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Supply chain risk management strategies: A case study in the South African grocery retail industry

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Abstract

In recent years, grocery retailers have changed their business environments to adapt to globalisation which increased their vulnerability and exposure to supply chain risks. In order to manage and mitigate risks, a grocery retailer can employ a supply chain risk management process. Implementing strategies during each phase of the process helps managers to manage daily and exceptional risks within the supply chain. The purpose of this study was to determine what supply chain risk management strategies a South African grocery retailer uses during the supply chain risk management process. A single case study design was adopted. Data were collected from a large supermarket chain in the South African grocery retail industry through 14 semi-structured interviews held with managers and executives. The study found that the focal retailer has a formal process in place for the management of macro environmental risks, as well as an informal process to manage demand, supply, process and control risk. The focal retailer makes use of strategies during the supply chain risk management process to improve risk identification, assessment, mitigation and the monitoring of potential disruptions internal to the supply chain. The managerial implications suggest how managers can improve internal communication, replenishment and in-store logistics to enhance supply chain performance and efficiency. The research contributes to the limited literature on managing supply chain risk within a South African grocery retail context through investigating the supply chain risk management process.

Key phrases

Grocery retailer; risk management process; semi-structured interviews; single case study; South Africa; supply chain and qualitative research

1. INTRODUCTION

South African retailers face numerous disruptions resulting from natural disasters, strikes, volatile demand, suppliers' incorrect deliveries and slow operations. Global retail markets face persistent out-of-stock (OOS) problems where up to 20% of retail items are not available on shelves (Stüttgen, Boatwright & Kadane 2017:1). This is due to supply chain (SC) disruptions which influence store reputation, customer loyalty and sales; it also has a direct financial impact on retailers (Huang & Zhang 2016:13). Global designs of modern supply chains push retailers to improve their SC efficiency and reduce their operating costs by delivering the required quantity of products to the correct place, cost-effectively (Tummala & Schoenherr 2011:474). This increases trends such as centralised distribution, lean manufacturing, low-cost sourcing, just-in-time (JIT) delivery, reduced product lifecycles, as well as the rationalisation of distribution and suppliers (Wieland & Wallenburg 2013:302).

The changing business environment may expose grocery retailers to supply chain risks (SCR) and disruptions (Giannakis & Louis 2011:23). SCR refer to variations in the distribution of possible SC outcomes, their likelihood and subjective values which have a negative impact on business operations and cause vulnerability (Colicchia, Dallari & Melacini 2010:680; Diehl & Spinler 2013:313). Supply chain vulnerability leads to a delay and disruption in the SC, thus damaging the quality of the products or information flowing through the SC to the end customer (Vakharia & Yenipazarli 2008:249). Supply chain risk management (SCRM) refers to the management of risk areas in the SC through developing a process for the identification, assessment, mitigation and monitoring of risks (Lavastre, Gunasekaran & Spalanzani 2012:829; Pfohl, Köhler & Thomas 2011:36). Therefore, a SCRM process aims to ensure an efficient flow of products and materials by identifying and

managing risks that prevent the efficient flow of information and products between parties in the SC (Manuj, Esper & Stank 2014:243).

2. PROBLEM STATEMENT

South Africa (SA) has the most developed retail market in sub-Saharan Africa; eight out of every ten retailers in SA are grocery retailers, making it the most competitive sector in the country (PWC 2016:Internet). The South African grocery retail industry competes against those of other African and foreign countries. As a result of being part of a developing country, South African organisations are more vulnerable and can take longer to recover from disruptions (Essers 2013:63; Gereffi & Luo 2015:56). This requires SA grocery retailers to develop business specific supply chain risk management strategies throughout the SCRM process.

Previous studies investigated SCRM strategies in the grocery retail industry within a foreign context. These studies focused on aspects of SCRM such as the implementation of accurate supply-and-demand forecasting, strategic distribution planning, supply flexibility and inventory planning through continuous replenishment (Hübner, Kuhn & Sternbeck 2013:512-516; Oke & Gopalakrishnan 2009:169). More recent SA studies, explored 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) in the South African grocery manufacturing industry focusing on the ability of organisations to manage SCR and recover from disruptions.

Although previous studies have contributed to the literature on SCRM, empirical research on supply chain risk management strategies within a South African grocery retail context remains scant. An extensive search of specialist e-journal databases, including SA ePublications and Google Scholar, indicated that no previous study has investigated the identification and management of SCR through the SCRM process in the South African grocery retail industry. This study was executed as a response to Jüttner's (2006:121) recommendation to explore SCRM strategies using a case study approach. The purpose of

this single case study was to determine what SCRM strategies a South African grocery retailer uses during the SCRM process.

The following research questions guided the study:

1. What SCRs do the focal retailer face?
2. Which risk identification strategies do the focal retailer use?
3. Which risk assessment strategies do the focal retailer use?
4. Which risk mitigation strategies do the focal retailer use?
5. How does the focal retailer monitor and control its SCRM process?

The remainder of the article is structured as follows. The next section reviews the literature on SCR, type of risk and managing risk by using the SCRM process. This is followed by a description of the research strategy and methods used in the study, after which the findings are presented. Finally, the significance of the findings is discussed before the article concludes with some remarks about contributions, limitations and opportunities for further research.

3. LITERATURE REVIEW

3.1 Supply chain risk

SA has the most developed retail market in sub-Saharan Africa which is subject to changes in the economy and consumer spending (Global Retail Development Index 2016:Internet). South African supermarkets dominate the country's grocery retail industry. As the key suppliers of food and household consumer products, they account for 60% of all retail sales (Das-Nair & Chisoro-Dube 2015:Internet). Grocery retailers focus primarily on selling perishable products, with a short lifespan, and non-perishable products, with a longer lifespan. The variety of products causes their SCs to be more complex and vulnerable to higher prices, demand variability, competitiveness, OOS situations and high food safety standards (Akkerman, Farahani & Grunow 2010:864; Hübner *et al*. 2013:513). The increase in complexity and vulnerability prompts retailers to adopt global and different SC strategies,

but this may expose grocery retailers to risk and disruptions (Diehl & Spinler 2013:312; Giannakis & Louis 2011:23). Wieland (2012:653) explains that risk entails a certain level of exposure to events causing disruptions, uncertainties, damage or loss in the organisation's environment and operations. While disruptions are events that are characterised by extreme unexpectedness interrupting the normal flow of goods and services, therefore exposing the organisation to operational risks within the SC (Ambulkar, Blackhurst & Grawe 2015:112; Habermann, Blackhurst & Metcalf 2015:494). However, risk that occurs in the SC has a broad definition. Table 1 summarises existing definitions of SCR.

TABLE 1: Definitions of SCR

Source	Description
Diehl and Spinler (2013:314)	"An unplanned disruption or delay in the flow of information, material or products which may lead to a disparity of supply and demand, eventually affecting the cost or quality".
Ho, Zheng, Yildiz and Talluri (2015:5034)	"The probability and impact of unpredicted macro and micro events that cause operational, tactical or strategic losses within the supply chain".
Kersten, Blecker and Ringle (2012:106)	"An event that adversely affects supply chain operations and hence the desired performance measurements".
Rajabinasr, Nourbakhshian, Hooman and Seyedabrishami (2013:968)	"The variation in the distribution of possible supply chain outcomes, their likelihoods, and their subjective values".

Source: Author's compilation.

Based on the definitions presented in Table 1, SCR is defined as follows:

SCR is the probability and impact of unexpected events caused by external or internal sources, influencing the SC outcomes and values. When the SC is exposed to risk, it can disrupt or delay the flow of information and materials. Disrupting the SC causes disparity in demand and supply, and this will eventually affect the cost and quality of products or services and the organisation's performance measurements.

The SC is a network of organisations that control, manage, improve and ensure the flow of material and information to deliver value in the form of products or services to the end customer (Charkhab, Eslami & Dehnavi 2014:413). Unplanned or unexpected events that disrupt the flow of goods and material cause a SC disruption (Habermann *et al*. 2015:494).

Disruptions cause longer lead-times, stock-outs, the inability to meet customer demand and increased costs which influence the SC to become vulnerable (Blackhurst, Dunn & Craighead 2011:375).

3.2 Classification and types of supply chain risks in the grocery retail supply chain

Retailers can determine their risk profiles by grouping the external and internal sources of SCR into the five generic risk categories, described below (Martino, Fera, Lannone & Miranda 2017:140).

3.2.1 Macro environmental risk

Macro environmental risks are manmade or natural disruptions that cause severe financial and operational losses in an organisation (Tukamuhabwa, Stevenson, Busby & Zorzini 2015:5593). These are events such as labour unrest, strikes, crimes, economic downturns, natural disasters, animal sickness and environmental changes. Badenhorst-Weiss and Waugh (2015:7) found that labour unrest and strikes cause work absence, operational losses and a delay in the SC. According to Van der Walt, Jonck and De Lange (2016:2), grocery retailers can lose up to 5% or more of their annual revenue due to crimes such as hijacking that lead to losses in sales and stock. As is explained by Kaswengi and Diallo (2015:71), consumers are more likely to spend less during economic downturns due to price sensitivity, which leads to losses in grocery sales. In addition, natural disasters lead to demand-and-supply shocks within grocery retailers and have a negative impact on product availability and stock-outs (Cavallo, Cavallo & Rigobon 2013:Internet; Marucheck, Greis, Mena & Cai 2011:712). Ali and Shukran (2015:541) add that animal diseases affect food safety and restrict the supply of products, causing an increase in food prices.

3.2.2 Demand risk

According to Saleheen, Miraz, Habib and Hanafi (2014:63), customers expect the right product to be available at the right time and place when walking into a grocery retail store. Not meeting the customers' demand due to OOS or bad quality products, puts the grocery retailer at risk of sale losses, bad reputation and declining customer loyalty (Aastrup &

Kotzab 2010:149; Ehrenthal & Stölzle 2013:55). Chena, Chena and Bidandab (2017:81) point out those grocery retailers frequently experience the risk of demand fluctuations due to customer preferences, competitor prices and stock-outs. Therefore, demand risk has a direct impact on grocery retailers and influences their financial performance.

3.2.3 Supply risk

Manuj and Mentzer (2008:198) define supply risk as: "… the supplier's inability to fulfil its requirements and lead time to deliver quality products on the right time and in the right quantity, causing the organisation to lose trust in the supplier's reliability". The supplier's failure to meet the delivery requirements affects a broad range of issues in a grocery retailer, such as product quality, delays, product reputation as well as, lost demand and sales (Dupont, Bernard, Hamdi & Masmoudi 2017:4). This can be due to poor forecasting, planning and execution of the order (Ettouzani, Yates & Mena 2012:214; Williams & Waller 2010:232).

3.2.4 Process risk

Process risks involve events occurring within the organisation's operational environment, causing disruptions in the SC. This includes events such as incorrect master data, distribution centre (DC) delays and products not being delivered to the store on time due to incorrect handling or quality, product waste and product safety problems (Sosa, Garcia & Catrellon 2014:960). Moussaoui, Williams, Hofer, Aloysius and Waller (2016:518) indicate that master data inaccuracy occurs due to wrong product characteristics which lead to inventory management errors and delays at the DC, which can be responsible for 10% or more of OOS situations and may cause a further disruption down the grocery retail SC. Also, when products are not received at the right temperature or quality, it may cause product safety problems and a delay in the distribution of products to stores (Marucheck *et al*. 2011:711; Saleheen *et al*. 2014:64).

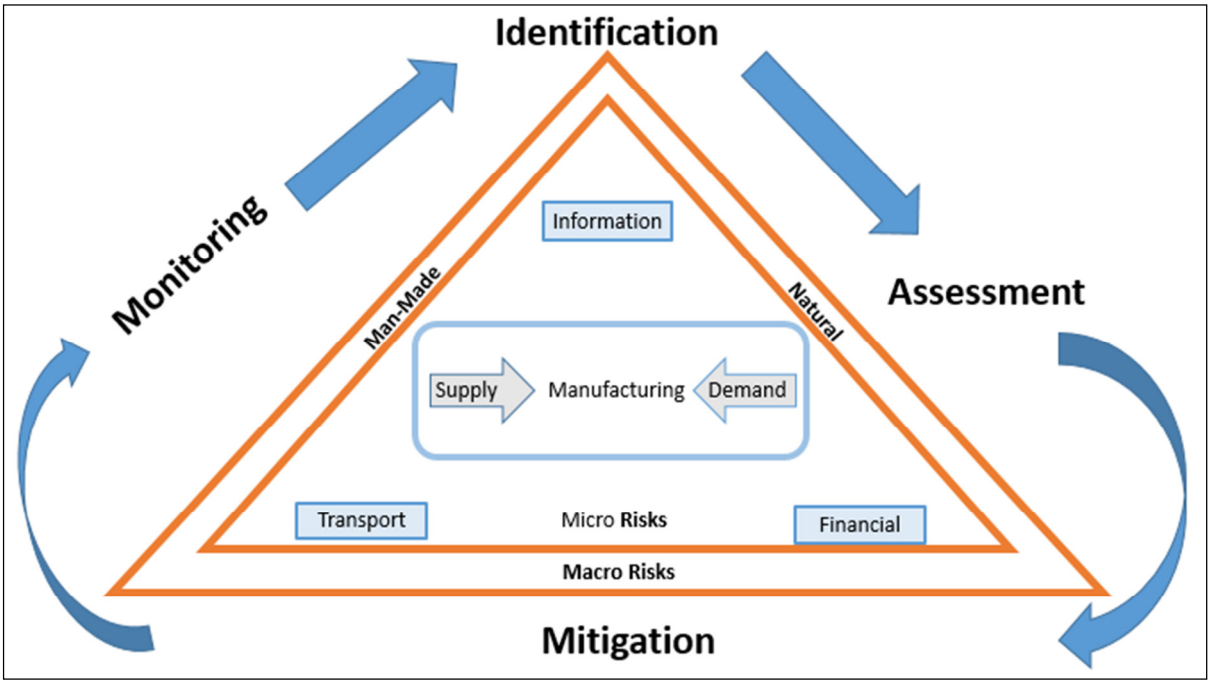
3.2.5 Control risk

Control risks are internal events that cause SC disruptions due to inventory policies, poor planning and forecasting, and a delay in replenishment (Martino *et al*. 2017:142). Reiner, Teller and Kotzab (2013:924) add that the in-store logistics process remains challenging for grocery retailers due to shelf stock-outs. According to (Stüttgen *et al*. 2017:1), 95% of grocery retailer stock-outs are due to shelf stock-outs where shelves are not re-stocked quickly enough and products are not on the right shelf. Product waste and backroom stock-outs also contribute to these situations. In-store logistics includes offloading products from trucks, storing and handling the products and getting products on the shelves timeously (Holweg, Teller & Kotzab 2016:638). It is therefore essential to improve the efficiency of in-store logistics to reduce product waste and to ensure that good quality products are presented to customers – on the right shelf, in the right quantity and at the right time (Gruber, Holweg & Teller 2016:20). Furthermore, poor replenishment is associated with not ordering enough, too much or not in time and leads to OOS situations in stores, product overstock in the DC or a delay in delivering short shelf-life products (Alftan, Kaipia, Loikkanen & Spens 2015:238). Kaipia, Dukovska-Popovska and Loikkanen (2013:263) add that poor replenishment is influenced by poor forecasting as well as poor planning, causing a further delay in operations and the grocery retail SC.

3.3 Managing Supply Chain Risk

The above-mentioned risks can be addressed and managed by using a SCRM process. Breuer, Siestrup, Haasis and Wildebrand (2013:333) define SCRM as: "… the implementation of strategies that assist in managing both daily and exceptional risks facing the SC; it involves continuous risk assessment to reduce vulnerability and ensure continuity". The process is illustrated in Figure 1 and includes risk identification, risk assessment, risk mitigation and risk monitoring.

FIGURE 1: The SCRM process



Source: Ho *et al.* (2015:5036).

Organisations that manage their risk effectively have the opportunity to improve their market, financial and operational performance (Narasimhan & Talluri 2009:115). Knemeyer, Zinn and Eroglu (2009:142) add that organisations can use SCRM to identify and evaluate risks and consequent losses within the SC. In addition, the SCRM process enables managers to adopt strategic thinking and decision-making when evaluating options, thereby possibly improving SC performance (Kilubi & Haaisis 2015:41). Wallace and Choi (2011:285) posit that the process helps managers to react or respond to risks through monitoring, thus improving the agility and robustness of the SC to withstand shocks from disruptions. This enables an organisation's SC to resist change without adapting its initial stable configuration (Wieland & Wallenburg 2012:890).

3.4 Risk Management Strategies in the supply chain risk management process

3.4.1 Identification of risks

Risk identification is the first and most important phase in the SCRM process. This enables grocery retailers to map external and internal sources of risks and their effect on each department within the SC and its performance; therefore it is important to use the experience and knowledge of every member of the organisation (Prakash, Soni, Rathore & Singh 2017:70). Expert knowledge and historical data are helpful to identify and map potential SCR; however, other risk identification methods may also be used in the SCRM process. Three of these methods are discussed below.

- **Interpretive structural modelling (ISM)**

ISM is a SC mapping technique that assists organisations to illustrate their SCs (Pfohl *et al*. 2011:33). When SC details are mapped, potential events and disruptions can be identified and classified more clearly among inter-relationships in the SC, thereby providing an improved evaluation and understanding of their impact (Venkatesh, Rathi & Patwa 2015:154).

- **Event and fault tree analyses**

Event and fault tree analyses are techniques for developing a relationship between events that may lead to a disruption (Zeng & Skibniewski 2013:334). Event tree analysis (ETA) characterises the consequences of a disruption and determines the chances of possible outcomes, while fault tree analysis (FTA) characterises the causes of the disruption and evaluates its likelihood (Ferdous, Khan, Sadiq, Amyotte & Veitch 2011:87).

- **Ishikawa cause and effect analysis (CEA)**

The Ishikawa CEA enables retailers to reason structurally and review all the possible causes and effects of disruptions using fishbone diagrams, brainstorming and examinations (Berrado, El-Koursi, Cherkaoui & Khaddour 2010:5).

The methods outlined above are used to improve risk identification so that appropriate risk assessment strategies can be implemented in Phase 2 of the SCRM process (Tummala & Schoenherr 2011:476).

3.4.2 Risk assessment

Risk assessment is the second and most important phase in the SCRM process. It enables the organisation to determine the likelihood, frequency and impact of disruptions and to evaluate overall risk (Nakandala, Lau & Zhao 2016:4185). The assessment phase requires a comparison and emphasis on each of the risk variables to prioritise risks and improve decision-making which is constituent to SCRM (Hachicha & Elmsalmi 2014:1302).

The literature on risk assessment methods used by grocery retailers is outlined below and it deals with demand, supply, process, control and environmental risks (Aqlan & Lam 2015:55).

- **Fuzzy logic and fuzzy bow-tie method**

This method is used when it is difficult to accurately measure or numerically quantify data. Organisations therefore rely on expert knowledge, which is applied to a rule-based system, to assess the overall risk level (Nakandala & Lau 2012:59). The method measures the severity of each risk using a linguistic value, such as high, low or very low, which is awarded to each risk (Nakandala *et al*. 2016:4185). Thereafter, a bow-tie analysis is used to calculate the total risk scores in terms of probability and impact to prioritise the risk (Aqlan & Ali 2014:39).

- **Risk filtering, ranking and management framework (RFRM)**

The RFRM helps to prioritise risk by filtering and ranking risk scenarios according to their importance (Nakandala *et al*. 2016:4185). The framework provides a systematic risk scoring and matrix which include the probability of occurrence, severity of consequences and prioritising risk into different levels or ranks (Cox 2008:499). Prioritising, ranking and weighting each risk enables managers to be aware of low or high-level risks and to determine the most severe risk (Kumar, Himes & Kritzer 2014:878; Lockamy 2014:769). This

allows them to implement mitigation strategies more effectively by focusing on the risk which has the highest impact on the SC.

3.4.3 Risk mitigation

The third phase of the SCRM process is mitigating the risk. This phase enables organisations to prepare for unknown risks and respond to risks. It is therefore essential to have proactive and reactive measurements in place (Scholten, Sharkey Scott & Fynes 2014:216). Risk mitigation reduces the impact and probability of risk in the SC; therefore, the right strategies must be in place for each risk (Manuj *et al*. 2014:241). Extensive research has been done on strategies to mitigate SCR in grocery retailers.

McKnight and Linnenluecke (2016:290) indicate that having a continuity management team and disaster risk continuity plan in place is vital for restoring and managing the SC after a natural disaster has occurred. Tran, Childerhouse and Deakins (2016:1102) mention that managers within the organisation should share risk-related information with trading partners as a mitigation strategy. Communicating risk and sharing forecasting or point-of-sale (POS) data can improve collaborative relationships with SC partners, demand planning and mitigates supplier risk of short or late deliveries (Alftan *et al*. 2015:238; Jin, Williams, Tokar & Waller 2015:199). Communication and sharing information with external suppliers are of high importance for improving SC integration (SCI). SCI is one strategy many businesses have embraced to manage SC complexity and attain increased SC performance (Droge, Vickery & Jacobs 2012:252).

According to Jacobs, Yu and Chavez (2016:60), managers should not only focus on improving communication with external partners but also with employees. Communication to employees increases visibility and awareness of goals, policies, procedures and operations that may cause disruptions in the SC (Borca & Baesu 2014:497; Durach, Wieland & Machuca 2015:120).

The implementing of new technology and systems is a proactive mitigation strategy, which helps grocery retailers to improve demand prediction, sharing information to suppliers and managing operations within the DC more effectively (Esbjerg, Pearse & Glanz-Chanos

2016:1371). According to Salam (2017:298), technology is systematically associated with improved collaboration and trust amongst SC partners, which will improve visibility, communication and operational performance.

To keep track of the identified risks and to ensure the execution and evaluation of mitigation strategies, the risk monitoring phase is required as the last phase of the SCRM process (Aqlan & Ali 2014:46).

3.4.4 Risk monitoring

The risk monitoring phase enables the organisation to examine the progress of the SCRM process, manage risks and to implement corrective actions to achieve SC performance (Blome & Schoenherr 2011:50). This phase is a continuous event which effectively evaluates and executes mitigation strategies to manage risks and to identify new potential risks (Aqlan & Ali 2014:46). Extensive literature provides effective monitoring and control strategies that can be implemented within grocery retail SC.

Qrunfleh and Tarafdar (2014:341) emphasise the implementation of information systems which provide information regarding customer preferences, stock and supplier service levels. Radio frequency identification (RFID) is an advanced communication system to improve SC 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 enables grocery retailers to monitor and improve the quality and temperature of products delivered by suppliers; it also helps to check inventory levels, improve in-store logistics, on-shelf availability and product safety, as well as reducing product waste (Goyal, Hardgrave, Aloysius & Dehoratius 2016:796).

Manzini and Accorsi (2013:253) argue that although RFID is an effective system, it is expensive to implement and can be substituted with control systems, followed by “what-if”-scenario analyses. Furthermore, the authors focus on putting effective key performance indicators (KPI) in place to monitor supplier service levels and daily operations within the SC. These KPI enable managers to detect and react to poor supplier deliveries. Where operations are slowing down, it should be monitored on a weekly basis, while everyday

operations in the DC should be monitored daily (Newsome, Thompson & Commander 2013:6-9). This phase is a critical aspect of successfully managing SCR, creating visibility and managing future risks (Xie, Tummala & Schoenherr 2011:480).

4. METHODOLOGY

4.1 Research design

A single, holistic case study design was used. According to Mariotto, Zanni and De Moraes (2014:259), case studies are important tools for researching the field of management; they also contribute to the research strategy of building on theory. Single case studies with a qualitative approach can build on theory through extension or by generating new theory (Gaya & Smith 2016:531). It is one of the most suitable strategies to use when investigating the management of risks in the grocery SC because it considers data on a micro level, whilst also enabling the researcher to investigate the phenomenon within the whole SC (Oke & Gopalakrishnan 2009:170; Sgarbossa & Russo 2017:599). The selected single case study used a qualitative approach and enabled the researcher to gather information-rich sources for an in-depth understanding and analysis of the context, causes and processes involved in the phenomenon under study (Bhattacharya 2017:109; Yin 2012:8).

4.2 Selection of the case

The study used criterion-i purposive sampling to select the focal retailer. This method is related to the inclusion of a certain category; it therefore helped to select the focal retailer according to criteria of importance, providing the researcher with information-rich sources relevant to the research questions (Creswell 2012:207; Palinkas, Horwitz, Green, Wisdom, Duan & Hoagwood 2015:535). The organisation was chosen based on being one of the four biggest grocery retailers in SA. The focal retailer has more than 1000 stores, along with DCs, throughout Africa and deals with 9000 suppliers. It has invested extensively to improve its SC (e.g., through establishing advanced distribution centres, sophisticated information management systems and transport operations).

A total of 14 semi-structured interviews were conducted with managers and executives. The final sample size was determined by the guidelines of Guest, Bunce and Johnson (2006:61) which state that 6-12 interviews are sufficient for the development of meaningful themes and valuable interpretations. Maximum variation sampling was used to effectively gather multiple perspectives on the SC (Pettit, Croxton & Fiksel 2013:50). This was done by interviewing a wide range of managers from different departments within the SC. The managers all have different characteristics, such as their job titles and responsibilities to manage SCRM, but they all follow the same pattern of managing SCR. Participants had to meet the following criteria: have a management position, manage SC activities and dealing with SC risks or disruptions. The rationale behind these criteria was to get in-depth information about SCR, managing SCR and the implementation of a SCRM process. Table 2 indicates the different SC directors and managers who were interviewed:

TABLE 2: 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.

4.3 Data collection

Data were collected by conducting 14 face-to-face, semi-structured interviews. Participants 2 and 3 chose to be interviewed together. The interviews were conducted at the participants' offices, lasting an average of 43 minutes per interview. One-on-one, semi-structured interviewing, guided by the discussion guide was regarded as the most appropriate method to gather detailed information; it also allowed the researcher more control over the quality and type of information received (Plano Clark & Creswell 2015:218). Semi-structured interviews are appropriate to use when there is a lack of existing literature which is evident in the proposed research problem (Rowley 2012:262). This method allowed the researcher to gain in-depth and detailed information, new insights and a better understanding of the phenomenon under investigation. The interview questions were formulated based on the research questions. A pilot interview was conducted with Participant 7 to test the quality of the questions. Thereafter, minor changes were made to the discussion guide according to the feedback of the participant. Before conducting the interview, all participants signed a consent form and also approved the researcher's request to audio record the interview. Afterwards, the researcher transcribed each interview and compared it with the recordings, while making necessary changes to ensure verbatim accuracy.

4.4 Data analysis

The collected data was analysed through thematic data analysis which include a preliminary exploratory analysis and a critical assessment of the audio recordings and interview transcripts (Nieuwenhuis 2007:104; Roller & Lavrakas 2015:235). Codes were generated through this process and grouped into themes for analysis (Creswell 2012:243). The list of frequency codes in Table 3 shows the final set of codes used in the study and also indicates

in which interview transcripts each code occurred, as well as how many times each code was applied. From the revised codes list, subthemes and main themes related to the research questions were analysed and established.

TABLE 3: Frequency of codes

Codes	Subthemes	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	Total
Out of stock	Demand 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 stock	Supply risk	1			1	1	1	1								5
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	Macro	1	1										1	1	1	5

or store	environmen t risk															
Economic downturn	Macro environmen t risk	1	1	1	1											4
Hijacks	Macro environmen t risk	1	1											1		3
Avian influenza	Macro environmen t risk	1									1					2
ISM through meetings and planning sessions	ISM	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14
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 performance	Importance of monitoring	1	1				1		1		1		1			6
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 performanc e 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 3 helps to structure and map the findings by presenting the linkage between raw data, the codes identified in the data, the relevant subthemes and the main themes.

4.5 Trustworthiness

To ensure trustworthiness and high-quality research, credibility, confirmability and transferability need to be ensured (Plano Clark & Creswell 2015:364; Polit & Beck 2012:582-583). Data triangulation was used to help achieve credibility and conformability; multiple participants were used in order to contrast and compare research data obtained through interviews (Roller & Lavrakas 2015:364). The confirmability of the findings was improved by relating it to the existing literature, thus ensuring confidence in the research findings. Transferability was ensured by providing an in-depth and contextualised description of the background, research context, participants of the study and the experiences and processes observed (Polit & Beck 2012:852). The verbatim quotes gathered from the discussion guide were used to directly state the participants' perspectives. This ensured that the researcher's objectivity was maintained; the data presented are exactly the same as provided by the participants and were not overly influenced by the researcher's personal thoughts or theoretical inclinations.

4.6 Ethical considerations

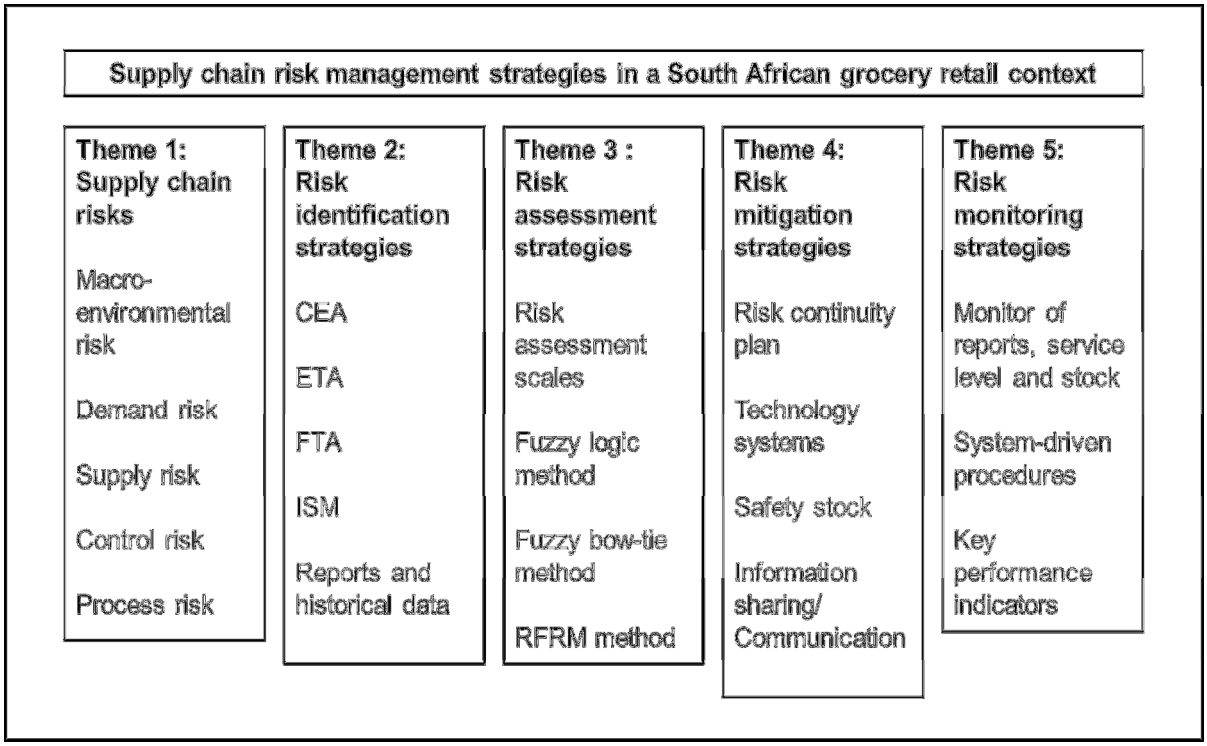
The study was approved by the Research Ethics Committee at a South African university, after a letter of authority had been issued by the case study organisation confirming its support of the research. All interviewed participants were required to read and sign an informed consent form before participating in the interview. The consent form gave a brief explanation of the purpose of the study. It emphasised that participation was voluntary and that the participant could stop the interview or refuse to answer any question that might make them uncomfortable. The consent form also stressed the fact that the data gathered from the participant, the participant's name and organisation's name would be kept anonymous and confidential. The pseudonyms listed in Table 2 were used to ensure anonymity.

5. FINDINGS

The study set out to determine the types of SC risks a grocery retailer in South Africa faces and how it uses a SCRM process to manage and improve SC efficiency. The five main

themes were identified from the data analysis, as shown in Figure 2 below. Each theme and subtheme is discussed, with relevant evidence from the data to support the discussion.

FIGURE 2: Summary of themes and subthemes



Source: Author's compilation.

5.1 Supply chain risks

SCR was the first theme, which contributes to the research question regarding the type of risks the focal retailer faces. The subthemes included the deductive grouping of SCR into the five generic risk categories, namely macro environmental, demand, supply, process and control risks.

5.1.1 Macro environmental risks

Twelve of the 14 participants indicated that macro environmental risks have a negative effect on their SCs and cause operations to slow down, OOS situations, change in demand and a

delay in getting the product to the customer. The most frequent events and disruptions include strikes, labour unrest, fire at the DC, hijacking of trucks, economic downturns and avian influenza. The following quotes by participants identify the types of macro environmental risks:

> *"Strikes and hijacks are daily events that occur, which are risks to our supply chain … also, economic downturn and high unemployment influence the consumer to spend less money, reducing the demand on certain products." (P1, male, chief planning manager)*

> *"Incidents like fire … where you lose the whole site and cannot move or get stock will have a direct impact on the store stock." (P12, male, operational manager)*

The literature review emphasised that macro environmental risks have a major influence on the loss of stock, stock availability, operational slowdown, fluctuations in demand and the supply of products when natural events or disruptions occur. These cause severe demand-and-supply shocks within grocery retail SCs (Cavallo *et al.* 2013:Internet; Marucheck *et al*. 2011:712).

5.1.2 Demand risk

Eleven participants indicated that not having the right product at the right time in the right place is the main cause for not meeting customer demands. This is caused by events such as incorrect forecasting, stock-outs, a supplier's late delivery and demand volatility. The following quotes highlight demand risks:

> *"It's a fact that our forecast will be incorrect. So there will be areas where we're slightly in stock, out of stock or our productivity is slightly higher or slightly lower than we anticipate." (P8, male, deputy supply chain manager)*

> *"We are a consumer-driven business; if we don't have the right product at the right time on the shelve, we will lose customers and turnover, so it has a financial impact." (P1, male, chief planning manager)*

This corresponds with previous findings that not meeting the demand due to OOS situations and fluctuations in demand has a financial and competitiveness impact on the grocery retail SC (Aastrup & Kotzab 2010:149; Chena *et al.* 2017:81).

5.1.3 Supplier risks

Eleven of the 14 participants mentioned that supplier risks are triggered by events such as late or incorrect deliveries from the manufacturer or supplier. The following quotes show the different disruptions:

> *"The manufacturer might not have the products available, which cause a delay and disruption. Not delivering on time at the DC causes a disruption or delay; also, the truck not being at the right temperature causes us to reject the product." (P9, male, senior manager of fresh food)*

> *"When suppliers deliver stock late or the quality is bad, it leads to loss of sales at the end of the supply chain and out-of-stock situations which is not good for our end consumers." (P14, male, planning manager)*

This corresponds with the literature of Dupont *et al*. (2017:4) that suppliers who fail to deliver the right products in a timeous matter cause a disruption in the SC, OOS situations and a loss in sales.

5.1.4 Process and control risks

The participants classified process and control risks together as operational risk. Nine participants indicated a delay in delivering products to the store as a risk. Delays are caused by slow operations, product waste, incorrect handling of products and delays in receiving because of wrong packaging and incorrect temperatures. Eight participants identified a delay in replenishment ordering as a risk, along with poor planning, the lack in communication, incorrect master data and forecasting:

> *"Then, when it goes into the DC, it's all about handling the stock correct and timing. Then, being loaded onto the truck, it causes a delay if the truck is not the right temperature and further delays are at store level where the truck has to*

stand in line to offload the goods. Poor planning from the supplier, poor planning in routes, scheduling, time, poor delivery or late delivery, poor ordering." (P9, male, senior manager of fresh food)

"There are a lot of incidents that can occur to delay the supply chain process; from an order perspective, ordering stock where the pack size is incorrect or the item is not listed under the right supplier code, placing an order where the unit cost is incorrect." (P7, male, general replenishment manager for non-foods)

"There is probability of a 20% delay which is under-ordering, under-forecasting from the replenishment team." (P4, male, senior buyer for foods)

Control and process risks are internal to the organisation and expose the grocery retailer to operational risk where slow operations, product safety issues and a lack of inventory management occur (Sosa *et al.* 2014:960). Poor replenishment, planning and forecasting cause delays in getting products to the store and affect the end customer and grocery retailer negatively (Alftan *et al*. 2015:238). The participants focused only on disruptions that might occur until the products are delivered to the store; they did not mention any disruptions or delays that might occur regarding in-store logistics.

5.2 Supply Risk Management Strategies in the Supply Chain Risk Management Process

The SCRM process enables the focal retailer to implement strategies to identify and manage risks. The four main themes, namely risk identification strategies, risk assessment strategies, risk mitigation strategies and risk monitoring strategies contributed to the remaining research questions of the study.

5.2.1 Risk identification strategies

Identifying risks is the first and most important phase in the SCRM process. All 14 participants find it necessary to have risk meetings or planning sessions where senior managers from each department would make contributions. This is important to map potential internal and external sources of risks that might affect each department and to

share information, knowledge and experience within the organisation (Prakash *et al*. 2017:74). The following quotes indicate the methods used to identify risk:

> *"Brainstorming sessions, the "what if's", the knowledge over the years and the built-in processes, historically what will happen if we do not have a distribution centre." (P13, male, business development manager)*

> *"Previous experience and incidents that were captured in the book help to identify certain risks, also observing historical data to determine where additional cost and charges occur ... where or when did we lose sales because of delays or disruptions … you will do evaluations, graphs and observe your stock levels in the DC and in stores." (P14, male, planning manager)*

Twelve participants indicated that they make use of data and historical documents to identify and monitor current stock holding, incoming orders and supplier service levels, while eight participants find it necessary to conduct "what if"-analyses. Furthermore, ETA, FTA and CEA methods are used in the case firm to determine what might happen, what the causes and consequences might be, and how it will affect the whole SC.

5.2.2 Risk assessment strategies

Eleven participants identified risk assessment as very important. The use of risk assessment scales enables them to measure, prioritise and determine the potential impact of risks on their department. Therefore, using assessment scales during risk assessment helps organisations to prioritise and evaluate risks based on likelihood, frequency and impact (Hachicha & Elmsalmi 2014:1302). The following quote illustrates the use of assessment scales during risk assessment:

> *"We use scales to identify the severity of the risk. And the likelihood of it happening. We use a matrix and follow the output of that matrix; we rank the risks from most severe to least severe." (P8, male, deputy supply chain manager)*

The fuzzy logic and fuzzy bow-tie method is used by participants who prioritise operational and macro environment risk according to their financial impact. This method enables the participants to prioritise risks – high versus low (Aqlan & Ali 2014:39; Nakandala & Lau 2012:59). The following quote reflects the prioritisation of risk based on financial impact:

> *"Low risk in terms of financial exposure gets a lower priority, but high risk with high financial impact will get the first priority. We will plan a sequences of events and have entry and exit points between each one of them. We try to streamline and deal with the risks as quickly as possible." (P1, male, chief planning manager)*

The RFRM assessment method is the most commonly used method among the participants to determine the probability of supplier service levels, product wastage and the severity of its consequences (Nakandala *et al*. 2016:4185). Participants assess risks through filtering and ranking supplier and product wastage scenarios according to their importance to the focal retailer:

> *"Every month we review all our suppliers whose service levels are under our expected 95%. We address them, starting from worst to best, and biggest contribution to the business." (P6, male, general replenishment manager for foods)*

As mentioned, risk assessment is of high importance within each department. The managers use formal risk assessment scales and methods to help them have the best mitigation strategy in place.

5.2.3 Risk mitigation strategies

Risk mitigation helps grocery retailers to prepare for unknown events, creates awareness of possible disruptions and enables managers to be proactive or reactive towards SCR (Scholten *et al*. 2014:216). Twelve participants indicated that technology systems help them to communicate and mitigate risk more effectively and to be proactive regarding SC risks

(Salam 2017:298). This includes warehouse management systems, voice-picking, demand systems, supplier and delivering schedule, systems and third-party integrated systems.

As proposed by McKnight and Linnenluecke (2016:290), the focal retailer's mitigation strategy for dealing with macro environmental risks entails having a continuity plan in place, along with a recovery plan and scenario testing:

> *"So we put all our disasters together and that's why we developed a disaster continuity and recovery plan and that plan is documented, it's updated, then we run a scenario test." (P2, male, chief supply chain manager)*

Demand and supply risks are mitigated by making use of demand planning and communicating POS and forecast information to suppliers (Alftan *et al*. 2015:238). These mitigation strategies are implemented by the participants through technology systems, SCI and sharing information to suppliers:

> *"We have systems to do that for us. We will hold buffer stock and safety stock to protect us. Our system builds in a lead time variance, so if a supplier is reliable, the lead time variance will be less. So you won't hold as much safety stock … The information we're sharing with them is what's sold through the tills so the supplier can forecast what he physically sells through the tills." (P6, male, general replenishment manager for foods)*

To mitigate process risk, the participants improved their operations at the DC by implementing voice-picking systems and following strict quality-check procedures. No specific mitigation strategy was mentioned for improving inventory policies and diminishing delays in replenishment. Poor replenishment can have a further effect on process and supplier-and-demand risks, therefore being one of the core factors of disrupting the SC (Kaipia *et al*. 2013:263).

Participants indicated that the communication of risk is very important, especially to the parties in the SC who are directly affected and also to external parties. They stated that

communication is not that easy and not always effectively used, which influence visibility (Borca *&* Baesu 2014:497; Durach *et al*. 2015:120). The following comment illustrates this:

> *"Communication is one of the easier forms of mitigating risk but also the one that is in most cases not executed properly. So communication is one of the biggest factors in our business that we are still struggling with." (P10, male, supply chain manager of fresh food)*

Other strategies mentioned to mitigate risk include having centralised distribution centres, supplier relationships, safety stock and providing POS data to suppliers. All of these help to ensure supplier efficiency, improve operations and product safety, get products to the store on time and, most importantly, to meet the demand of customers (Esbjerg *et al.* 2016:1371).

5.2.4 Risk monitoring strategies

The last phase of the SCRM process is risk monitoring. Six participants indicated that the monitoring phase helps to achieve SC performance, while five participants stated that it helps to manage risk and adapt or improve the SCRM process. This phase enables the organisation to examine the progress of the SCRM process and to implement corrective actions to achieve SC performance and efficiency (Blome & Schoenherr 2011:50). The quote below supports the theme:

> *"A lot of it is system-driven so we do have built-in KPIs through the system, which allow us to identify upfront risks. We look at sales, forecast, current SOH, current inbound and DC capacity, so we constantly monitor throughout the supply chain at each point where the stock is moving. It is on-going and on a weekly basis, daily basis when situations occur." (P1, male, chief planning manager)*

The strategies frequently used are report monitoring, system-driven procedures, built-in KPIs, scenario analyses and post-mortems where data and documentation are updated. The strategies used by the participants to monitor and control SCR are aligned with the literature of Manzini and Accorsi (2013:253). Although the focal retailer monitors and controls the

movement of products through the SC, having a RFID technology system in place can speed up the monitoring process, increase SC visibility and performance (Goyal *et al*. 2016:812; Ramundo *et al*. 2016:Internet).

The participants monitored the process mostly on a daily, weekly and quarterly basis, depending on the type of risk. These findings correspond with the literature; monitor and control is a critical aspect of successfully managing SCR, creating visibility and managing future risks (Xie *et al.* 2011:480).

6. CONCLUSION

6.1 Summary of findings and theoretical implications

The purpose of this study was to determine what strategies a South African grocery retailer uses during the SCRM process. The study investigated strategies that are used for risk identification, assessment, mitigation and monitoring. By first identifying the type of SCR faced by the focal retailer, the findings revealed macro environmental risks such as strikes and fires. Daily risks included demand risks influenced by OOS situations, supplier risks due to late or incorrect deliveries, process risks such as delays at the DC and delays in replenishment. The study discovered that the focal retailer uses a formal, documented process for managing macro environmental risks, but an informal process with flexible strategies for demand, supplier, process and control risks.

The supply chain risk identification methods enable the organisation to be proactive by holding meetings with SC partners; this contributes to SC mapping by providing a clear view and understanding of possible risks that might occur at different points in the SC. The other methods formulated are part of ETA, FTA and CEA strategies as suggested by Ferdous *et al*. (2011:87) and Berrado *et al*. (2010:5).This included brainstorming sessions using historical data, reports, supplier service levels and stock holding to identify possible disruptions in the SC.

Formal risk assessment strategies are used to determine the likelihood of risks happening and to identify severe risks. Ranking the risk with the use of assessment scales is the most

common strategy, whereas the fuzzy logic and fuzzy bow-tie technique is used to prioritise risk according to its financial implications. The RFRM assessment strategy is used to determine which suppliers have low service level scores and which products cause the most product waste, contributing little to the profit margin of the organisation. The studies by Aqlan and Ali (2014:39) and Nakandala *et al*. (2016:4185) corroborate the risk assessment strategies of the focal retailer.

The most frequently used supply chain risk mitigation strategy is using technology systems to determine demand patterns and managing supplier deliveries. Sharing information such as POS data with suppliers is necessary for accurate forecasting of products. Communication to external parties, such as forwarders and suppliers, was identified as a strategy, but the focal retailer does struggle with internal communication to non-managerial staff due to the difficulties in executing communication properly. Although the focal organisation identified poor replenishment at DC level as a risk, no specific risk mitigation strategy was given on how it manages and mitigates this risk.

Supply chain risk monitoring is very important to the participants who indicated that monitoring, managing and controlling the SCRM process helps to achieve SC performance. The methods implemented by managers include built-in KPIs in systems and monitoring the stock and service levels of suppliers, while a post-mortem and scenario analyses are the less mentioned strategies. The participants find it very important to monitor operational risks: control and process risks (on a daily basis), stock monitoring (on a weekly basis), supplier service level (on a monthly basis) and macro-economic risks (on a quarterly basis).

The supply chain risk mitigation strategies for specific risks are aligned with literature, except for mitigating poor replenishment, in-store logistics and communication to non-managerial staff. The focal retailer uses risk mitigation strategies for improving its forecasting, managing stock levels, managing suppliers through collaboration and being prepared for macro-environmental risks. These strategies are aligned with the suggestions of several authors on how grocery retailers can prepare for unknown risks and respond to or control current risks, mitigate OOS situations and achieve SC efficiency (Alftan *et al*. 2015:238; McKnight &

Linnenluecke 2016:290; Salam 2017:298). The supply chain risk monitoring strategies are aligned with the literature for managing and mitigating risk to ensure visibility (Xie *et al*. 2011:480).

The study contributed to existing literature by exploring the types of risk facing grocery retailers when dealing with perishable and non-perishable products. In addition, the strategies most commonly used by grocery retailers when implementing a SCRM process to manage and mitigate identified risks were identified. The findings revealed that the grocery retailer within SA makes use of a formal and informal SCRM process to mitigate and manage daily and exceptional risks in its SC. These findings add value and help to narrow the gap of scant research on SCRM in the South African grocery retail context.

7. MANAGERIAL IMPLICATIONS

The SCRM process enables managers to adopt strategic thinking and decision-making techniques when dealing with SCR. It helps them to react or respond to risks. Through monitoring, SC agility and resilience can be improved which will help the organisation to withstand shocks from disruptions and promote a robust SC. While the focal retailer has implemented a successful SCRM process to deal with various risks, it lacks effective communication of risk and risk-related information to non-managerial employees. Not communicating effectively to employees may cause them to have a weak understanding of risks, goals, policies, procedures and operations and may cause further disruptions in the SC (Borca & Baesu 2014:497; Durach *et al*. 2015:120).

Communication to non-managerial staff members can be improved by having weekly meetings discussing possible risks, encouraging teamwork and giving guidance on how the staff can participate in the execution of strategies to reduce SCR. Furthermore, managers can implement social structures between staff and management that include formal or informal communication mechanisms. This would facilitate participation in executing communication, feedback and decision making, while building and improving management-staff relationships. Management also needs to make training a priority and provide guidance to staff that assist in replenishment activities. The training and guidance should focus on

operational practices and skills to monitor, control and manage inventory levels, timeous ordering and problem-solving.

The participants did focus on the importance of getting stock on time to the store and using systems to determine shelf capacity to meet customer demand. However, they did not directly identify or expand on in-store logistics as a potential risk. They mostly focused on disruptions that might occur until the product was delivered at the store. In-store logistics play a major role in customer satisfaction, stock shelf availability, stock ordering and sales, which constitutes a vital risk to the grocery retailer (Reiner *et al*. 2013:925). There is an opportunity for the focal retailer to implement the RFID technology system, which enables managers to improve internal communication, replenishment and in-store logistics (Reyes *et al*. 2016:805).

Furthermore, focusing on improving replenishment, internal communication and monitoring in-store logistics can improve the organisation's SC performance, reduce OOS situations, increase customer loyalty or satisfaction and contribute to financial performance.

8. LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

This study focused on a single case study organisation within the South African grocery retail industry. Therefore, further research across other organisations operating in the same industry can be done to determine the transferability of the findings. Because South African grocery retailers are extending their operations to other African markets, it would be valuable to replicate the study in other African countries in which South African grocery retailers compete. Furthermore, this study was limited to the grocery retail industry and could be expanded to other retail industries, such as clothing.

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