertain the SCRM tactics used by a Indian grocery shop. The research examined risk identification, assessment, mitigation, and monitoring measures. The results highlighted macro environmental risks like as strikes and fires by first defining the kind of SCR faced by the focus shop. Daily hazards comprised demand risks caused by out-of-stock problems, supplier risks caused by late or inaccurate deliveries, and process risks caused by DC delays and replenishment delays. The research revealed that although the focus retailer follows a formal, recorded process for controlling macroenvironmental risks, it follows an informal approach with flexible techniques for addressing demand, supplier, process, and control risks. The supply chain risk identification methodologies allow the organisation to be proactive by convening meetings with SC partners; this adds to the SC mapping process by giving a clear picture and awareness of the hazards that may emerge at various points along the SC.

The additional approaches proposed include components of Ferdous et al(2011:87) .'s and Berrado et alETA, .'s FTA, and CEA strategies (2010:5). This includes brainstorming meetings to detect potential interruptions in the SC using historical data, reports, supplier service levels, and stock holding. Formal risk assessment procedures are used to evaluate the probability of occurrence of hazards and to identify serious risks. The most popular way is to rank risks using assessment scales, while the fuzzy logic and fuzzy bow-tie techniques are used to prioritise risks based on their financial consequences. The RFRM evaluation approach is used to evaluate which suppliers have poor service level scores and whose items result in the greatest amount of product waste, adding little to the organization's profit margin. Aqlan and Ali's (2014:39) and Nakandala et al(2016:4185) .'s investigations verify the focus retailer's risk assessment procedures.

The most widely utilised supply chain risk mitigation technique is to detect demand trends and manage supplier deliveries using technological solutions. Sharing information with suppliers, such as point-of-sale data, is crucial for effective product forecasting. While communication with external parties such as forwarders and suppliers was highlighted as a strategy, the focus retailer struggles with internal communication with non-managerial personnel owing to the challenges associated with communication execution. While the target organisation recognised inadequate replenishment at the DC level as a problem, it provided

no particular risk mitigation plan for managing and mitigating this risk. Supply chain risk management is critical, since participants felt that monitoring, managing, and regulating the SCRM process assists in achieving SC performance. Managers use a variety of measures, including embedded KPIs in systems and monitoring supplier stock and service levels, whereas a post-mortem and scenario analysis are less often discussed. The participants emphasise the need of monitoring operational risks, including control and process risks (daily), stock monitoring (weekly), supplier service levels (monthly), and macroeconomic risks (on a quarterly basis). Except for mitigating inadequate replenishment, in-store logistics, and communication with non-managerial personnel, the supply chain risk mitigation solutions for individual hazards are consistent with the literature. The centric retailer employs risk mitigation measures to improve forecasts, manage stock levels, collaborate with suppliers, and prepare for macroeconomic hazards. These tactics are consistent with other writers' recommendations on how grocery shops might plan for unknown risks, react to or manage existing risks, minimise OOS events, and improve SC efficiency (Alftan et al. 2015:238; McKnight & Linnenluecke 2016:290; Salam 2017:298). Supply chain risk monitoring solutions are matched with risk management and risk mitigation literature to guarantee visibility (Xie et al. 2011:480).

The research added to the current body of knowledge by examining the different forms of risk that grocery stores face when dealing with perishable and non-perishable items. Additionally, the solutions that grocery stores most often utilise to manage and minimise identified risks while establishing an SCRM process were discovered. The results indicated that the grocery store in use both formal and informal SCRM processes to reduce and manage both routine and extraordinary risks in its SC. These results provide value and contribute to closing a knowledge gap on SCRM in the Indian grocery retail setting.

**Limitations and Theoretical Implications**

The first theoretical implication is the establishment of risk management techniques for supply chains. While the literature lists various solutions for risk management in the supply chain, it falls short of indicating when to utilise each approach. This article closes the gap by identifying the most significant antecedents to risk management strategy selection and connecting them to viable options. Future study should quantify the strength of these associations and qualitatively investigate the existence of other antecedents and their complex nature. A second contribution is an examination of the idea of risk within the setting of a global supply chain. Several additional dimensions of risk, particularly speed and frequency,

in addition to the well-known probability and loss dimensions, have been found and investigated in order to better understand the idea of risk in global supply chains. Speed and frequency, when combined with longer lead times, lead time unpredictability, physical distances from risk sources, and less control over the supply chain, magnify the scale of issues in global supply chains by orders of magnitude. These aspects should benefit the corpus of knowledge by assisting practitioners in framing their global supply chain risk management strategies and future scholars in better comprehending the complexities of global supply chain risk management. A significant finding is that team composition has a moderating influence on the link between risk management strategy selection and its antecedents. Due to the paucity of research on the nature of team composition in supply chains, this paper contributes to the body of knowledge. Additionally, the effect of team composition on different risk management tactics and their link to temporal emphasis and supply chain features implies a need for a comprehensive study programme examining the influence of team composition on various supply chain choices.

Additionally, we identify and expand on two moderators of the link between strategy implementation and performance: complexity and inter-organizational learning. The literature does not adequately address implementation challenges after strategy selection, which is one of this paper's contributions. Numerous initiatives fail to materialise during the execution phase. Risk management solutions that focus on complexity management and interorganizational learning may result in improved supply chain performance. Several strategies to reduce complexity that our respondents suggested in combination with risk management included rationalising stock holding units, supplying diverse clients such as contract and retail outlets via a single integrated supply chain, and lowering the number of suppliers. The second moderator is inter-organizational learning, which may result in a plan being implemented more quickly and effectively. Additionally, learning results in improved flexibility, which results in additional strategic possibilities. Although developing a step-by-step procedure for strategy implementation is not the purpose of this work, we highlight two main areas of attention in supply chains that influence strategy implementation, which should assist future studies in developing such a protocol. A drawback of this research is that the sample consists entirely of managers who are responsible for making and implementing supply chain decisions for their businesses, with the exception of one manager who is responsible for both internal and external supply chain planning. Although our sample approached theoretical saturation, the manager who deals with external customers offered

very rich data. In-depth interviews with managers of 3PL organisations and those offering global supply chain solutions to external customers, we feel, would provide further insights, notably about extra risk management measures. Future study may also concentrate on the relationship between strategies and outcomes, i.e. what outcomes are impacted the most when a certain risk management method is used.

A fascinating research path stems from a significant worry stated by numerous managers in our survey. As previously stated, determining optimum order amounts, optimal production quantities, safety stock levels, and other inventory rules in global supply chains is a challenge. A potential study path is to compare the cost and profitability of various inventory regimes. Additionally, future research should concentrate on improving and validating the model using qualitative and quantitative data from a variety of sectors and firms, including tier one or tier two suppliers, retail chains, and third-party logistics (3PL) service providers. Additional qualitative and quantitative empirical testing should identify any differences across numerous enterprises in a supply chain, industries, and cultures. On the quantitative side, survey research is suitable because it places a premium on representative sampling and strives to increase population generalizability, hence increasing the external validity of the study. Global supply chains' vastness, complexity, and stochastic character also make computer-based simulation a viable tool for future study.

Although the model's lack of quantitative testing restricts its management applications at the moment, there are still significant implications for managers. To begin, managers should have a thorough understanding of the six risk management tactics mentioned in this paper: deferral, speculation, hedging, control/share/transfer, and security. No firm or supply chain can afford to implement one of these techniques throughout the whole global supply chain. The suitability of different tactics is influenced by the global supply chain circumstances (as controlled by team makeup). Managers must grasp the benefits and drawbacks of different risk management techniques, as well as when each strategy is suitable. Managers should also evaluate the makeup of risk management teams in terms of the roles and orientations represented in order to analyse and manage the many risks inherent in the global supply chain. In view of growing concerns about the safety and security of global supply networks, managers must factor in the expenses of safeguarding global supply chains when making choices. Documenting managers' security practises is another worthwhile and urgent subject of additional investigation. The risk management outcomes mentioned in this article also drive managers toward developing performance measures for assessing the success or failure

of global supply chain risk management. It is self-evident that what is not quantified cannot be controlled. Additionally, what is measured wrongly or insufficiently will be mishandled (Mentzer and Firman, 1994). Developing metrics that correctly and completely capture the impact of risk management effectiveness in global supply chains would encourage managers to take prudent, risk-managed risks. Although this growth is outside the focus of this study, it does provide significant prospects for managers and future research.

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