

# **Managing Out-Of-Stocks and Over-Stock Occurrences in Supermarket Stores: A Case Study in Singapore**

A thesis submitted in fulfilment of the requirements for the degree of  
Doctor of Philosophy

Lai Yin, HOOI (Elsie)  
School of Business Information Technology and Logistics  
College of Business  
RMIT University  
October 2013

Senior Supervisor: Associate Professor Booi H. Kam  
Secondary Supervisor: Professor George Cairn

# Declaration

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I certify that except where due acknowledgement has been made, the work is that of the author alone; the work has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the thesis is the result of work which has been carried out since the official commencement date of the approved research program; any editorial work paid or unpaid carried out by a third party is acknowledged; and, ethics, procedures and guidelines have been followed.

*Elsie Hooi*

Lai Yin, HOOI (Elsie)

October 2013

# Acknowledgements

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*This dissertation is dedicated to my father (Victor), mother (Jessie), sister (Irene) and my husband (Stanley) for their unconditional love and endless patience toward me.*

*Thank you mother, for going to the temples diligently, come rain or shine, to pray for success in my life, especially towards the completion of this research.*

*Thank you father, for your warm cuddles and words of encouragement. Your immense pride in me has helped me persevere in life.*

*Thank you my dearest sister, for EVERYTHING (too much to list).*

*Thank you my dearest husband, for your patience, for helping out with household chores and most of all, for cooking all the comfort food that I so needed, especially towards submission time.*

First and foremost, I want to thank the Heavenly Powers, for it was 'them' who brought me endless opportunities (and challenges) to complete this amazing journey.

Sincerest thanks go to my Primary Supervisor, Associate Professor Booi Kam. His creativity guided this research and helped me to develop insights that would never have materialised without his continuing mentorship.

I would also like to thank my second supervisor Professor George Cairns, who encouraged and lifted me up whenever I felt discouraged.

No PhD student would manage the administration of their candidature without the research team, especially Prue Lamont, who consistently lent a kind listening ear and shoulder whenever I needed her.

Special thanks to the respondents who participated in my research and who gave their extremely limited time. Their patience in helping me to understand the challenges of their operations and most importantly, allowing me to carry out unobtrusive observations to all areas of their operations was much appreciated. Without such high quality access and information, I would not have been able to complete my research.

I would also like to thank my past and current colleagues at RMIT for their understanding, support and encouragement.

I would like to thank Vicki Watson at Callisto Green, who provided copyediting and proofreading services, in accordance to the guidelines laid out in RMIT-endorsed guidelines (Australian Standard for Editing Practice (ASEP) – specifically Standards D (language and illustrations) and E (completeness and consistency)).

# Abstract

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Managing out-of-stocks (OOS) and over-stocking (OS) occurrences is aimed at optimising on-shelf availability of stocks (OSA). OSA is a key performance indicator of retail logistics and is at the heart of order fulfilment. Yet, despite over 40 years of research on OOS, OOS rates remain at an average of 8%. Further, while there has been clear evidence that the store is the major contributor to OOS situations, the store continues to remain a 'black-box' in OOS research. Previous studies on OOS tend to focus predominantly on issues, such as consumer responses to OOS, extent and root causes of OOS, and use of technology to minimize OOS and OS occurrences. Despite the significant influence to minimise OOS and OS occurrences, the accurate execution of in-store processes has to date received little recognition.

The study employs a case study approach to examine how supermarket stores execute in-store processes to manage OOS and OS occurrences. The study was based on the in-store operations practices of 19 stores of a major supermarket chain in Singapore. Semi-structured interviews with store managers and supervisors were conducted at each of the 19 stores, supplemented by unobtrusive on-site observations on the execution of in-store processes. Within-group analysis was conducted on store-specific operating procedures (SSOPs) on each stores' in-store processes. Cross-group comparative analysis was also conducted on the operations practices employed by the 19 stores. Patterns of OOS and OS occurrences, as well as their resolutions, were identified. Based on the similarities and differences in approaches in managing OOS and OS occurrences among the 19 stores, a number of working propositions were developed, contributing to the knowledge base of OOS and OS management.

The results of this study indicate that majority of OOS incidences in stores of the case supermarket chain occurred as a result of various relatively trivial lapses in human actions, such as scanning errors or inaccurate deliveries, rather than caused by major operational problems. Effective management of OOS and OS was dependent on the store managers' attitude towards management of OOS and OS. The study found store managers with positive attitude towards the management of OOS and OS led to low extent of OOS and OS incidents and effective relationships with headquarters and suppliers.

Mainstream inventory management literature showed that OOS and OS occurrences are generally brought about by mismanagement of logistical processes, specifically, in-store logistics operations. This study, however, has shown that trivial operational issues and minor human errors are major sources of OOS and OS situations, and store managers' attitude played a significant role in the management of OOS and OS occurrences.

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# Chapter 1 Introduction

## 1.1 Motivation

This thesis aims to explore and investigate how stores of a supermarket chain manage out-of-stock (OOS) and over-stocking (OS) occurrences. Research into OOS and OSA in supermarkets has been carried out for over 40 years, yet ‘shelves were ‘still empty’’ (Aastrup and Kotzab 2010). The problem is so severe that even Wal-Mart, well known as a ‘paragon of logistics’, is also struggling to restock their shelves (Dudley 2013). A comprehensive study conducted by A.C. Nielson for the National Association of Food Chains in 1968 found that stores experienced 12.2% of OOS that were fundamentally caused by inadequate space allocations, incorrect ordering routines and lack of experienced personnel (Aastrup and Kotzab 2010). Over three decades later, in one of the most comprehensive, worldwide surveys on OOS, Gruen et al. (2002) reported that OOS averaged 8%, despite the increased use of advanced technologies (see Figure 1-1). ECR Europe (2003) stated that an OOS rate of 7%-10% would translate into annual sales of £4 billion for European supermarket chains.

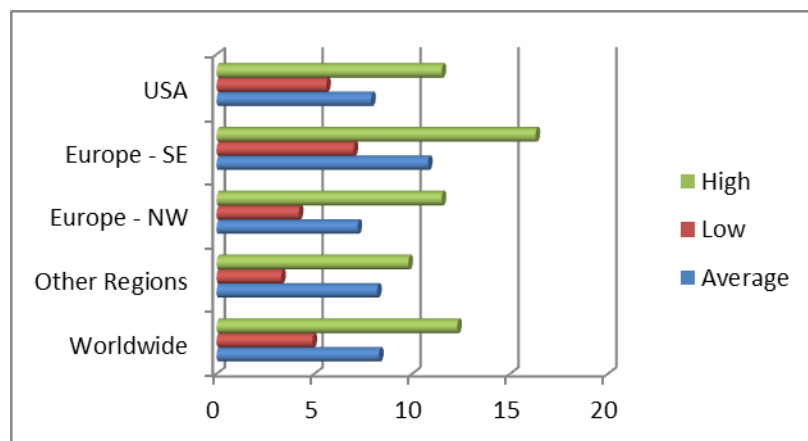


Figure 1-1 Worldwide Overall OOS Extent (Source: Gruen, Corsten and Bharadwaj 2002, p.11)

Due to the complex nature of grocery retailing (Skinner 1974; Ton and Raman 2010), managing an extensive array of product assortment (e.g. food, non-food, household, electrical and health and beauty products) exposes the grocery retailer to mistakes, e.g.

error scans caused by similarity of product packaging (Raman, DeHoratius and Ton 2001). In addition, grocery retailers, such as supermarkets, face constant challenges in offering a plethora of products and services to satisfy customers' demands and in controlling costs to support such offerings (Yücel, Karaesmen, Salman, and Türkay 2009). Failure to manage OOS occurrences and to maintain on-shelf availability (OSA) will eventually lead to high operating costs and poor patronage (Lowson 2001; Taylor and Fawcett 2001; ECR Europe 2005; Goswami and Mishra 2009). Although losses due to OOS will affect both retailers and manufacturers, reducing OOS in retail stores is ultimately the responsibility of the former (Gruen and Corsten (2002). Another consequence of mismanagement of OOS incidents is increased logistical and supply chain costs (ECR Europe 2003). Mismanagement of OOS incidents results in inaccurate inventory information, which impacts product ordering (Gruen et al. 2002). Inaccurate ordering can cause unnecessary inflation of product demand, i.e. the 'bull-whip' effect, driving up logistical and supply chain costs (ECR Europe 2003).

A closely related yet contrasting problem to OOS is over-stocking (OS). To mitigate the negative impacts of OOS occurrences, grocery retailers have largely resorted to OS of products (Anand and Cunnane 2009), which increases inventory holding costs (ECR UK 2003; Anand and Cunnane 2009). Another problem with OS is its impact on space management (Gruen et al. 2002). Maintaining excess stock puts a strain on the organisation of store back rooms, which can lead to ineffective and inefficient replenishment of display shelves (Waller, Tangari and Williams 2008). To achieve optimum OSA, Aastrup and Kotzab (2010) suggest that grocery retailers need to find a balance between minimising the cost of understocking (i.e. OOS) and that of over-stocking (OS).

In an intensely competitive environment, OSA is critical in achieving store loyalty (Miranda, Kónya and Havrila 2005). With OSA as a key performance indicator (Cachon 2001), Pal and Byrom (2003) argue that grocery retailers must ensure they offer the right product, at the right time, the right price and the right place. If any 'rights' are not achieved, OOS occurs,

OSA is affected and the risk of losing customers becomes a reality. The key to effective OSA management is minimising OOS occurrences (Corsten and Gruen 2003). Despite unrelenting logistical innovations in recent years, which continue to streamline supply chain operations, retailers remain concerned about OSA issues (Fernie and Sparks 2004; ECR UK 2004; Fernie and Grant 2008; Aastrup and Kotzab 2010; Grant 2012).

In short, OOS and OS occurrences negatively impact not only grocery retailers (due to lost sales and store loyalty) but also manufacturers (due to lost sales and brand loyalty) and consumers (who are unable to complete grocery shopping lists). The underlying issue with OOS and OS management is to be aware of the extent of focus required to implement in-store processes effectively and efficiently to minimise OOS and OS occurrences (Corsten and Gruen 2003; Kotzab and Teller 2005; Ton and Raman 2010). This study looks into how stores of a supermarket chain in Singapore manage OOS and OS occurrences. It aims to identify the specific activities these stores undertook to execute in-store processes in ways to minimise causes of OOS and OS.

Previous studies on OOS and OSA occurrences have largely been conducted from two perspectives. The first perspective focused on examining consumer reactions to OOS where causes have emerged from the demand side (Emmelhainz and Stock 1991; Verbeke, Farris and Thurik 1998; Campo, Gijsbrechts and Nisol 2000; Fitzsimons 2000; Gruen et al. 2002; Sloot, Verhoef and Franses 2005; Che, Chen and Chen 2012). Studies on consumer reactions to OOS have found five common reactions to OOS incidents: (1) Switching size; (2) Switching brand; (3) Switching store; (4) Delaying purchase; and (5) Deferring purchase (Emmelhainz and Stock 1991; Campo et al. 2000; Fitzsimons 2000; Corsten and Gruen 2003). The second perspective concentrated on exploring the extent and root causes of OOS and OS emerging from the supply side (Corsten and Gruen 2003; ECR Europe 2003; Kotzab and Teller 2005; Scott 2006; Anderson, Fitzsimons and Simester 2006; Anand and



Cunnane 2009 and Aastrup and Kotzab 2009; 2010). This study joins the latter research stream, focusing on how supermarket stores manage OOS and OS occurrences.

Previous studies have identified factors found to influence the extent of a stockout to include the location of stockout within a distribution channel, the effects of size of a stockout and the product characteristics (e.g. type, value, promotional or non-promoted) of the under-stocked item (Walters 1977; Ettouzani et al. 2012). Gruen et al. (2002) found that 72% of OOS causes stemmed from in-store processes which included in-store planning (e.g. excessive product assortment, inadequate shelf space and management (Corsten and Gruen 2003; Kotzab and Teller 2005; McKinnon, Mendes and Nababteh 2007)), in-store ordering (e.g. inaccurate order quantity or product and delayed ordering (Corsten and Gruen 2003; ECR Europe 2003; Gruen and Corsten 2007)), and in-store replenishments (e.g. incorrect shelf space allocation, infrequent replenishment activities to storage and shelves and insufficient manpower to execute replenishment activities (Fisher, Krishnan and Netessine 2000; Waller et al. 2008; Ton and Huckman 2008)) (see Figure 1-2). The ineffectiveness in transferring goods from the stores' receiving dock onto the display shelves, known as 'the last 50 yards of a supply chain', has also been blamed for causing OOS (Grant and Fernie 2008). ECR Europe (2003) observed that product availability deteriorates throughout the supply chain; they found that service levels between parties in a supply chain indicated 'shelf service levels' to be around 92-93%.

In 2009, in-store operations contributed to 98% of OOS in stores (Aastrup and Kotzab 2009). The type of stores, day of the week, age of store, range of SKU variety, infrastructural environment and quality of logistical infrastructure have all been found to affect the occurrences of OOS (Taylor and Fawcett 2001; DeHoratius and Raman 2003). For example, stores with a higher variety of SKUs tend to experience higher inaccuracies, as these stores normally carry multiple items very similar to each other (Raman et al. 2001). In addition, while OOS causes are generic to all product range, its negative impacts vary with certain

products (e.g. high value or high turnover products), and, therefore, the negative impacts of OOS on these products are more significant (McKinnon et al. 2007). Another example where infrastructure affects the impact of OOS occurrences is in older stores with less efficient docks, which are located in congested urban areas and have complicated delivery and receiving operations (Taylor and Fawcett 2001). As the stores of the case supermarket chain were located in different parts of Singapore, this study investigates whether locational factors (e.g. densely populated residential areas) and store characteristics (e.g. age of stores and store formats) influence the management of OOS and OS occurrences.

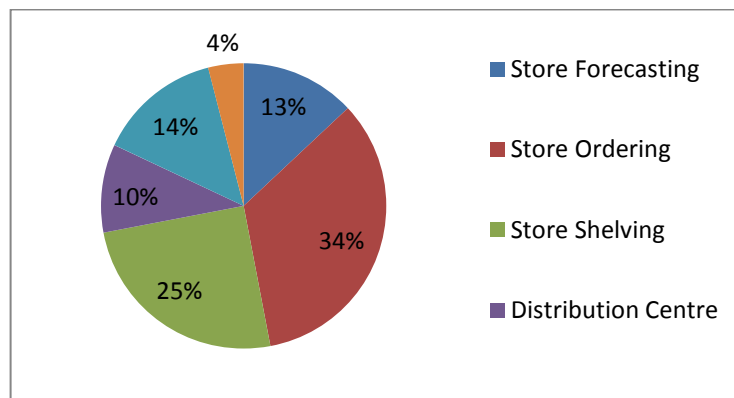


Figure 1-2 Summary Findings of OOS Causes – Worldwide Average (Source: Corsten and Gruen 2003 p.609)

Proposed solutions to resolve OOS occurrences encompass areas of process improvement, operational accuracy, incentive alignment and human factors (Corsten and Gruen 2003; McKinnon et al. 2007; ECR Europe 2003; Kotzab and Teller 2005; Grant and Fernie 2008; Svensson 2002). For example, the use of Planograms has been suggested as a means of improving management of product assortment and shelf space (ECR Europe 2003; Quelch and Jocz 2012). However, lack of adherence to Planograms by staff negated their effectiveness (ECR 2003; Product Profitability 2009). Strategies to improve operational accuracy have looked at inventory management, with initiatives such as continuous replenishment programs, computer-assisted ordering (Harris, Swatman and Kurnia 1999) and efficient consumer response (Svensson 2005). Such strategies are, however, still

dependent on accurate information, long-term trust and cooperation from all suppliers (Hoffman and Mehra 2000). In addition, previous studies have also found that in most occasions of OOS occurrence, the stock was actually in the stores but not on the shelves, i.e. 'phantom stocks' (Ton and Raman 2010). The use of incentives to encourage desirable staff behaviour (e.g. accurate scans at checkouts) (Corsten and Gruen 2003; DeHoratius and Raman 2007) was also suggested, as was an increase in staff training to improve data quality related to stock levels and movement (Corsten and Gruen 2003; Hausruckingner 2006; Andres 2008). This study examines specific operational strategies adopted by the stores of the case supermarket chain to improve accurate execution of in-store processes.

Previous studies have shown that the extent of OOS also varied due to managerial practices as well as determining what was to be measured (Gruen et al. 2002; Corsten and Gruen 2003). It is common for retail stores to determine the OOS rate per category and then average this rate for reporting (Gruen et al. 2002). However, such an approach fails to look at the selection criteria of product categories, the frequency and timing of audits, the duration of investigations and the level of human error (Gruen et al. 2002). Managerial emphasis on OOS and OS management, such as number and quality of staff tasked to monitor stockouts and effect solutions, also influence in-store performance. Solutions to improve OSA have also gravitated towards the responsibility of top management whereby the key suggestion has been for top management to raise awareness of the importance of maintaining OSA in stores (McKinnon et al. 2007). ECR (2003) also proposed seven levers to improve OSA and achieve improved customer satisfaction, OSA and productivity of suppliers, retailers, depots and stores. However, ECR UK (2007) later stated that OSA was also affected by store location and size, company ranging strategy and supply chain infrastructure. This study investigates specific strategies adopted by stores of the case supermarket chain to achieve OSA in their stores.

Although there have been extensive previous studies undertaken to understand various aspects of managing OOS and OS occurrences, these studies have focused on specific in-store processes, such as ordering (Clark 2004) or replenishment (Fisher et al. 2000), or on specific product ranges or categories, such as chilled orange juice (Trautrimis et al. 2009) or beauty and health products (McKinnon, Mendes and Nababteh (2007). These studies did not investigate OOS and OS occurrences from a store operations perspective, i.e. when, where and how do OOS and OS occur in stores? Kotzab and Teller's (2005) study was one of the few to investigate OOS occurrences via a complete grocery in-store logistic model. This study utilizes Kotzab and Teller's (2005) model to investigate how in-store processes are executed and how stores of a supermarket chain manage OOS and OS occurrences.

## 1.2 Research Questions

This thesis examines how stores of one supermarket chain in Singapore manage OOS and OS occurrences. Minimising the occurrences of both phenomena is expected to result in reliable OSA, an outcome commonly desired by supermarket chains (Grant and Fernie 2008; Corsten and Gruen 2003; Kucuk 2004; Kotzab and Teller 2005; McKinnon 2007; Fernie and Grant 2008). As pointed out in the previous discussion, OOS and OS events are not only the failings of in-store processes but also a host of other factors linked to the operations of these processes. Therefore, understanding how OOS and OS occurrences are minimised would necessitate an investigation into the manner in which factors triggering the occurrence of these two phenomena are managed, leading to the following overarching research question:

*How are OOS and OS occurrences managed in supermarket stores in Singapore?*

Due to the inextricable link between the management and causes of OOS and OS occurrences, a study into how OOS and OS occurrences are managed, as such, cannot be complete without an in-depth inquiry into how these events occur in the first instance. This gives rise to the following sub-question:

*How do OOS and OS occur in supermarket stores?*

Understandably, studying how OOS and OS events are managed should not be confined to exploring how factors triggering their occurrences are managed. A comprehensive study should also examine the way supermarket stores handle these events when they occur, including the specific actions taken both during and after the event. The need to also understand these operational tasks added three additional sub-questions to the study:

*How do supermarket stores deal with OOS and OS events?*

*When OOS and OS occur, what action(s) do supermarket stores take?*

*After the occurrences of OOS and OS events, what follow up action(s) are implemented?*

Answers to the above research questions are expected to expose valuable operational insights to further extend the extant knowledge base on the management of OOS and OS occurrences.

### 1.3 Context

Previous research on OOS, OS and OSA events in supermarkets has been based largely in the context of the retail environments in Europe and USA (Aastrup, 2009; 2010; Campo et al., 2000; Emmelhainz, 1991; Fernie, 2008; IGD, 2007). These studies share common characteristics of context, including geographical distance, levels of automated inventory processes and labour-related issues. This thesis focuses on supermarket chains in Singapore, which possesses a unique and intense level of competition brought about by the growth of increasingly modernized grocery retail outlets located in extremely close proximity to one another against a stable population<sup>1</sup> (KPMG 2006). Singapore has a national culture that focuses on progress and prosperity by encouraging its citizens to be highly-skilled and businesses to strive for excellence, embracing technology and connectivity to the world (Singapore Media Fusion 2011). To ensure low unemployment rates<sup>2</sup> in the country, Singapore's government established employment assistance schemes, such as CareerLink, operated by Singapore Workforce Development Agency (WDA) and its Distributed CareerLink Network (DCN) partners, involving Community Development Councils and the National Trade Union Congress (NTUC) – the sole national trade union in Singapore (Ministry of Manpower 2010). The labour workforce in Singapore is also maintained by a Skills Development Fund (SDF) imposed by the government, where levies are collected by employers to subsidise employees' skills improvement programs (Ministry of Manpower 2010). Despite being nicknamed as the 'little red dot' (Othman and Chan, Singapore 2007), Singapore has many accolades, such as having the 'Top postal agency in the world' (Channel News Asia 2013), 'Best infrastructure in the world' (Rikvin 2012), 'Top two most competitive cities in the world'. 'Best business environment in Asia Pacific and the world' and

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<sup>1</sup> The number of modernised grocery outlets in Singapore had been increasing relatively rapidly, e.g. FairPrice's supermarkets increased from 79 supermarkets in 2004 (The Straits Times 2004) to 93 supermarkets in 2010 (NTUC Corporate website 2010). Population in Singapore grew from 4.401 million in 2006 (Department of Statistics Singapore 2008) to 5.077 million in 2010 (Department of Statistics Singapore 2013).

<sup>2</sup> According to a report 'Singapore in Figures 2013' prepared by Department of Statistics Singapore, unemployment rate in Singapore was only 2.2% in 2010. It was the lowest unemployment rate compared to selected countries and regions around the world in the same period – Australia (5.5%); Canada (8%); Hong Kong (4.3%); Japan (5.1); Republic of Korea (3.5%); New Zealand (6.7%); Taiwan (5.2%), United Kingdom (7.8%) and United States (9.6%).

being the 'top 10 in Asia for most motivated workforce and most skilled' (Future Ready Singapore (2013). Against this backdrop of industry best-practices, productivity and discipline, it was assumed that supermarket chains in Singapore would have more disciplined and stringent controls towards the management of OOS and OS in their stores. In addition, and on account of Singapore's strict policing strategies, it was also believed that examining how stores managed OOS occurrences would offer a valuable context due to a reduced level of pilferage.



## 1.4 Contribution and Significance

Raman et al. (2001) point out that execution is the missing link in retail operations. They argue that 'operational execution can be improved quickly and dramatically if retail managers were to create awareness of the magnitude and impact of execution problems in their supply chain and learn from those stores that are currently executing well' (Raman et al., 2001, p140). With a focus on how in-store processes are conducted and how OOS and OS causes are managed before, during and after OOS and OS occurrences, this study aims to shed light on the operational details of how OOS and OS events can be effectively handled. Using a case study approach which is well-suited to exploring 'how' questions (Yin 2003; Eisenhardt 1989), this study compares the in-store processes and OOS and OS management approaches of the high-OSA achieving stores versus their less well-performing counterparts to develop a best practice model of OOS and OS management.

Extant literature on the management of OOS and OS occurrences generally lacks operational details. Many of the well-founded strategic recommendations, such as the ECR 7 improvement levers (ECR Europe 2003), are easier said than done. Few studies have included the 'extra' operational tip that Ton and Huckman (2008) have in their study on the impact of employee turnover on operating performance. Ton and Huckman (2008) identify that process conformance is the key to reducing the effect of employee turnover on task performance, adding that discipline in implementing standardised policies and procedures are an effective means to lessen the impact. Without additional operational details, many of these OOS management recommendations become ineffective in practice because the manner in which they should be implemented is unclear to the retailer. Given the widespread execution problem that pervades the retail sector (Raman et al. 2001), a study that offers operational details on how OOS and OS occurrences are effectively managed has the potential not only to promote best industry practice but also contribute to building theories of OOS and OS management. This is what this study intends to achieve.

## **1.5 Thesis Organization**

This thesis is organised into six chapters. Chapter 2 will review the literature surrounding the areas of OOS, OS and OSA. It will present the concepts of OOS, OS and OSA, factors causing OOS, OS and OSA, followed by prescribed solutions and recommendations to manage OOS, OS and OSA. Chapter 3 will present the methodology used in this study. It will describe the process of case selection, data collection and the data analysis framework that divides the stores of the case supermarket into three groups based on the extent of their OOS occurrences. Chapter 4 will present the findings, beginning with the case supermarket chain's background operational characteristics and followed by a within-group analysis. Chapter 5 will present the results of the cross-group analysis, focusing on the similarities and differences between the three groups and leading to the development of propositions. Chapter 6 will conclude the study, summarising the salient findings and their implications for theory and practice. Limitations of the study will be highlighted and directions for further studies outlined.

## Chapter 2 Literature Review

OOS is an extensively studied subject. According to Aastrup and Kotzab (2010), OOS has a research history in excess of 40 years, beginning with the study by A.C. Nielsen for the National Association of Food Chains in 1968 (*Progressive Grocer* 1968). This Chapter assesses the mainstream literature on OOS, with the objective of identifying research opportunities to expand its knowledge base. It is divided into five sections, commencing with a discussion on the concepts and definitions of OOS and two of its allied concepts, OS and OSA, in Section 2.1. This is followed by a review of the root causes of OOS in Section 2.2, and the effects it has on retailers and manufacturers as well as on logistics and supply chain practices as a whole in Section 2.3. Section 2.4 examines consumers' reactions to OOS, while Section 2.5 surveys the range of solutions suggested, including both prescriptive recommendations and empirically documented approaches found in practices. The chapter concludes with an analysis of the state of OOS knowledge, leading to identification of productive areas for further investigation. Figure 2-1 shows the five areas of concern in extant OOS research, around which this literature review has been organised. Appendix A shows further details into the five areas of concerns.

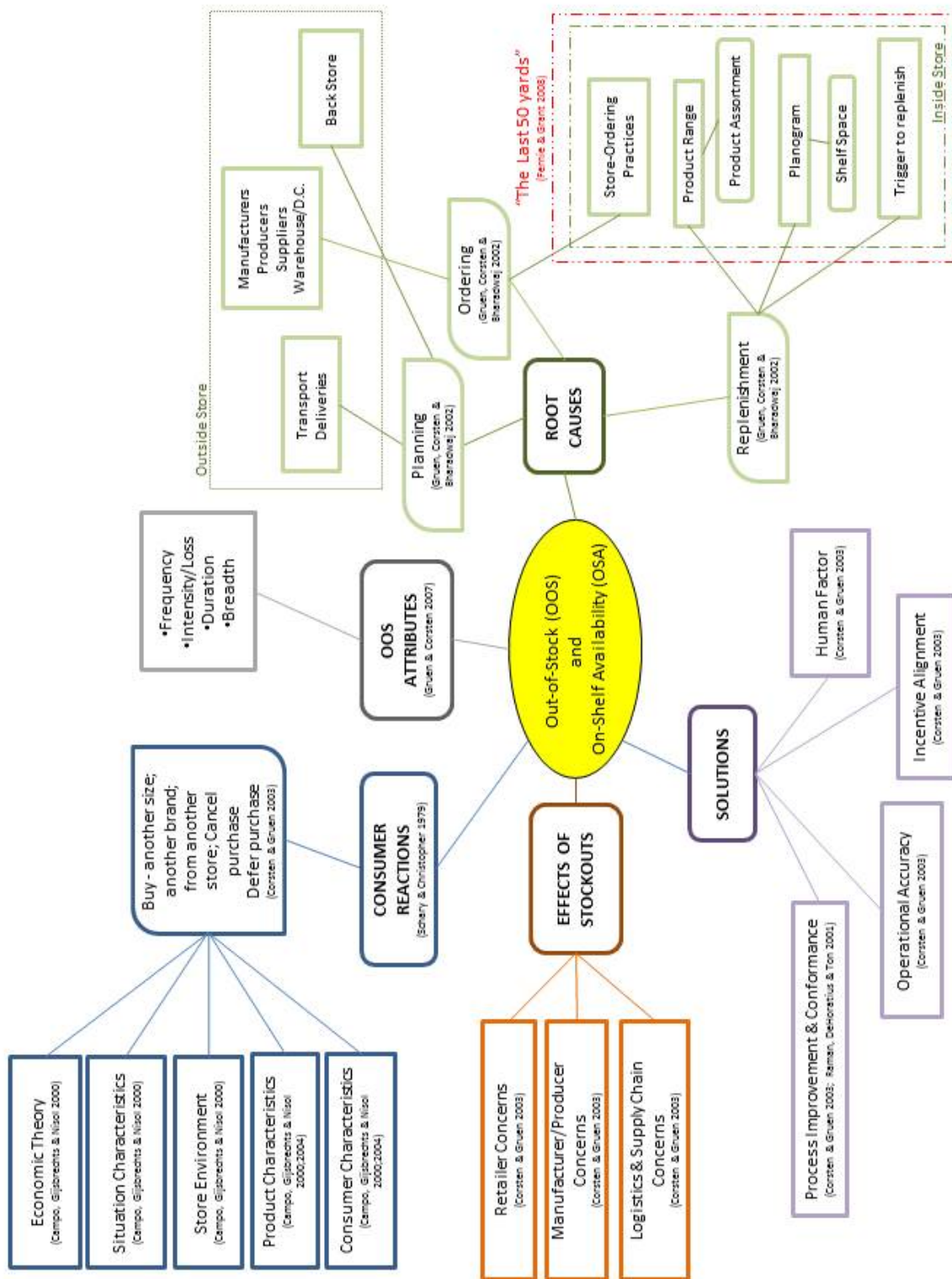


Figure 2-1 Five areas of concerns in OOS research

## **2.1 Concepts of OOS, OS and OSA**

### **2.1.1 Definitions**

#### ***Out-of-Stock (OOS)***

An out-of-stock (OOS) situation is said to have occurred when customers fail to locate the desired product in the store (Gruen and Corsten 2007). This definition implies a customer expectation that the item will be available on the shelf as indicated, as Aastrup and Kotzab (2009) reiterate: 'an OOS situation is (when) an item in store assortment that is not available for the customer on the shelf.' (p.767). Ton and Raman (2010) label products that are physically in the store but cannot be located by customers as 'phantom products', because they are not placed in the designated shelf space. 'Phantom inventory' is therefore more than what is actually on-hand (Gruen and Corsten 2007).

In fact, the definition of an OOS situation is not confined to the occurrence of phantom products. ECR Europe (2003) extended this definition of an OOS event to include 'a product not found in the desired form, flavour or size, not found in saleable condition' (p.8), again from the consumer perspective. This definition suggests that even if the desired product is available on-shelf, if it does not meet the expectations of the customer, it gives rise to an OOS situation.

Gruen et al. (2002) define the incidence of OOS as 'the number of times a consumer looks for the SKU (stock keeping units) and does not find it' (p.11). In other words, OOS could also be interpreted as 'an instance of an item being unavailable for sale intended' (Gruen and Corsten 2007, p.11).

There are many reasons why a product fails to appear at its stipulated location, e.g., it may be in other locations or storage areas or misplaced (Raman et al. 2001). Ton and Raman (2010) view OOS as a quality issue, arguing that misplaced stocks are essentially the result

of weak conformance quality and represent a 'defect in conformance quality terms' (2010, p.548) because the store failed to uphold its specifications.

### ***Over-Stocking (OS)***

The complement of OOS is over-stocking (OS); a situation which can quickly lead to challenges of space and escalating inventory holding costs (ECR UK 2003). Distribution centres pushing stocks to stores as well as poor shelf space allocation management tends to result in excess stocks being moved to back rooms, which have been branded as a breeding ground of OS (Ferne and Grant 2008; Aastrup and Kotzab 2009). OS can also occur when a product has a stipulated selling period but unknown demand, thereby resulting in increased returns to suppliers (Tsay 2001). Processing returns back up the channel involves extensive logistical and administration costs (Tsay 2001). Retail stores with excess stocks also experience higher risks of pilferage and inventory obsolesces, which could, in turn, lead to OOS occurrences (Chandra and Kumar 2001).

When demand is uncertain, OS is often employed as a convenient option to hedge against OOS situations (Gertner and Rosenfield 1999), with the level of OS corresponding directly to the level of uncertainty, i.e., the lower the uncertainty, the lower is the need for OS. Aastrup and Kotzab (2010) also discuss the cost of OS and cost of understocking. The challenges, they state, are to measure and make these insights visible within the systems, and to ensure proper guidance on how these should be taken into account in different situations. Also, it is a challenge to make such a differentiated approach part of ordering and replenishment routines in stores and also in upstream logistics as both approaches require different ordering processes and replenishment policies respectively (Chopra and Meindl 2007; Aastrup and Kotzab 2009).

### ***On-Shelf Availability (OSA)***

On-shelf availability (OSA) refers to situations where an item is available for sale on the shelf when a customer enters the store to purchase it (Chopra and Meindl 2007). In this sense, OSA is the inverse of OOS – the higher the OOS, the lower the OSA and vice versa (Gruen and Corsten 2007). OSA reflects effective in-store practices (Schary and Christopher 1979). OSA is also an indication of successful collaborations between retailers and producers (Walters 1977). When customers experience reliable supply of stock on the display shelves, retailers enjoy store loyalty (Fernie and Grant 2008). Papakiriakopoulos (2012) added that because OSA builds brand and store loyalty, it provides economic importance not only to retailers but also to manufacturers.

Morgan and Dewhurst (2007) argue that OSA is an index of what is actually on the display shelf versus what should have been on the display shelf, while Kucuk (2004) suggests that it is an indication of effective distribution and distribution channel management, which makes stocks continuously available in retail stores. Grant et al. (2006) views OSA as the performance of a successful supply chain where 'the last 50 yards' (Fernie and Grant 2008 p.293) of the chain actually distributes directly to the customers.

A number of quantitative approaches have been used to examine OOS occurrences. Kang and Gershwin (2005) used analytical and simulation modelling to demonstrate how stock loss caused inventory inaccuracy, which eventually led to OOS occurrences. Corsten and Gruen (2003) and Aastrup and Kotzab (2009) used physical checks and retailers' IT systems to identify root causes of OOS. Papakiriakopoulos et al. (2009) used a decision support system to detect products missing on display shelves based on heuristic rules. Aastrup and Kotzab (2010) adopted the concept of economic-order-quantity (EOQ) to optimise the cost of product availability, trading off the costs of over-stocking, understocking and demand uncertainty.

Previous studies have used various contextual factors to study OOS events, including store size (ECR UK 2007), store formats (ECR Europe 2003), number of SKUs (ECR UK 2007), number of available brands (Motes and Castleberry 1985), product category (food and non-food), movements (McKinnon et al. 2007; van Woensel et al. 2007); delivery frequencies (Aastrup and Kotzab 2010) and information technology used (Rani and Velayudhan 2008; Grant and Fernie 2008). Gruen and Corsten (2002) looked at the extent and causes of OOS situations via a variety of measurements methods, participant profiles, product categories, duration of OOS, and daily as well as weekly factors. In 2007, they included manual audits, data from PoS system and perpetual inventory to examine duration and frequency of OOS occurrences.

Measurement of OOS situations, OS and OSA helps retail stores to determine tangible (such as financial) and intangible (such as store loyalty) impacts on their performance. Results of the exercise can also help management to allocate resources correctly and focus on strategies to improve OSA.



## **2.2 Root Causes of OOS situations, OS and OSA**

### **2.2.1 Causes of OOS situations**

Over 40 years of research on OOS occurrences has revealed that the majority of causes arise from within the retailer store itself. For instance, Angerer (2004), in summarising a study conducted by the Coca-Cola Research Council (1996), noted that only 28% of stockout incidents were caused by upstream supply chain activities, with in-store processes accounting for 72% of the OOS occurrences. Likewise, cases reported in ECR Europe (2003) also indicated that only about 15% of OOS occurrences were traceable to the manufacturer, implying that some 85% of the OOS situations were the result of the retailer's operations.

Activities which influence OOS and OS occurrences within the store include planning of product range and assortment, establishment of a Planogram, shelf space management (Gruen et al. 2002; Corsten & Gruen 2003), replenishment activities (Fisher et al. 2000; Fernie & Grant, 2008; van Zelst et al. 2009,) and store-based ordering (Corsten & Gruen 2003; Fox, Montgomery & Lodish 2004). Activities outside the store that influence OOS and OS occurrences include planning of transportation deliveries, back store management, inventory ordering activities of manufacturers, supplier management and the warehouse/distribution centre servicing the stores (Gruen et al. 2002; Clark 2004).

Studies on OOS causes in retail stores have generally found that OOS occurrences are closely linked to the way in which in-store processes have been carried out (Kotzab and Teller 2005; Fisher et al. 2006), with the bulk of the problems – 35% excluding forecasting (Gruen & Corsten 2002) and 47% including forecasting (ECR Europe 2003) – emanating from store ordering. In addition to process-related OOS occurrences, poor communication between headquarters and stores within the same retail chain and inadequately trained staff have also been identified as factors contributing to OOS situations, despite the existence of standard operating policies (Fernie and Corcoran 2011). Table 2-1 presents ECR Europe's

(2003) and Gruen et al.'s (2002) findings of key root causes occurring with in-store processes, specifically in-store ordering, store replenishment and 'delisting' (of products or brands) by staff.

Table 2-2 summarises the common causes of OOS situations occurring at the three major in-store processes of planning, ordering and replenishment.

Table 2-1 Key causes of OOS occurrences in in-store processes

	<b>Gruen &amp; Corsten (2002)</b>	<b>ECR Europe (2003)</b>
Store ordering	47% (including forecasting)	35% (excluding forecasting)
Total upstream causes	28%	-
Delisting by store staff	-	30%
In store but not on shelf	25%	-
Shelf replenishment	-	12%

Table 2-2 Common causes of OOS and OS situations

In-Store Processes	Common Causes of OOS Situations	References
Planning	<ul style="list-style-type: none"> <li>• Inadequate space allocation</li> <li>• Delisting by store staff</li> <li>• Miscommunications between supplier and retailer</li> <li>• Incongruence between shelf capacity and replenishment frequency</li> <li>• Lack of product knowledge</li> <li>• Improper product list management</li> <li>• Inadequate management of product proliferation</li> <li>• Low planogram compliance</li> <li>• Poor in-store practices (e.g. hiding stock; inaccurate shelf-tagging)</li> <li>• High SKUs &amp; inventory</li> <li>• Lack of enforcement to HQ policies</li> </ul>	<ul style="list-style-type: none"> <li>• A.C. Nelson (1968)</li> <li>• Gruen et al. (2002)</li> <li>• Gruen et al. (2002)</li> <li>• Corsten &amp; Gruen (2003)</li> <li>• Corsten &amp; Gruen (2003); Abu-Shalback Zid (2004)</li> <li>• ECR Europe (2003)</li> <li>• McKinnon et al. (2007)</li> <li>• Corsten &amp; Gruen(2003); Hariga et al. 2007</li> <li>• Gruen &amp; Corsten (2007)</li> <li>• Gruen &amp; Corsten (2007)</li> <li>• Ton &amp; Raman (2010)</li> <li>• Ton &amp; Raman (2010)</li> </ul>
Ordering	<ul style="list-style-type: none"> <li>• Inaccurate inventory information</li> <li>• Inaccurate product item data</li> <li>• Inaccurate demand forecasting</li> <li>• Issues with data capture &amp; collection systems (e.g. inaccurate scans)</li> <li>• Orders placed too late &amp; too little</li> <li>• Insufficient 'store-educated' staff</li> </ul>	<ul style="list-style-type: none"> <li>• Gruen et al. (2002)</li> <li>• Corsten &amp; Gruen (2003)</li> <li>• ECR Europe (2003); Gruen &amp; Corsten (2007); Kang &amp; Gershwin (2005)</li> <li>• Hausrueckinger (2006); Clark, (2004) and Andres (2008)</li> <li>• Gruen et al. (2002); Campo et al. (2003)</li> <li>• Aastrup &amp; Kotzab (2009)</li> </ul>
Replenishment	<ul style="list-style-type: none"> <li>• Disorganised back rooms</li> <li>• Incorrect shelf space allocation</li> <li>• Infrequent replenishment activities to store, shelf &amp; storage</li> <li>• Miscommunications among warehouse, buyer &amp; retailer</li> <li>• Insufficient manpower &amp; high staff turnover</li> </ul>	<ul style="list-style-type: none"> <li>• Gruen et al. (2002)</li> <li>• Waller et al. (2008)</li> <li>• Fisher et al. (2000); Gruen &amp; Corsten (2007)</li> <li>• Gruen et al. (2002)</li> <li>• Aastrup &amp; Kotzab (2009); Ton &amp; Huckman (2008)</li> </ul>

### ***In-Store Processes – In-Store Planning***

In-store planning involves examining product ranges, product density, nature of packaging, new product introduction (McKinnon et al. 2007) and product list management, such as current products, discontinued products or products to be delisted by store staff (Corsten and Gruen 2003; ECR Europe 2003). According to McKinnon et al. (2007), in-store planning also encompasses product assortment management and shelf space management. In the context of supermarket operations, the aim of in-store planning of activities is to make available all SKUs important to consumers (McKinnon et al. 2007). Because stores are location-specific, in-store planning of product ranges and product assortment management differs between stores.

Miscommunications between retailers and suppliers, and under-shipment by manufacturers have been identified as two main causes of OOS (Gruen et al. 2002). Incongruence between shelf capacity and replenishment frequency was another (Corsten and Gruen 2003). Poor management of product proliferation (Abu-Shalback Zid 2004; Corsten and Gruen 2003; Hariga, Al-Ahmari and Mohamed 2007) and lack of product knowledge (ECR Europe 2003) have led to OOS situations. The design and use of Planograms, which include product assortment, product promotion management (McKinnon et al. 2007; Quelch and Jocz 2012) and item management, also contribute to OOS occurrences. Low Planogram compliance and poor in-store practices of hiding gaps and products and poor shelf-tagging accuracy have resulted in the occurrences of OOS (Gruen and Corsten 2007). When guidelines on item management are established, lack of enforcement could lead to OOS occurrences.

While high product variety and inventory levels lead to increased sales, both elements have a negative effect on sales due to in-store logistics (Ton and Raman 2010). Firstly, high SKUs increase complication and perplexity in the retail stores' operating environment (Hayes and Clarke 1986; Skinner 1974). Secondly, high product variety and inventory levels have been

found to increase stock, which is in the store but not on the shelves (Verhoef and Sloot 2006; Ton and Raman 2010). Fast-moving consumer goods have also been found to cost more to stores when OOS situations occur, compared to slow-moving stock (Gruen and Corsten 2002). Planning activities at the Headquarters level, such as supplier selections, warehouse operations or distribution arrangements (which affect inbound logistics), also cause OOS and OS occurrences in stores (ECR Europe 2003; Fisher et al. 2006).

### ***In-Store Processes – In-Store Ordering***

Both Gruen and Corsten (2002) and ECR Europe (2003) have found that in-store ordering is one of the most significant causes of OOS occurrences. As retail stores' operational decisions are highly dependent upon inventory records (Kang and Gershwin 2005), major in-store ordering issues affecting stockout include inaccurate inventory information (Kang and Gershwin 2005), such as errors in product item data. Inaccurate inventory information leads to poor demand forecasting (Raman et al. 2001), both of which can result in insufficient orders, erroneous orders, late orders and late deliveries (Gruen et al 2002; Corsten and Gruen 2003; ECR Europe 2003; Gruen and Corsten 2007).

One of the most common causes of inaccurate inventory information is scanning errors at the PoS in store (Hausrucking 2006). Given that an important goal of checkout stations is to prevent long queues, and hence congestion, staff at the checkout stations are typically required to scan items quickly. Errors occur when an item is over- or under-scanned. The queue-saving practice of scanning different items of the same price only once, followed by recording the total number of such is a typical cause of inventory inaccuracy in retail stores (Gruen and Corsten 2007; Raman, DeHoratius and Ton 2009). Product mis-identification due to very similar packaging (which results in staff scanning only one of the items with the remaining items recorded only in number to obtain the total amount) is yet another common cause of scanning error that has a significant effect on inventory accuracy (Gruen and

Corsten 2007; Raman, DeHoratius and Ton 2009). Incorrect product identification due to wrong labels and bar codes affixed by suppliers is a further source of errors (Gruen and Corsten 2007).

Inaccurate inventory levels have also been found to be caused by a number of other factors, including:

- poor store and distribution centre replenishment processes (Gruen et al. 2002);
- merchandising or product proliferation, a typical cause of confusion in order picking at distribution centres (Corsten and Gruen 2003);
- bad store practices, e.g. hiding stock (Corsten and Gruen 2003);
- poor information about promotions (McKinnon et al., 2007), which reduces forecasting accuracy and results in poor execution of store-based ordering activities;
- mismanagement of inventory process, e.g. placing orders too late or ordering too little for promotional items (Gruen et al. 2002; Campo et al. 2003);
- frequent staff turnover (Raman et al. 2001a and 2001b); and
- lack of 'store educated employees' (Aastrup and Kotzab 2009).

Other regular causes of errors in inventory records include stock loss – especially unknown loss (ECR Europe 2003) – transaction error, inaccessible inventory or 'phantom products' (Raman et al.2001b) and incorrect product identification. Stock loss can also be caused by product shrinkage due to pilferage (Miller 1997; Turcsik and Summerour 2001; Verhoef and Sloot 2006), damage, expiration or spoilage (Philp 1995; Tonglet and Bamfield 2004; Amato-McCoy and Deena 2009).

### ***In-Store Processes – In-Store Replenishment***

In retail operations, in-store replenishment process is constantly challenged by three main issues: inadequate shelf space allocated to accommodate expected demand for specific

products; irregular replenishment frequency; and back room disorganisation which prevents staff from moving stocks effectively out onto display shelves (Fisher, Raman & McClelland 2000; Gruen et al. 2002; Fernie and Grant 2008).

According to Gruen et al. (2002), shelf space allocation is normally determined by the size of a case pack<sup>3</sup> and not by the turnover rate of the product. With case pack size being used to allocate shelf space, any excess stock or large case packs that do not fit on the display shelves are stored in the back room (Waller, Tangari and Williams 2008; Eroglu, Williams and Waller 2013). Both Waller, Tangari and Williams and Eroglu et al. have shown that this approach can result in higher risks of stockout, if replenishment of shelves from back rooms are not timely or regular, giving rise to the 'backroom logistics effect'.

Placing stocks that cannot be accommodated on shelves in the back room causes back room dysfunction. Gruen and Corsten (2007) argue that there is a 'positive correlation of backroom inventory and shelf OOS' (p9). Disorganised back rooms could result in longer replenishment lead time due to more time taken to search for the required stock (Waller, Tangari and Williams 2008). However, this does not suggest that a well-organised back room necessarily leads to better replenishment performance. Gruen and Corsten (2002) found that retailers with well managed small back rooms and systematic transport networks were still unable to improve the quality of their store replenishment process.

Corsten and Gruen (2003) also identified a number of factors that can hinder in-store replenishment performance, sowing seeds for potential OOS occurrences. These include errors during receiving, poor organisation of shelf replenishment activities, inconsistency in adherence to Planograms as well as inventory shrinkage due to damage and theft. Other factors that can impact the replenishment process include merchandising, shelf-filling and

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<sup>3</sup> The determination of case pack size has financial and operational implications for both suppliers and retailers (Eroglu et al. 2013). There are also logistical considerations factored into the determination of a case pack size such as size of pallet, type of material handling equipment and carrying capacity of transportation modes used.

replenishment speed and lack of availability checks (McKinnon et al. 2007; Hariga et al. 2007; Laine 2010). ECR Europe (2003) further indicates that missing shelf-edge labelling, absence of established processes to signal replenishment, and orders erroneously deleted could affect replenishment activities. Poor communication or miscommunication amongst warehouse staff, purchase manager and store manager about promotional activities and price changes have also been identified as challenges to on-shelf activities and are potential causes of OOS situations (Waller et al. 2008). Reiner et al.'s (2013) study on in-store logistics processes for managing dairy products observed that there were different levels of efficiency for different store formats. They found that small hybrid store formats, e.g., small hypermarkets, performed less efficiently compared to supermarkets and hypermarkets, due to factors such as delivery delay and damage to (dairy) products (Reiner et al. 2013).

In addition, Aastrup and Kotzab (2009) point out that insufficient manpower and high staff turnover both have an effect on operations quality, specifically in the case of in-store ordering and in-store replenishment activities. In a similar vein, Raman et al. (2001b) state that that new employees, who are less familiar with stores' product and replenishment processes, tend to make more mistakes when moving items from storage to display shelves. Trautrim's (2011) examined retailers' management of their in-store replenishment management systems and identified four types of replenishment interactions – operations-focused, store-based, customer care-focused and outlet-based, that segmented the extent of interactions between employees and their replenishment management systems (See Table 2-3). Trautrim's (2011) study also found that employees' frequency of interactions with the replenishment management systems resulted in different impacts on in-store processes.



Table 2-3 Four Types of Replenishment Interactions

Type of Replenishment Interaction	Description of Replenishment Interaction
Operations-focused	'Centralised and standardized' (p.270) design to ensure efficient processing and consistency in methods processing customer orders.
Store-based	Dependent upon shop floor employees' 'local knowledge and judgement' (p.270). Frequent interactions permitted to improve accuracy of store data and orders.
Customer care-focused	Interactions to assist with customers' orders.
Outlet-based	Little or no interactions with the replenishment management system. Floor staff replenished shelves with what was delivered to the store, with little or no input towards type of products to be delivered.

Source: Trautrim (2011)

### **Format of Stores**

Store size can influence store format, i.e., whether the store will be set up as a supermarket, a discount store, a traditional grocery neighbourhood store, a convenience store, a warehouse store or a hypermarket (Uusitalo, 2001). According to Uusitalo (2001), small stores offer convenience, accessibility, familiarity of product range, store layout and intimacy; therefore store staff gain store familiarity much faster. Conversely, while large stores offer bulk purchase discount opportunities and availability of product range and convenience in terms of 'one-stop shopping', store staff require longer periods in these larger stores to achieve store familiarity. Store formats (Burt and Spark 1994; 1995), marketing policies and consumer shopping behaviours (Messinger and Narasimhan 1997) often influence the range of products sold and their price levels. These latter factors affect store operations (e.g. on-shelf replenishment process) and contribute to OOS situations (Messinger and Narasimhan, 1997).

### **Warehouse/Distribution Centres**

Mis-pickings at distribution centres can also lead to OOS occurrences. Missing roll cage labels, wrongly positioned roll cages and not using scanners in picking processes at

warehouses have been cited as common causes of in-store OOS occurrences (Ettouzani et al. 2012).

### ***Shrinkage***

Shrinkage can be caused by theft, administrative errors, and damage caused by expiration and inappropriate handling of products (Tonglet and Bamfield 1997). Inventory shrinkage is a common cause of inaccurate inventory information in grocery stores (Tonglet and Bamfield 1997; Chapman, Harrison and Beck 2003; Bamfield 2004; Chapman and Templar 2006; Howell and Proudlove 2007), and is a result of two types of causes: known and unknown (Chapman et al. 2003; Beck 2004; Kang and Gershwin 2005). Seen as an indication of process failure, inventory shrinkage is considered a “system issue that extends across a business from design, through planning to operational execution” (Chapman and Templar 2006, p860), requiring broader contextual investigation in order to identify where improvements should be focused (Beck 2004; Chapman and Templar 2006).

#### Known Causes

Shrinkage can be caused by theft committed by internal parties (e.g. store employees) or external parties (e.g. customers and vendors). Internal theft is considered a known cause of stock loss, e.g. losses that are identified by store staff and noted into an inventory management system (Beck 2004; Kang and Gershwin 2005). External theft (committed by customers or vendors) is also considered as a known cause of stock loss, e.g. customers helping themselves to stock and vendors pushing aside stocks for private consumption while carrying out stock management at the store (Kang and Gershwin 2005). Other known causes of shrinkage include process failures (Beck 2004), such as administrative error (Howell and Proudlove 2007) and goods labelled ‘unavailable for sale’ due to spoilage, expiration or damage (Bamfield 2004; Kang and Gershwin 2005).

### Unknown Causes

Unknown stock losses that are undetected by staff and system may include undetected theft or consumed food (Chapman et al. 2003; Beck 2004; Kang and Gershwin 2005). Another example of unknown stock loss is when a discrepancy between goods ordered and goods received is undetected by the receiving staff. As such, inventory information would not reflect actual inventory levels (Kang and Gershwin 2005).

### **2.2.2 Causes of OS**

OS events are caused by inaccurate inventory information and the tendency of distribution centres to push stocks to stores in order to meet store demand as well as order picks for home shopping demand where stocks at stores are picked by store staff to process online orders (Ferne and McKinnon 2003; Fernie and Grant 2008). OS also occurs when a product has a stipulated selling period with unknown demand, where retail stores deliberately overstock to hedge against demand uncertainty (Tsay 2001; Fernandes, Gouveia and Pinho 2010). Excess inventories also cause OS due to congestion in the supply chain and lack of synchronisation between the replenishment processes of supply chain members (Waller et al. 2008).

### **2.2.3 Causes of OSA**

According to Pal and Byrom (2003), there are five factors affecting OSA in stores: (1) systems that control stock ordering, store display, and stock rotation; (2) standards that determine the level and quality of service within the shopping environment; (3) right stock being offered at the right time, right price, right place; (4) right space utilisation that maximises return on investment; and (5) the right staff to manage day-to-day store and department operations to replenish shelves, advise and support customers.

Inaccurate inventory information causes retail store staff to delay placement of orders or order insufficient stocks, thereby hindering retail stores from achieving OSA (Walters 1977; ECR UK 2007, Fernie and Corcoran 2010). Furthermore, higher inventory levels do not necessarily result in higher sales. In fact, high levels of inventories can lead to poor OSA due to congestion in back rooms, thus preventing stocks from getting replenished on time (ECR Europe 2003).

Characteristics of product categories have also been found to affect OSA in retail stores (Corsten and Gruen 2002; ECR Europe 2003). There are two category characteristics – demanding categories (e.g. detergents and ice cream) and less demanding categories (e.g. cosmetics and hair care) (ECR Europe 2003). Products within the demanding categories have high levels of expectation on supply chains where time to market is critical and special storage or handling are critical to their saleable conditions (ECR Europe 2003). Less demanding categories tend to have more stable demand expectations, less product proliferation and less pressure on shelf life (ECR Europe 2003).

Promotional items face higher demand than non-promotional items but also face higher OOS occurrences when supply fails to meet increased demand (ECR Europe 2003; Ettouzani et al 2012). Accuracy of product demand forecasting is therefore important to ensure that all promotional processes have been considered. According to ECR Asia Pacific (2011), promotions and advertisements affect the OSA of retailers with higher SKUs more than retailers with lower SKUs. This is because retailers with higher SKUs have more sophisticated promotional processes involving several channel members and as such, any late changes can cause confusion across parties, thereby resulting in mistakes and poor OSA (Ettouzani et al 2012).

Inaccurate ordering practices also result in weak OSA in retail stores (Fox et al. 2004; Hausrueckinger 2006). The impact of inaccurate ordering affects OSA, since deliveries are

linked to store ordering schedules but not shelf replenishment (Hausrucking 2006). This means that retail stores struggle to achieve OSA when all three activities (order schedules, replenishment schedules and delivery schedules) are not linked (ECR Europe 2003). Another inaccurate ordering practice is related to irregular order frequency and inaccurate order quantities as these affect the duration of OOS occurrences and OSA respectively (Corsten and Gruen 2002; Hausrucking 2006; ECR UK 2007; Ettouzani et al 2012).

Supplier availability and performance have also been found to affect OSA. Grant and Fernie (2008) found that retail stores that lack focus on OSA and collaboration with suppliers were less capable of achieving OSA. Supplier availability was one of the main root causes of OSA according to ECR Asia Pacific (2011), and the fact that there were not enough suppliers close to Wal-Mart stores was revealed as one of the reasons the company struggled to keep their shelves fully stocked (Dudley 2013).

Varying levels of attitudes towards achieving OSA from headquarters and store staff cause store staff to be inept in resolving OOS issues at retail stores, and this in turn affects their OSA abilities (Fernie and Corcoran 2010). Untimely updates of orders at headquarters cause distribution centres to become congested, thereby causing OOS at store level (Ettouzani et al 2012). Distribution centres have also been found to affect the OSA of retail stores. Inaccuracy of inventory information, mis-pickings due to human error and OOS occurrences in distribution centres have exacerbated inaccurate in-store ordering and OSA (ECR Asia Pacific 2011; Ettouzani et al 2012; Papakiriakopoulos 2012). OOS situations of consumers' favourite brands are an indication of poor distribution and in-store operations (Kucuk 2008).

Effective in-store replenishment requires the correct number of products to be slotted onto the display shelves at the right time (Hausrucking 2006; ECR UK 2007), and retail stores without established replenishment triggers experience OSA challenges (Corsten and Gruen

2002). Grant (2012) stated that as logistics and supply chain activities have become more complex, replenishment activities outside the retail stores have improved. This is not the case, however, for in-store replenishment.

Other less commonly discussed but still important factors that affected OSA include store formats, where supermarkets are observed to perform better than hypermarkets due to their smaller selection of goods, more creative use of space and higher, fast-moving SKUs (ECR Europe 2003).

OSA levels can vary on different days of the week because display shelves are stocked depending on store traffic and delivery schedule as well as replenishment processes (ECR Europe (2003). Papakiriakopoulos (2012) asserts that OOS rates can vary according to the day of the week or even the time of day, which affects OSA. Fernie and Grant (2008) found that picking orders for online home shopping at the stores exacerbated the 'last 50 yards' issue and Ettouzani et al (2012) found thirty-two causes that affect the OSA of promotional products, which they grouped into eight themes for retailers and manufacturers. The eight themes relevant to retailers are: demand fluctuation and forecasting; communication and collaboration; store discipline and replenishment; information technology; timescale; distribution; process and production. Grant (2012) states that depleting stocks in the 'last 50 yards' is recurrent and perhaps due to a 'divide' observed between channel members. However, 85% of issues related to OSA seem to occur within the store environment (ECR Europe 2003) and retailers' failure to allocate sufficient resources to in-store processes such as staffing levels for replenishment activities, also attributes to low OSA (McKinnon et al. 2007). According to ECR Europe (2003), management's failure to properly execute in-store processes also results in OOS occurrences, as does lack of training for retail store staff to resolve OOS issues and understand the implications of poor OSA (such as the importance of accurate checks in stores to avoid transferring incorrect information upstream (Ettouzani

et al 2012)). From the review of OOS, OS and OSA, it can be observed that the three phenomena share similar causes, and are therefore closely interlinked.

## 2.3 Effects of OOS on Retailers, Manufacturers and LSCM Practices

Corsten and Gruen (2003) argue that OOS is a risk to the entire supply chain and can be divided into four areas:

- (1) Retailer shopper loss risk. This risk occurs when shoppers permanently switch stores after experiencing an OOS situation. All things being equal, stores with a lower overall OOS levels have a net customer gain.
- (2) Retailer sales loss risk. This risk is a combination of three possible OOS effects: consumers purchasing the OOS item from a competitor store, consumers cancelling their purchase of the item, and consumers substituting the OOS item with a smaller and/or cheaper item. Combining the estimated lost sales from these three effects and multiplying the result by the extent of OOS yields an estimate of the percentage of the retailer's total gross sales lost from OOS items.
- (3) Manufacturer shopper loss risk. This occurs when consumers decide to switch to a competitor's brand within the same category for all subsequent purchases.
- (4) Manufacturer sales loss risk. This risk stems from consumers substituting the OOS item with a competitor's item or cancelling a purchase.

The impact of OOS situations is not confined to the lost sales of the OOS item alone. From an operations and supply chain management perspective, OOS distorts inventory information which in turn affects ordering and replenishment. At the same time, rectification of OOS items demands use of additional resources, which could be avoided if processes were in place to manage OOS occurrences. In short, OOS occurrences lead to logistics and information inefficiencies as well as order-fulfilment failures across the entire supply chain. In



this sense, OOS situations not only disappoint customers, but also increase costs along the supply chain (Gruen and Corsten 2007; Quelch and Jocz 2012).

From a services delivery perspective, an OOS item reflects service failures on a number of fronts, decreasing both customer satisfaction and store and brand loyalty, while increasing shoppers' costs. Lastly, from a marketing and sales forecasting perspective, the presence of OOS items distort the baseline on which demand forecasts are made, thereby creating bullwhip effects further up the supply chain.

## 2.4 Consumer Response to OOS Situations

The effect of OOS occurrences on retail stores would be inconsequential if OOS had little effect on consumers because the ultimate objective of a product supply chain is for consumers to complete their purchases at the retail stores. When a product is out of stock, there is an immediate loss of revenue, not only to the retail store and its suppliers (Scharj and Christopher 1979), but also to the manufacturers (Gruen et al. 2002), who, like retailers, suffer losses in terms of sales, product loyalty and store loyalty (Corsten & Gruen 2003). Supply chain costs increase due to inaccurate inventory levels, wasteful activities and poor overall customer service levels (Anderson, Fitzsimons & Simester 2006), and stores that regularly experience OOS occurrences face declining customer patronage and even avoidance from major suppliers (Gruen et al. 2002; ECR Europe 2003).

Unsurprisingly, in addition to research which looks at the extent and root causes of OOS occurrences, a second stream of research in the literature concentrates on consumer reactions to OOS situations. Emmelhainz et al. (1991) argue that understanding consumer responses to OOS situations helps retail stores design their in-store logistics processes to reduce OOS occurrences and ease the impact of OOS events on store performance.

Previous studies on consumers' responses to OOS situations have identified six common behavioural responses: (1) switch store; (2) switch item; (3) delay or postpone purchase; (4) cancel purchase completely; (5) switch category; and (6) switch brand (Peckham 1963; Scharj and Christopher 1979; Emmelhainz et al 1991; Sloot et al. 2005). According to Gruen and Corsten (2002), when faced with an OOS situation, between seven and twenty-five per cent of shoppers choose not to purchase the item on that shopping trip, while twenty-one to forty-three per cent shopped elsewhere, depending on the product category. An earlier study of grocery shoppers in London by Scharj and Christopher (1979) indicated that the proportion of customers electing to purchase an OOS item from another shop could be as

high as forty-eight per cent. When shoppers do not manage to complete their shopping at a store due to one or more of the intended purchases being in an OOS situation, customers experience dissatisfaction (Krafft et al. 2006; Schary & Christopher 1979). When they abandon their purchase of the OOS item or switch stores, the loss to the store may not be limited to sales loss on that occasion but also impact future sales (Anderson, Fitzsimons and Simester 2006).

Three main factors have been found to closely associate with variations in consumer response to OOS occurrences (See Table 2-4) – product variables, consumer characteristics and situational variables (Schary and Christopher 1979; Emmelhainz et al 1991; Campo et al 2000; 2004; ECR UK 2003; Sloot et al. 2005; Rani and Velayudhan 2008; Zinn and Liu 2008; Trautrimis et al. 2009).

The different types of product variables yield different consumer reactions (e.g. OOS of convenience goods cause consumers to switch brands or packaging, whereas OOS of emergency goods would cause consumers to switch stores to ensure purchase) (Campo et al. 2000).

Different consumer variables influence consumer reactions to OOS incidences (e.g. consumers who are 'time-poor' or who live a fair distance from the store tend to switch brands or packaging in order to complete their shopping trip) (Dupre and Gruen 2004).

Situational variables can cause customers to react differently. For instance, in shopping trips undertaken for leisure, consumers may postpone the purchase of OOS item, whereas if the shopping trip is to fulfil a specific quantity of products, when faced with OOS of the required items, customers may change brands or switch stores to ensure that their purchases are complete (Campo et al. 2004).

Table 2-4 Factors affecting customer reactions to OOS.

Factors that Cause Variations to Customer Reactions to OOS	Descriptions	References
Product Variables	<ul style="list-style-type: none"> <li>• Convenience Goods</li> <li>• Shopping Goods</li> <li>• Specialty Goods</li> <li>• Emergency Goods</li> </ul>	Emmelhainz et al.(1991); Campo et al. (2000); Fitzsimons (2000); Svensson (2002)
	Hedonic versus utilitarian/functional nature	Campo et al. (2000)
	Availability of pack sizes	Campo et al. (2000)
	Assortment alternatives	Campo et al. (2004); Kucuk (2008); Miranda & Jegasothy (2008)
	Item loyalty	Campo et al. (2004)
	Preferred package size	Campo et al. (2004)
Consumer Variables	Proliferation of retail brands	Schary & Christopher (1979); ECR Europe (2003)
	Demographics and lifestyles	Schary & Christopher (1979); Emmelhainz et al (1991)
	Store loyalty in general, including the tendency to concentrate purchase in one store	Emmelhainz et al (1991); Campo et al. (2000)
	Store distance in terms of travel time	Campo et al. (2000)
	Specific outlet preference/loyalty	Campo et al. (2000)
	Trust in store of choice	Campo et al. (2000); ECR Europe (2003)
	Time pressure	ECR Europe (2003); Campo et al. (2004)
	Commoditisation of product brands	ECR Europe (2003)
	Desire for 'one-stop' shopping	ECR Europe (2003)
	Store loyalty	Campo et al. (2004)
	Shopping attitude	Campo et al. (2004)
	Shopping frequency	Campo et al. (2004)
Situational Variable	If OOS item is highly time-dependent	Emmelhainz et al (1991); Campo et al. (2000); Sloot et al. (2005)
	Specific purchase occasion	Campo et al. (2000)
	Specific quantity required	Campo et al. (2000)
	Time of purchases	Campo et al. (2000)
	Time available for purchases	Campo et al. (2000); Zinn & Liu (2001)
	Attitudes towards shopping	Campo et al. (2000); Rani & Velayudhan (2008)
	Type of shopping trip	Campo et al. (2000)

Of the five behavioural responses to an OOS situation, switching stores and cancelling purchases completely are the most damaging to stores, undermining store loyalty (Emmelhainz et al 1991; McKinnon et al. 2007). To prevent consumers from switching stores or cancelling purchases, Anderson et al. (2006) suggests that stores should adopt approaches that encourage consumers to switch brands or sizes so that they will continue with their purchases at the store. Offering discounts to encourage back orders was one such example. Aastrup and Kotzab (2010) suggest that retailers should look at product categories (hedonic and utilitarian) and brand issues separately, as they both affect OSA.

## **2.5 Solutions and Recommendations to Deal with OOS Events**

Previous studies and publications in OOS, OS and OSA situations have shown that minimising the occurrences of OOS and OS, and therefore optimising OSA, requires successful execution of retail logistics processes (Salmon 1989; Raman et al. 2001; Kotzab and Teller 2005; Fisher et al. 2006; Fernie and Grant 2008). Salmon (1989), in his discussions on 'key success factors' (p.372) in optimising retailing performance, mentions the importance of sound logistical skills to avoid 'too much inventory and too many stockouts as well as excess inventories in one store when they are needed in another.' (p.374). This view is shared by Mangan and Christopher (2005).

On the other hand, Fisher et al.'s (2006) empirical study on which store operating policies result in successful execution, found that the role of employees is important in store execution because most store employees perform a variety of tasks (such as transferring inventory from the back room to the display shelves, conducting inventory audits, monitoring adherence to Planograms and maintaining security against shoplifting). Getting management to adopt a culture of ensuring OSA and putting relevant processes in place (e.g. aligning supply chain activities, such as transportation schedules, with store processes) to ensure availability in stores is also important in improving OSA (Fernie and Grant 2008).

### **2.5.1 Inventory Management**

According to Balakrishnan, Pangburn and Stavroulaki (2004), highly visible inventories, including having multiple display locations, stimulate demand for a variety of reasons – the notion of the product being popular, assurance of future product availability and ease of purchase access. On-shelf availability of psychic stock – 'retail display inventory' (Larson and DeMarais 1999 p499) – also stimulates demand and leads to increased sales (Larson and DeMarais 1999). Furthermore, visibility of stocks' physical location "is a cornerstone of inventory management." (Quelch and Jocz 2012, p. 80)

To ensure display shelves are adequately stocked, effective inventory management and replenishment processes are required (Chandra & Kumar 2001; Hausrucking 2004). For example, manufacturers and producers need to collaborate with retailers to ensure that shelves are stocked in ways that achieve shopper satisfaction (Hausrucking & Hasse 2003). Manufacturers, producers and retailers need to work together (e.g. by providing easy access to real-time, accurate information about inventory levels and promotions) to continually improve inventory management processes in order to achieve sustainable operational accuracy (Lowson 2001). Retailers should also identify the various dimensions of customer satisfaction and factor them in to priority store performance measures (Blöse, Tankersley and Flynn 2005).

One possible approach to improve OSA is to consider measures such as filling empty display shelves with items that present similar characteristics to the OOS item but of a different brand, thus reducing the impact of OOS items (Emmelhainz et al. 1991). Retail stores could pay special attention to increasing product variety so as to encourage consumers to continue with their purchases, by carrying 'at least two different brands of the same variety and size, as well as two different varieties of the same size and brand' (Emmelhainz et al. 1991, p.145). While this approach has not been empirically tested, recent studies have suggested that product attributes and substitution should be considered for this reason (Campo et al. 2004; van Woensel et al. 2007). The effectiveness of the above approach, i.e. stocking different brands of same variety and size and two different varieties of same size and brand, is subject to product characteristics (e.g. hedonic versus functional), product purchase frequency (e.g. regular versus occasional purchase) and availability of acceptable alternatives in product assortment (Emmelhainz et al. 1991; Campo et al. 2004). Increasing product variety to enable consumers to complete their purchases does, however, come with a trade-off – increased inventory risks (the higher the inventory holding costs, the higher the number of phantom products (Ton and Raman 2010)) and increased complication and complexity in the retail store's environment (Skinner 1974). Walter and Grabner (1975) –

suggesting that an ability to distinguish between critical and non-critical items based on consumer response is essential. Van Woensel et al. (2007) also argue that knowledge on consumer buying behaviour could help determine the aggregation level in the ordering process and that incorporating customer behaviour in inventory management policies may improve store performance by minimising OOS occurrences.

Similarly, Aastrup and Kotzab (2010) state that although consumer reactions to OOS items have been studied to measure economic effects, these responses have not been adopted to manage OOS rates for different product categories. Aastrup and Kotzab (2009) argue that 'for some items it might be more profitable to work with a certain OOS level' (p.157). In their 2010 study, they suggest adopting Economic Order Quantity (EOQ) principles to optimise product availability by following three guidelines: 'cost of overstocking, costs of understocking and demand uncertainty' (Aastrup and Kotzab 2010, p.157), where 'cost of overstocking' includes all implicated costs involved in holding excess (e.g. risk of obsolescence and pilferage), 'cost of understocking' represents lost sales, and 'demand uncertainty' refers to uncertain product demands, especially those of promotional items. By combining the EOQ principles with insights from consumer response to OOS events, Aastrup and Kotzab (2010) demonstrate how the costs of understocking could be used to direct attention to items that had the 'most significant business impacts' on retailers when OOS situations occurred (e.g. cost of understocking high-turnover items).

### **2.5.2 In-Store Planning**

Product assortment planning, rationalisation of product range, identifying best product mix, efficient assortment management (EAM) and permanent assortment reductions (PAR) have been suggested to help reduce problems caused by increased product variety and inventory levels (ECR Europe 2003; Corsten and Gruen 2003; Campo et al. 2004). However, increased product variety and inventory levels drive up levels of phantom stocks (Ton and Raman 2010) and hence increase the risks of both OOS and OS occurrences. To manage



the implications of product proliferation, micro-marketing strategies have been suggested, e.g. adapting the marketing mix to the local market (Quelch and Jocz 2012) in which the store outlet operates. With information gathered from PoS data and store loyalty cards, retailers and manufacturers could identify SKUs' performance profiles (e.g. turnover rate) in their respective stores and locations (Quelch and Jocz 2012). Henceforth with this strategy, allocation of store space across product categories becomes location-specific and store format-specific (Campo, Gijsbrechts, Goossens and Verhetsel 2000; Quelch and Jocz 2012). The role of merchandising and correct use of Planograms are purported to reduce OOS and OS situations as well as optimising shelf allocation and management (ECR Europe 2003; McKinnon et al. 2007). In short, focusing on a relatively small number of SKUs could be an effective strategy in lowering lost sales due to OOS (Gruen and Corsten 2007).

In relation to product assortment, both Taylor and Fawcett (2001) and Aastrup and Kotzab (2010) recommend identifying 'hot' or high turnover items with the most significant 'contributions' to lost sales due to OOS in order to minimise OOS and OS occurrences. While some of these items may be inexpensive, they are normally sold in large units, and thus are capable of contributing to high stockout costs (DeHoratius and Raman 2003). Ranking items and stores based on their turnover and performance, as well as risks of OOS and OS, has been suggested as a means of quantifying losses in both areas (Gruen and Corsten 2007). The results of this ranking process should be formalised to continuously benefit from OOS reductions (Gruen and Corsten 2007).

Segmentation of products based on item, brand and categorisation in terms of their importance to OSA could enhance specific in-store processes and reduce the cost of understocking (Aastrup and Kotzab 2010). Aastrup and Kotzab (2010) suggest that such targeted measurements and segmentation should be factored in the inventory planning process to serve as a general guide for stores.

Che, Chen and Chen (2012), who investigated the effects of OOS situations on consumers' SKU preferences and price sensitivity, found that (1) consumers' price sensitivity tends to be underestimated when product unavailability was not accounted for in a discrete choice model; (2) in categories with a high level of SKU share concentration, consumer preference for a SKU is reinforced when facing OOS of other similar-in-attribute, familiar SKUs; and (3) in categories characterised by short inter-purchase time, consumer preference for a SKU is attenuated when it is frequently stocked out. Che, Chen and Chen (2012) contend that their findings offer retailers valuable insights into how OOS situations can affect category revenue and market shares of SKUs in periods following OOS incidents.

### **2.5.3 In-Store Ordering**

Suggestions to overcome OOS occurrences due to in-store ordering function have revolved around accurate data capture and recording to ensure accurate inventory forecasting (Gruen and Corsten 2002; ECR Europe 2003; Corsten and Gruen 2003; Hausrucking 2003; Clark 2004; Yun et al. 2005; McKinnon et al. 2007). Other measures to improve forecasting accuracy and in-store ordering include using automatic ordering systems, automatic availability measures, EDI, internet and real-time ordering, increasing frequency of stock counts and reconciliation activities, engaging with suppliers to achieve seamless flow of information relating to inventory levels and orders, and considering adoption of inventory management operational strategies, such as vendor management inventory (VMI) and collaborative, forecasting, planning and replenishment (CFPR) (Lowson 2001). Collaborative store ordering, where suppliers and retailers share real-time, daily information through shared PoS data over an internet platform (Pramatari and Miliotis 2008) and improving promotion management by regular communication on promotional activities between manufacturer and retailer (ECR Europe 2003; Papakiriakopoulos 2010) have also been suggested.

## 2.5.4 In-Store Replenishment

Two in-store replenishment improvement strategies that are commonly recommended are managing stock movements from back rooms onto display shelves (Gruen et al. 2002; Trautrimis et al. 2011; Trautrimis et al. 2012) and allocating adequate on-shelf space for product display (Hariga et. al. 2007; Fernie and Grant 2008; Aastrup and Kotzab 2009; Dudley 2013). Corsten and Gruen (2003) contend that decisions on category tactics and shelf space allocation and frequency and quantity ordering and replenishment should be linked to achieve a sustainable on-shelf availability management process. They advocate three strategic pylons of 'process responsiveness, operational accuracy and incentive alignment'<sup>4</sup> to resolve the root causes of OOS situations (Corsten and Gruen 2003, p.611). In terms of operations, Kotzab and Teller (2005) suggest the use of store-specific, sequenced, slotted roll-cages to reduce replenishment lead time and improve replenishment performance, although such practices may pose challenges for stores with limited aisle space.

Gruen and Corsten (2007) suggest two methods involving process and product design to minimise the chances of OOS occurrences. The first suggestion is called store-friendly delivery (Gruen and Corsten 2007), which involves designing processes to load pallets and products onto trucks in product groups, facilitating offloading and transporting to shelves with minimal in-store transportation and handling. The second approach is to develop shelf-ready packaging (SRP) by designing products that are packaged in a store-ready merchandised unit which permits easy identification, easy opening and easy placement onto shelf and easy disposal. Although SRP could impact the cost structure of a product due to industrial investment or additional outer packaging cost, pilot projects by some European retailers, such as ASDA, Tesco, Sainsbury, and Carrefour, in collaboration with many suppliers and

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<sup>4</sup> Specific suggestions for Corsten and Gruen's three remedies of process improvements, operational accuracy and incentive alignment have been illustrated in Appendix A.

service providers have indicated that SRP significantly reduces handling costs and increases in-store productivity, OSA, and product recognition on shelf by shoppers (ECR Europe 2007).

### **2.5.5 Retail and In-Store Management**

Corsten and Gruen (2003) suggest three areas of focus – process improvement, operational accuracy and incentive alignment – to reduce OOS and OS occurrences in store. In terms of process improvement, they state that retailers should identify products of variable turnovers and focus their efforts on increasing shelf space for fast turnover products to minimise OOS situations. Technology in the form of automatic ordering systems, electronic data interchange (EDI) and internet and real-time ordering should be embraced to improve forecasts and ordering frequency and mitigate the ‘bull-whip’ effect. Retailers should also work closely with suppliers to reduce inventory in the supply chain, since high inventory levels correlate with higher OOS rates. With lower inventory levels, retailers can improve management of their supply chains and have better control of where inventories should be maintained. Corsten and Gruen (2003) also point out that streamlining process from receiving to the continuous replenishment of shelves with multiple deliveries helps increase store productivity and inventory accuracy.

The second area of focus – improving operational accuracy – emphasises embracing technology to establish automatic measurement and detection of product availability as well as monitoring item turnover rate (Corsten and Gruen 2003). Automatic measurement and detection of product availability enables staff to prioritise their in-store activities, while an enhanced understanding in item velocity helps provide useful information to design systems to trigger replenishment ‘alerts’. Corsten and Gruen (2003) also suggest targeting inventory recording, focusing on removing inaccuracy inventory information, such as ‘corrupted’ PoS data arising from poor scanning by checkout staff. Placing ‘intelligent tags’ on each stock

keeping unit (SKU) was one of the measures suggested to increase inventory control accuracy (Corsten and Gruen 2003).

To improve incentive alignment, Corsten and Gruen (2003) suggest that retailers offer incentives to store managers so that they embrace an attitude towards achieving OSA by ordering adequate inventories and reducing shrinkage. They also suggest that incentives should be extended to promote closer collaboration between buyers and store managers, as the latter have better knowledge of their customers' buying behaviour. Understandably, buyers' procurement decisions are based on purchase negotiations, profit margins and incentives tied to volume performance but if combined with store managers' insight on customer buying behaviours, stores would be more inclined to adhere closely to their company's intended product offerings (Corsten and Gruen 2003). To improve OSA, retailers should therefore factor that objective, i.e. focusing on availability, into the respective roles and responsibilities of store staff (Corsten and Gruen 2003).

One specific issue which Corsten and Gruen's (2003) highlighted was the introduction of new technologies to help store managers better manage OSA. They suggest that store managers employ technologies (e.g. inventory management systems) to extend the capabilities of both themselves and their store staff, also recommending that staffing be scheduled and aligned with 'replenishment peaks and shopper peaks' (p.614). Finally, for incentives to be 'attractive' and sustainable, they propose that retailers should engage in a paradigm shift towards consistent availability, preaching not just to the store staff but to all supply chain partners.

The role of human factors in the execution of in-store processes have also been highlighted by a host of OOS studies (Raman et al 2001; Gruen et al 2002; Kotzab and Teller 2005; Aastrup and Kotzab 2010; Trautrim et al 2012). While improvements in staff performance in the execution of in-store processes can minimise OOS and OS events, management have to

take the lead to focus on strategies that address OOS and OS events as well as continuous OSA (Gruen et al. 2002; Svensson 2002; ECR Europe 2003; McKinnon et al. 2007; Fernie and Grant 2008; Aastrup and Kotzab 2009). Retail managers should use incentives to encourage accurate execution of in-store activities and factor in OOS, OS and OSA measurements in regular employee appraisals (Svensson 2002; ECR Europe 2003). Adequate staffing levels and having a motivated, reliable, 'store-educated' workforce could improve in-store ordering and replenishment activities, thereby improving store OSA performance (Taylor and Fawcett 2001; Aastrup and Kotzab 2009).

Another perspective relating to how staff performance can improve OOS occurrences, OS and OSA is process conformance. Ton and Huckman's (2008) study into the impact of employee turnover on performance shows that the degree of process conformance affects stores ability to manage their OOS, OS and OSA challenges. Ton and Huckman (2008) purport that store performance, measured by profit margin and customer patronage is related to employee turnover and affected by management style at the store level. They conclude that execution and degree of process conformance to in-store logistical operations could increase accuracy in activity performance, thereby improving OSA in stores.

Raman et al.'s (2001) study into execution being the missing link in retail operations shows that despite standard information systems and monetary incentive structure being used in stores of a retail chain, errors at key in-store processes (e.g. replenishment and sales processes at stores and distribution centres, merchandising and inventory management) continue to result in incorrect inventory records and misplaced SKUs in stores. In the same study, the researchers state that execution problems of processes within the stores and distribution centres were extensive amongst the retailers that participated in their investigations. In addition, store design, with specific features, such as store size, number of back rooms as well as other storage areas influenced the level of effectiveness in the execution of processes within the store and distribution centres (Raman et al. 2001), and

different store performances varied despite the presence of standard systems and structures in the stores. Raman et al. (2001) infer that the main causes of difference in performance between stores are attributable to store management and labour. In their study, for example, the researchers observed that vendors supplying stocks directly to the stores were more careful to ensure correct deliveries versus those supplying stocks to the distribution centres because vendors found store managers more stringent in checking inventory receipts compared to staff receiving supplies (Raman et al. 2001). In the case of merchandising and inventory management, Raman et al.'s investigations revealed that greater variety and store inventory results in higher inaccurate inventory records and misplaced SKUs. DeHoratius and Raman (2008) contend that these factors create an operating environment that induced employees to make mistakes, making process conformance a challenge. In line with this observation, Reiner et al.'s (2013) study reveals that inefficiencies occur due to retail management's failure to provide a conducive environment to allow logistics activities to meet expected store performance.

Another reason supporting Raman et al.'s (2001) argument that store management and labour are the main causes of difference in store performance is that many in-store processes, such as shelf replenishment, are carried out manually. Store staff (both store management and labour) play a crucial role in store performance, especially in the context of managing OOS events. Raman and Ton (2008), for instance, examined the impact of employee turnover on store performance and found that stores with high process conformance, i.e. close adherence to standard operating procedures, are less affected by staff turnover than stores with low process conformance. Raman and Ton (2008) reasoned that familiarity of task performance resides in the staff and not in standard operating procedures. Stores with low process conformance thus experience greater impact with employee turnover due to loss of consistency in tasks performance. Raman et al. (2001) also found that stores with higher turnover of employees stationed on the display floor area recorded more phantom stocks (Ton and Raman 2010).

DeHoratius and Raman (2007) point out that store managers are integral to retailing operation. Apart from ensuring store performance and maintaining customer service levels by generating sales, store managers play a critical role in controlling shrinkage. They found that increasing penalties to store managers for shrinkage results, unsurprisingly, in increased efforts to prevent shrinkages.

A 2003 study by ECR Europe indicates that improving communications between store managers and suppliers on promotional events could improve on-shelf activity and reduce OOS occurrences. Retail stores that perform well have efficient supply chains as well as close collaborations with channel members to lower both OOS situations and inventories (ECR Europe 2003). Gruen and Corsten (2007) state that store managers with intimate knowledge of their customers' demands can provide valuable assistance in demand forecasting compared to a central forecasting team. Trautrimis et al (2012) draw on Mangan and Christopher's (2005) 'T-shaped skills profile' model, arguing that logistics managers must not only be well-versed in specific logistics management skills, but also possess a comprehensive knowledge of related areas, such as activity-based costing or business process engineering. They also suggest that logistics personnel operating within stores should be aware of their performance influence on logistical operations outside their stores.



## 2.6 Literature Limitations

OOS and OS occurrences have been widely found to be caused by execution failures within the store environment, in particular in-store logistical processes (Gruen et al. 2002, Corsten and Gruen 2003, Gruen and Corsten 2007, McKinnon et al. 2007, Aastrup and Kotzab 2009). The main suggestions provided by these studies centre on operational improvement, such as use of technology to detect and resolve process failures (Clark 2004; Hausrueckinger 2006; Andres 2008), incentive alignment, e.g. using incentives to encourage accurate execution of in-store activities (Raman et al. 2001; Svensson 2002; Corsten and Gruen 2003; ECR Europe 2003), and emphasis on human factors, e.g. training staff to improve data quality (Raman et al. 2001; Corsten and Gruen 2003; DeHoratius and Raman 2007; Ton and Huckman 2008). These suggestions typically refer to broad areas of focus, offering little or no specific activity or operational details on how they should be implemented. For instance, Corsten and Gruen (2003) suggest that staff should be trained to improve quality but do not go further into which training methods to be used and how often should training (or re-training) be carried out. This study will look at strategies and methods used to manage OOS and OS occurrences in supermarket stores in Singapore.

Previous studies have investigated different aspects of in-store processes, such as shelf space allocation and management (Yang Chen 1999); in-store merchandising and store attractiveness (Kucuk 2004); replenishment (Gruen and Corsten 2007) and collaborative store ordering (Pramatari and Miliotis 2008), to understand their effects on OOS and OS occurrences, and to offer suggestions to minimise OOS and OS and optimise OSA. However, these studies were largely fragmentary with little efforts made to link different causes to each other. In other words, causes of OOS, OS and OSA were identified independently and there were very limited discussions on how causes of the respective events relate to each other. As Aastrup and Kotzab (2010) argued, to minimise OOS occurrences, consumer reactions to OOS situations, and the root causes of OOS, OS and OSA issues should be jointly

discussed. This study explores the factors that cause OOS and OS in supermarket stores and examines how supermarket stores deal with OOS and OS events to maintain OSA.

Previous studies have looked into the use of standard operating procedures and process conformance to improve the execution of in-store processes (Raman et al. 2001; Fisher et al. 2006; Ton and Huckman 2008). These studies analysed store-level data, e.g. management of store-level SKUs (Raman et al. 2001), stock level in-store (Fisher et al 2006) and store level performance (Ton and Huckman 2008), to gain an in-depth understanding of store management and store execution of processes. However, these studies analysed OOS situations after their occurrence (e.g. 'Zero-Balance Walk' (Raman et al. 2001; p.149)) to identify OOS items and adjust HQ system inventory levels (Raman et al. 2001)). While measures were recommended, e.g. process conformance (Raman et al. 2001) to improve store operations and mitigate the negative effects of staff turnover, how these measures impacted store execution of in-store logistical processes was not addressed. Another area that had limited discussion was the influence of a store's operating environment upon store management. Raman et al. (2001) mentioned that replenishment activities were affected during high traffic periods, but did not discuss how in-store processes under different in-store operating environments (e.g. high customer traffic versus low customer traffic periods) were managed. This thesis will look at when and where OOS and OS occurred in-store as well as what actions were taken after their occurrences and whether the actions vary under different in-store operating environments.

In summary, managing OOS and OS occurrences at supermarkets is challenging because OOS and OS causes could stem from a range of factors that have different impacts on different stores, even within a single supermarket chain. Despite having standardised operating procedures and monetary incentives, internal factors, such as headquarters and senior store management's lack of focus on OOS and OS occurrences, execution failures, staff performance, staff interactions with store systems, extent of customer service and in-

store operating environment, and external factors, such as intensity of competition, can cause considerable performance variation. It is therefore the intention of this study to understand how stores of a single supermarket chain manage OOS and OS occurrences in the context of Singapore, where there is intense competition (Food Export Association of the Midwest USA 2013).

## Chapter 3 Methodology

There are two dominant approaches in business research: the qualitative approach and the quantitative approach (Yin 2009; Eisenhardt 1989; 1991; McCarthy and Golicic 2005; Gimenez 2005). Determining which method is suitable is dependent upon three circumstances: '(a) the research questions posed, (b) the extent of control the investigator has over actual behavioural events and (c) the degree of focus on contemporary as opposed to historical events' (Yin 2009, p.8). Saunders et al. (2003) add that the mining of data and subsequent methods of analysis distinguish the type of research approach necessary to address the research questions.

Quantitative research is suited to studies where questions of 'what' and 'how many' are to be addressed (Fernie and Grant 2008; Trautrim et al. 2009; Campo et al. 2004). It is adopted where the event needs to be identified and the frequency of the occurrences of this event is required for predictive purposes (Yin, 2009; Hammersley 2012). In contrast, qualitative research is suited to research studies aimed at understanding contemporary, 'real world' happenings (Miles and Huberman 1994; Yin 2009; Ghauri and Grønhaug, 2005; Hammersley 2012). Hammersley (2012) defined qualitative research as 'a form of inquiry that tends to adopt a flexible and data-driven research design, to use relatively unstructured data, to emphasize the essential role of subjectivity in the research process, to study a small number of naturally occurring cases in detail, and to use verbal rather than statistical forms of analysis' (p.12). The common methods used for data collection in qualitative research include unobtrusive and participant observations, analysis of archival records and open, as well as semi-structured, interviews (Miles and Huberman 1994; Yin 2009; Ghauri and Grønhaug, 2005; Hammersley 2012).

Circumstances leading to OOS and OS occurrences are highly complex. OOS and OS situations can occur due to myriad factors, including the level of sophistication of the

distribution systems (Hausruckinger 2006), the distribution channels used (Kucuk 2004), store formats and product category roles (Campo et al. 2000), performance of suppliers (Kotzab and Teller 2005), in-store operations processes (Corsten and Gruen 2003), degree of process conformance (Fisher et al. 2006; Ton and Huckman 2008), store management and staff turnover (Ton and Huckman 2008). The complex interactions of these factors warranted the use of an interpretivist, inductive, qualitative approach to examine how in-store logistical processes were managed to minimise OOS occurrences in supermarket stores. To obtain 'actual' accounts of the mitigation measures employed and the manner in which they were implemented in the selected supermarket stores, semi-structured interviews and unobtrusive observations were used in this study.

This chapter presents the qualitative case study methodology adopted in this study, beginning with a discussion, in Section 3.1, on how the research design was determined. This is followed by a discussion on how the case supermarket was selected and on the methods used to collect data for this study in Sections 3.2 and 3.3 respectively. The approach in which the data was analysed is presented in Section 3.4.

### **3.1 Research Design**

Following Saunders et al.'s (2003) 'The research process onion' (see Figure 3-1), this study adopted interpretivism as its research philosophy. Interpretivism philosophy is common in psychological research where it is usually related to the importance of interpreting human behaviour (Bakker 2010). Studies into social phenomena require an understanding of social environments where humans' everyday activities are interpreted to make sense of their actions (Blaike 2004). As such, the main objective of interpretivist research is to figure out the meaning of human actions, which are influenced by social roles and the context within which these social actions take place (Saunders et al., 2003). In social sciences,

interpretation of subtleties of human interactions and actions via case studies is a common research approach (Bakker 2010).

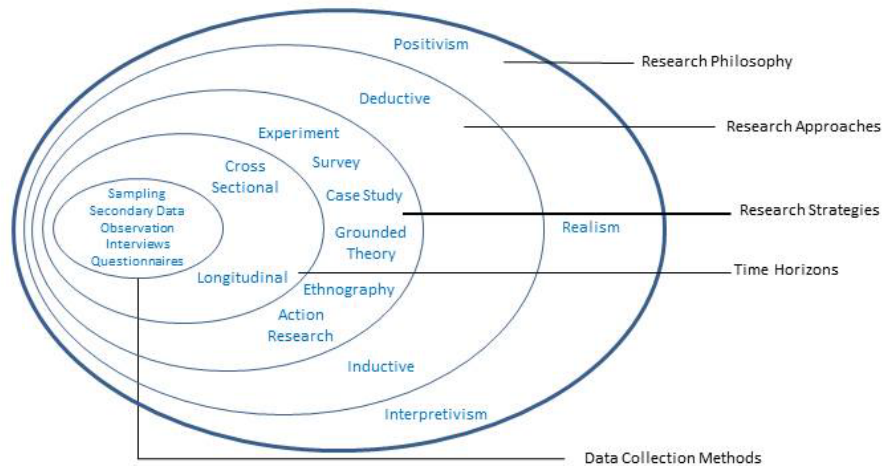


Figure 3-1 'The research process onion', adapted from Saunders et al. 2003 (p.83)

The interpretivist approach is commonly adopted to explore phenomena that occur in complex and unique environments (Saunders et al. 2003). Supermarkets operate in a complex and competitive market environment, striving to achieve optimum OSA of an extensive range of products and services at the lowest possible price (Anand, 2009). Maintaining OSA is a challenge due to operational issues that could emerge from inside the stores, such as inaccurate planning of in-store activities (Gruen and Corsten 2003; Fernie and Grant 2008; ECR Europe 2003), as well as from issues arising from outside the store, such as inaccurate deliveries due to inaccurate inventory information at manufacturers and suppliers (ECR Europe, 2003; Kotzab and Teller, 2005). This study used the interpretivist approach to explore how social actions, manifested through operational processes at supermarket stores, were implemented in a complex (supermarket) environment to deal with issues surrounding the occurrences of OOS and OS events.

Interpretivism is usually associated with the inductive approach, where the aim is to understand the case scenario from which to extract theories (Saunders et al. 2003).

Inductive research is commonly used when little is known about the topic (Yin 2009; Eisenhardt 1989), and when the context where the phenomenon had occurred is considered a factor in the study (Saunders et al. 2003). The adoption of the inductive approach led to the use of semi-structured interviews and on-site observations as its primary modes of data collection (Saunders et al, 2003).

This research adopted the case study approach to explore why and how OOS and OS occurrences were managed in supermarket stores. Unlike laboratory experiments that isolate phenomena from context, case studies emphasise the rich, real-life context in which the phenomena emerge (Voss et al. 2002; Eisenhardt and Graebner 2007). The episodic occurrences of OOS and OS in supermarket stores and their management are complex phenomena that require the support of rich stories to develop theoretical propositions. Case studies utilise a variety of data sources, including interviews, observations and archival records (Eisenhardt 1989), which are very effective in capturing rich, empirical data (Eisenhardt and Graebner 2007). Voss, Tsiriktsis and Frohlich (2002) noted that the case study approach has been increasing as a significant research method in operations management as the nature of operations evolve due to intense changes in technology and emerging managerial strategies. Ellram (1996) confirmed that case studies were most effective in exploring how organisations address challenges related to supply chain management.

Two options were considered when designing this study. The first was to conduct a multiple case study of selected stores within two different supermarket chains as a means to compare and contrast their OOS and OS management practices. The second was to conduct a case study of all stores within one supermarket chain to examine between-store similarities and differences. The first option posed two challenges: determining how many stores and how best to sample a sub-set of stores to serve as cases from each of the two supermarket chains; and the relative difficulty of getting agreement from two supermarkets to

participate in the study, compared to getting only one to participate. While both challenges were not insurmountable, the sampling of stores from two supermarket chains could prove problematic. Being a qualitative study, the sampling should not be based on random sampling (Saunders et al. 2003). Rather, it should be purposive sampling (Saunders et al. 2003). One of the objectives of the research was to explore why some stores within the same chain were better able to manage their OOS issues while others might be less capable, given that both were expected to have the same chain-wide operations procedures to follow. Without any knowledge on the performance of the individual stores pre-interview, sampling of stores based on effectiveness of OOS management strategies used could prove tricky.

The second option also had its own set of issues. One of these was that only one supermarket chain would be investigated, which might be limited in offering replication logic as part of cross-case comparison. The argument against this limitation was that the second option may involve only a single supermarket chain; the stores within the supermarket chain were the units of analysis. In this sense, it was a single case study with multiple embedded units of analysis. The individual stores were multiple cases, similar to distinct experiments that offer replications, contrasts, and extensions to emerging principles (Yin 2009).

A further issue with the second option was that the number of stores involved could go as high as 97 (i.e. the number of stores which one of the five big supermarket chains in Singapore had at the time of data collection), depending on which supermarket chain eventually agreed to participate. Weighing all the issues that beset both options, the decision was made to go with the second option, though the number of stores to investigate might turn out to be more than in the case of the first option. Besides, confining the study to stores of the same supermarket chain had the advantage of 'constancy', as all the stores were, presumably, subject to the same chain-wide standardised operating procedures (also known as General Standard Operating Procedures (GSOP)) and business policies. Holding such factors like product assortments, staff training and other in-store processes constant would



also allow attention be directed to examining differences in management approaches toward process conformance and to the manner in which chain-wide operations procedures were implemented. It is noteworthy to point out that Ton and Huckman (2008) also opted to study stores of the same chain in their study of the impact of employee turnover on process conformance, arguing that this method had the benefit of examining 'longitudinal observations of stock level performance across sites that are owned and operated by the same parent company' (p.57). Raman et al. (2001) also argued that differences in processes and performance at different stores within the same retail chain could enhance understanding on how execution could be improved.

## **3.2 Case Selection**

### **3.2.1 Context**

The context for this study was supermarkets in Singapore. Singapore's food and retailing industry consists of around 3,000 retail stores of various formats (see Figure 3-2 and Figure 3-3): supermarkets, hypermarkets, departmental stores, convenience outlets and provisional shops (USDA Foreign Agricultural Service 2012). There are also around 1300 other specialty food and drinks retail outlets that are part of the food and retailing industry (USDA Foreign Agricultural Service 2012). There used to be five key players (see Figure 3-4) in the Mass Grocery Retail industry in Singapore: NTUC FairPrice (locally owned), Dairy Farm International (from Hong Kong), Sheng Siong Supermarkets (locally owned) and Carrefour (from France) (USDA Foreign Agricultural Service 2012). Four of the main players (NTUC, Cold Storage, Shop n Save and Sheng Siong) had a total of over 650 outlets of various formats among them. Carrefour used to (only) operate hypermarkets in Singapore and shut down operations in Singapore at the end of 2012 (Singapore Business Review 2012). Shop n Save was rebranded as Giant stores by Dairy Farm International in April 2013 (Kham 2013)

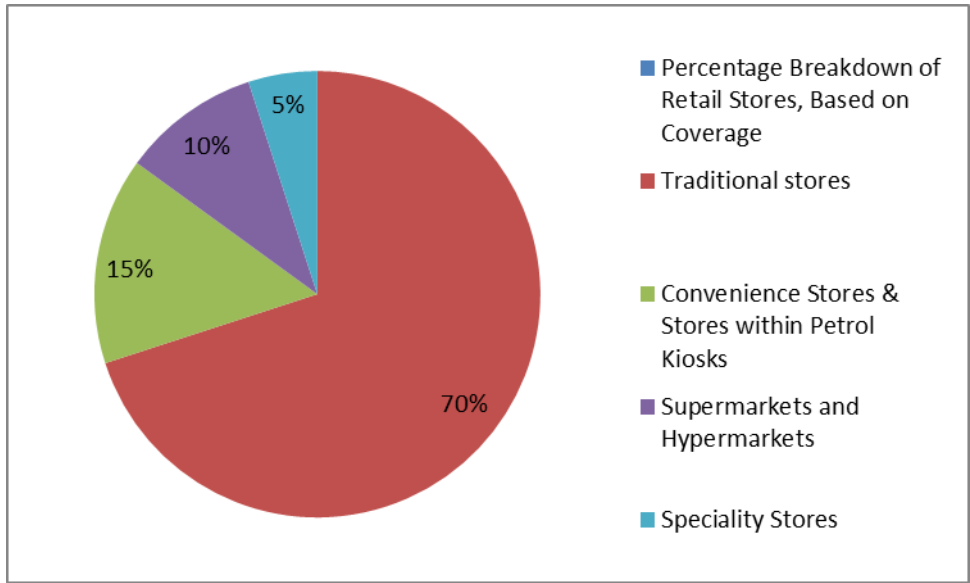


Figure 3-2 Percentage breakdown of retail stores based on coverage in Singapore (Source: USDA Agricultural Service 2010, p.10)

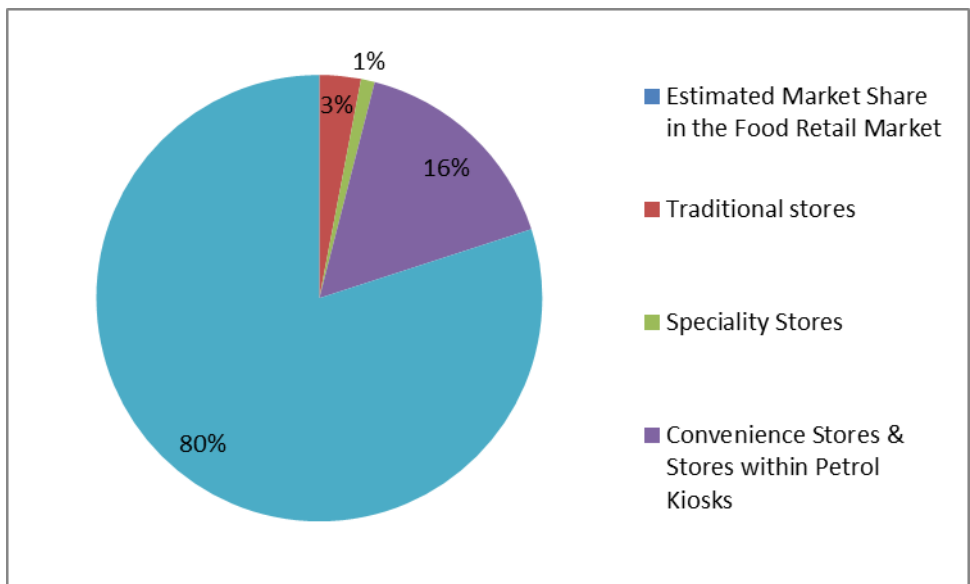


Figure 3-3 Estimated market shares in the food retail market coverage in Singapore (Source: USDA Agricultural Service 2010, p.11)

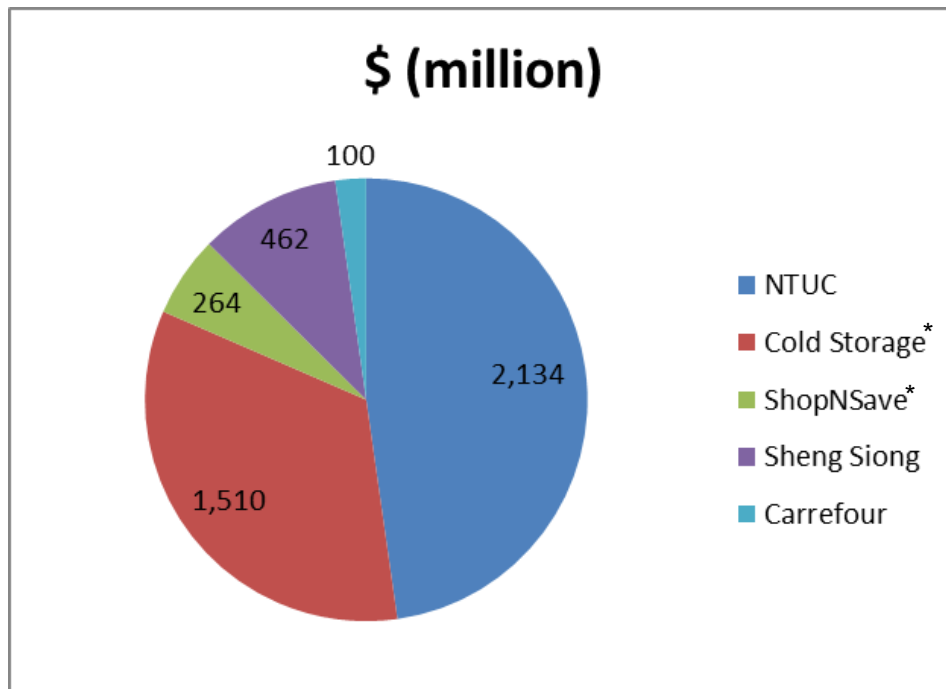


Figure 3-4 Annual sales in US\$ of major supermarket retailers in Singapore (Source: USDA Agricultural Service 2012)

*\*subsidiaries of Dairy Farm International*

Other than the four major grocery chains, there are other smaller grocery and food and drink outlets (which also retail a limited range of fast-moving groceries), totalling around 800 stores island-wide. With a small land size, geographical distances between retailers, suppliers and competitor supermarkets are therefore relatively short, suggesting that the retail grocery market in Singapore is a keenly contested one.

### 3.2.2 Supermarket Chain

All five major supermarket chains were invited to participate in the study, with the hope that at least one would accept the invitation. After several rounds of contact and persuasion it became apparent that three supermarket chains would not be participating, though there was no formal refusal. One particular supermarket chain was very forthcoming and gave high-level access to all its store outlets. With such an unusual opportunity of access (Yin, 1994; Eisenhardt 1989), this case supermarket became the selected case by default.

Another attractive feature of the case supermarket was that it had 23 stores in total, which was a manageable size for purposes of data collection and analysis.

### 3.2.3 The Case Supermarket Chain

For confidentiality reasons, the case supermarket chain will be called 'FS' in this thesis. The case supermarket chain was one of the five (5) main players in Singapore's Mass Retail Grocery industry (USDA Foreign Agricultural Service 2012). FS was a very progressive company, investing heavily in technology and industry best practices. The company adopted a three-fold strategy – (1) retaining customers through competitive pricing; (2) expanding business to gain advantage from scale economies; and (3) keeping abreast with creative technologies and distribution infrastructure to keep pace with industry best practices (FS's corporate website 2010; Business Monitor International 2010).

FS operated 23 outlets (22 supermarkets and one hypermarket). Their stores were scattered throughout the five Planning regions<sup>5</sup> of Singapore – North, North-East, West, East and Central (see Figure 3-5): four in the North of Singapore, seven in the West, three in the South, seven in the East and two at the Central part of Singapore. All 23 FS's stores participated in the study.



Figure 3-5 URA Draft Master Plan 2008 presented in five regions of Singapore (Chye 2008)

<sup>5</sup> Singapore is demarcated by the Urban Redevelopment Authority of Singapore to facilitate urban planning efforts (Urban Redevelopment Authority 2012)

FS segmented its stores into three categories based on store size and the SKUs carried. Category A stores were sized between 25,000 square meters (sqm) and 45,000 sqm and offered 16,000 to 30,000 SKUs. There were five stores under this category and each had more than one level (floor) of operations, equipped with back storage rooms (also referred to as back rooms). Four out of five stores from Category A had designated loading/unloading areas.

Category B stores were sized between 10,000 sqm to 33,000 sqm and offered 6,000 to 20,000 SKUs. Some Category B stores were single-storied and equipped with small back rooms. Six out of seven stores from Category B had designated loading/unloading areas.

Category C stores were of size ranging from 4,000 sqm to 9,000 sqm and offered 3,000 to 12,000 SKUs. They were normally located in densely populated, old housing estates and the majority of them had very small back storage rooms. Only one out of seven stores from Category C had designated loading/unloading areas.

### **3.3 Data Collection**

#### **3.3.1 Sources of Information**

Multiple methods were used in this investigation to collect data and obtain rich information for within and cross analysis as well as to facilitate triangulation of collected evidence (Eisenhardt, 1989; Stake 2003). Primary data was obtained through face-to-face interviews and on-site field observations. Secondary data was obtained from research and trade publications as well as FS's annual reports and websites. A number of industrial websites (e.g. Business Monitor International, Datamonitor Plc., USDA Foreign Agricultural Service and Food Export Association of the Midwest USA) containing information on the food and retailing industry of Singapore were also consulted.

#### ***Primary Data – Face-to-Face Interviews***

Semi-structured, face-to-face interviews were conducted at the store and Head Office of FS Supermarket to collect data on how the case supermarket chain operated and how its store outlets managed both OOS and OS situations. Interview questions were designed to obtain information to find out how FS outlets managed their inventory with a specific focus on OOS and OS prevention. The interview questions delved into areas including inventory management, stores' relationship with their Head Office warehouse, stores' relationship with suppliers, manufacturers, producers and trading companies, OOS and OS occurrences in stores, and stores' ordering policies (refer to Appendix 3.1 for the Interview Protocol used).

The first interview was conducted at the case supermarket chain's Head Office with its Managing Director (MD). The interview was conducted in both Mandarin and English in the presence of the MD's secretary. Whenever the MD expressed business terms in Mandarin, his secretary would help to translate them into English. The interview session lasted over two and a half hours and questions concerning FS's business strategies and store operations dominated the interview. Questions on how FS managed its warehouse

processes to support all the stores were also posed. The MD was very open with his responses and revealed how the company's philosophy and culture influenced business strategies, distribution operations, store operations, employee welfare and, in turn, how these business strategies influenced in-store logistical operations.

The second interview was conducted in the same location with the MD. At the beginning of the interview, a transcript of the previous interview was reviewed to ensure validity and accuracy of the responses in that they had been accurately translated and transcribed (Kvale and Brinkmann 2009). The interview questions in the second session focused primarily on in-store logistical operations. Again, the MD was very open with his responses and he showed and discussed a recent consultancy report which benchmarked FS with the other main Mass Retail Grocery industry players in Singapore. The MD also showed documentation used at the stores, such as receipt orders of fresh meat, vegetables and fresh seafood, to explain their inventory management processes. Sections of the interviews (both first and second) with the MD that were unclear were sent back to him for clarification. To ensure prompt responses, long distance telephone calls (i.e. from Melbourne to Singapore) were made a few days after posting the interview transcripts.

Store managers were the original target persons for the semi-structured interviews at FS's stores. However, when the store manager was unavailable (e.g. on annual leave or on sick leave or at a meeting with HQ), another senior member in the store management team (e.g. store assistant managers, acting assistant managers, store executives or store supervisors) would be interviewed. All interviews were conducted at the store premises during store opening hours. The length of each interview ranged from one and a half to two and a half hours. The interview questions focused on obtaining insights on in-store logistical operations as well as the management of relationships with HQ and suppliers. The manner in which OOS and OS occurrences were managed using GSOPs and SSOPs dominated the discussion. The interviewees were generally enthusiastic about sharing their in-store

logistical operational challenges and how they managed OOS and OS occurrences in their stores.

Table 3-1 lists the organisational positions of the interviewees at the 23 stores. At one of the stores, the HQ's Assistant General Manager (AGM) was having a meeting with the store manager at the time of the scheduled interview. The AGM volunteered to participate in the store interview. Therefore, at store E-4-A, the AGM and its store manager jointly participated in the interview.

Table 3-1 Organisational positions of interviewees at the 23 stores

Store ID	Organisational Positions
E-4-A	AGM and Manager
E-5-B	Manager and Acting Assistant Manager
E-1-B	Manager and Supervisor
N-1-C	Manager and Assistance Executive
W-5-C	Acting Manager and Acting Assistant Manager
E-2-B, E-7-BC, W-6-B, W-7-B	Manager
S-2-A, E-3-B, C-1-C, C-2-C	Assistant Manager
N-3-A	Acting Manager
N-2-A, N-4-C, E-6-B	Acting Assistant Manager
W-4-A	Executive
S-3-C	Assistant Executive
S-1-C, W-1-C, W-2-B, W-3-C	Supervisor

### ***Primary Data – On-site Field Observations***

In addition to the semi-structured interviews, on-site observations were conducted at the stores in the form of a guided tour to obtain information that could not be covered via interviews (Veal 2005; Yin 2009). These on-site observations, which were conducted post-interviews, also enabled 'directness' (Robson 1997, p.310), i.e. 'real life' happenings in the 'real world' (Robson 1997, p.310), to be observed. Observation is a method commonly used in qualitative research to find out what is going on in a scenario (Robson 2002).



Guided tours around and inside the stores were conducted by store managers, to observe in-store logistical operations 'in action', such as receiving of goods, on-shelf replenishments from different storage locations and the management of returns and damaged goods. The guided tours lasted around two hours on average and provided opportunities to obtain additional information which could not be covered in interviews (Yin 2009). The guided tours provided insights on an extensive array of activities occurring at the receiving dock, the store aisles and back storage room. These activities not only helped clarify many aspects of the in-store operations described by the interviewees but also provided exceptionally rich operational information not achievable through interviews (Voss et al. 2002; van Donselaar et al. 2007).

The guided tours were in the form of a walkabout at each store with the store managers providing an introductory briefing about store operations and stocking processes. During the walkabouts, observations on all aspects of in-store processes were noted: receiving (from HQ as well as suppliers of fresh foods, such as confectionery, fruits and vegetables, fresh meat, seafood and live seafood), on-shelf replenishment (from receiving to shelves, from suppliers of chilled foods, from shelf tops to display shelves, from back room onto display shelves), management of promotional stock, back room logistics, inventory checks via physical walkabouts, store order placements process, store staff interactions and collaborations with chilled foods, fresh meat and seafood suppliers. Staff performing value-adding services (VAS), such as repackaging of fresh fruits, vegetables, fresh meat and seafood, were also observed. In most instances, the store manager would ask that we proceed to either a quiet aisle within the store, or a quiet area outside the store, to continue the interview. This would allow the store manager to continue to monitor store operations during the interview. Additional guided tours to specific in-store areas were also conducted after the interviews, to clarify issues discussed during the on-site observations. For example, after interviewing with store manager of E-A-4, we returned to the returns processing station to seek further clarification on processes occurring at that specific station.

### ***Secondary Data***

Secondary information about the case supermarket chain was obtained from FS's corporate website, investment reports from Singapore banks, websites of national newspapers and industry-related reports prepared by international research companies.

FS's corporate website provided much of the information about the company background, including its history, financial data, distribution networks, product assortments, product promotions and store formats. Investment reports from leading banks provided FS's investment portfolio, balance sheet, sizes of each store and development of the business. National newspapers provided information about certain stores' changes, such as refurbishment into new store layout, unique product assortment of certain stores and supermarket chain competition in general. Industry-related reports prepared by international research companies, such as Euromonitor International and Business Monitor International Ltd, provided relevant statistics on the retail industry in Singapore as well as the recognition of FS in Singapore's Mass Grocery Retail Industry.

## **3.4 Data Analysis**

### **3.4.1 Data Analysis Framework**

This study aimed to explore the mitigation measures adopted by FS's stores to manage the occurrences of OOS and OS, focusing on the way those measures were implemented, the circumstances surrounding their selection and implementation, and the relative effectiveness of the approaches employed to implement the measures. Because of the complexity of the information involved with OOS occurrences store-wide as well as the number of stores investigated (23 in all), two issues confronted the data analysis. The first was how to parcel up the data so that the information could be systematically dealt with across all stores. The second was how to present the rich information on management of OOS and OS occurrences for all stores in a simple, yet comprehensive manner without engaging in repetitive discourse.

To address the first issue, Kotzab and Teller's (2005) grocery retail in-store logistics model (see Figure 3-6), which depicts activity flow in a supermarket, was used as a framework to systematically summarise the main causes of OOS and OS occurrences at different sections of the stores, together with the management strategies adopted by the store in each of the sections. By summarising the flow of in-store logistics activities of all FS's stores in a similar manner, the relationships between these activities in different parts of the stores could be readily perceived. Additionally, the complexities surrounding the occurrence and management of OOS and OS situations in-store were also simplified. It is noteworthy to mention that Kotzab and Teller's (2005) model was empirically validated in a study on in-store logistics processes of dairy products in 200 stores in the Austrian grocery retail industry.

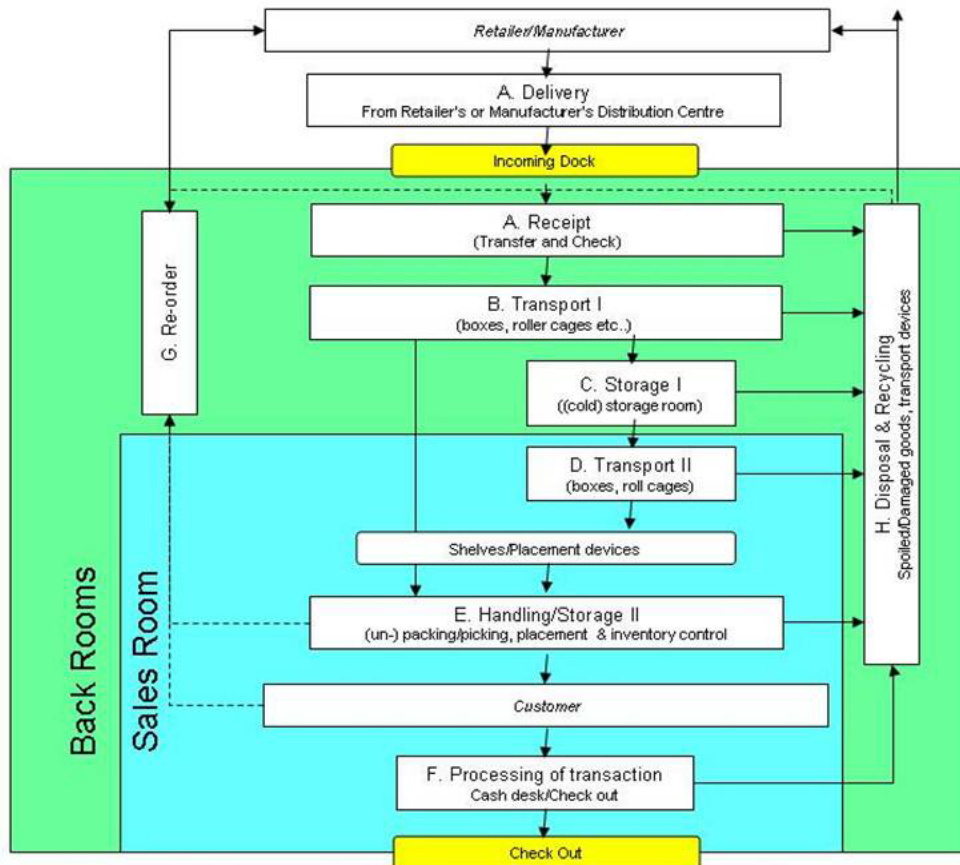


Figure 3-6 A grocery retail in-store logistics model (Kotzab and Teller 2005, p.597)

The second issue was resolved by dividing all the FS stores into three groups based on the extent of their OOS occurrences. In the semi-structured interviews with store managers, all stores were asked to give an estimate of the 'extent of OOS occurrences', based on either the estimated value of sales lost attributable to an OOS situation or the number of items (as a percent of all shelved items) where an OOS label had to be put on the shelf to inform customers in a day. Of the 23 stores surveyed, four did not provide any information relating to either piece of information, despite repeated reminders. The typical responses were: "We are too busy and haven't got the time to check the information" or "We did not have records of that information." Of the 19 that provided information on the extent of OOS occurrences, all gave data in terms of the estimated monetary value of sales lost attributable to OOS occurrences in 2010. Four of these 19 stores further offered an estimate of the number of items (as a percent of all shelved items) where an OOS label had to be put on the shelves in

a day to inform customers. This latter information was referred to as the store's estimate of 'the percentage of times an OOS situation occurred.'

Using the given information on OOS occurrences, the 'extent of OOS occurrences' was computed in terms of monetary value of lost sales attributable to OOS occurrences as a percentage of the monetary value of total SKUs in the store. The computation procedure for estimating the extent of OOS occurrences in each of the 19 stores is presented in Appendix B. Because four of the 19 stores also provided an estimate of the 'percentage of times an OOS situation occurred', the computed 'extent of OOS occurrences' was cross-checked with the store estimated figure. Table 3-2 shows that the computed percentage corroborated well with the estimated figures given by the store, which, indirectly, validated the computed figures.

Table 3-2 Comparison of store-estimated OOS occurrences and computed 'Extent of OOS Occurrences'

Store	Store Estimated OOS Occurrences (%)	Computed 'Extent of OOS Occurrences' as per Appendix B (%)
N-3-A	2-3%	3.11%
E-1-B	About 20%	18.70%
E-5-B	About 1 %	0.83%
W-6-B	About 4%	6.32%

The computed 'extent of OOS occurrences' ranges from 0.2% to 18.7%, with a mean value of 3.8% and a median value of 2.4%. In reviewing the plot of these occurrences (see Figure 3-7), it was decided to divide the 19 stores into three groups: low OOS occurrence, medium OOS occurrence and high OOS occurrence. The 'extent of OOS occurrences' thresholds for dividing the three groups were < 2%, 2% - 4%, and >4%, which were arrived at after examining the characteristics of the stores with OOS occurrences between 1.5% and 2.5% (i.e. stores E-6-B, W-5-C, W-4-A and W-3-C) and between 3.0% and 5.5% (i.e. stores N-3-A, N-4-C, W-7-B, S-2-A and S-3-C). The number of stores in the three groups, low, medium

and high, was respectively, 8, 4, and 7. Only the 19 stores which could be classified according to their 'extent of OOS occurrences' were used in this study.

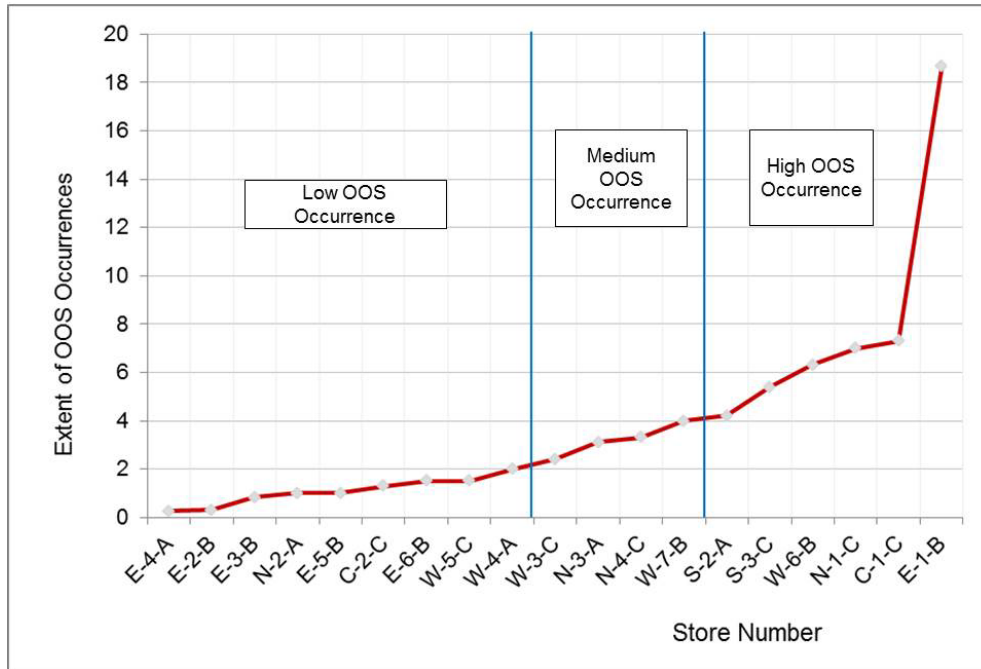


Figure 3-7 Extent of OOS occurrences by store

### 3.4.2 Within-Group Analysis

Within-group analysis focused on examining operations of the three groups of FS stores. First, the operational characteristics of the stores in each of the three groups were examined closely to understand the manner in which in-store logistical activities were carried out. This was followed by plotting the stated causes (by store managers) onto Kotzab and Teller's (2005) model to locate the occurrences of OOS and OS at various stages of the in-store logistical process and to get a sense of where the causes occurred within the stores of the three groups.

The manner in which FS's GSOPs and SSOPs were implemented to manage each of the causes of OOS and OS occurrences was next examined, including the steps taken when

processes stipulated by the GSOPs and SSOPs were not adhered to. The stages where GSOPs and SSOPs were implemented were also plotted onto the stages of in-store logistical processes, as displayed in Kotzab and Teller's (2005) model. The GSOPs and SSOPs were then grouped into three stages to indicate how they were implemented: before, during and after the occurrences of OOS and OS. This was followed by looking at how stores from the three groups managed the occurrences of OOS and OS in their respective stores. Examination of these factors provided an understanding into the extent of their impact on in-store logistical operations.

From the interviews, there were indications that store managers were rather influential in deciding how OOS and OS occurrences were managed, despite the presence of GSOPs and SSOPs. Therefore, in the three groups of stores, store managers' influence on the range of products to be retailed and on store operations were examined. Based on store managers' accounts of parties responsible for causing OOS and OS occurrences, four main parties were identified: store staff, HQ, suppliers and customers. Stores' relations with these four main parties were subsequently examined to understand how they were engaged in the management of OOS and OS occurrences. Preliminary findings on similarities and differences in management of OOS and OS occurrences in the stores provided guidance to the next step of the study: cross-group analysis.

### **3.4.3 Cross-Group Analysis**

Cross-group analysis is where polar types (e.g. stores with Low Incidence of OOS and OS versus stores with Medium and High Incidences of OOS and OS) are analysed to identify similarities and differences in OOS and OS management (Eisenhardt 1989; Miles 1994; Eisenhardt and Graebner 2007). According to Eisenhardt (1989), cross-case analysis compels investigations to drive down initial findings to unearth findings from different perspectives. In this study, cross-group analysis was used to establish possible reasons on

why, despite the implementation of GSOPs and SSOPs, the performance outcomes of OOS and OS management differed amongst stores.



### 3.5 Validity Issues

Establishing validity is a key concern of case study research (Yin, 2009). This study employed a number of strategies to ensure the following validity issues were dealt with at both the data collection and analysis stages (see Table 3-3):

Table 3-3 Validity of study and findings

Test	Case Study Tactic <sup>1</sup>	Phase of Research in Which Tactic Occurs
Construct Validity	<ul style="list-style-type: none"> <li>• Use multiple source of evidence.</li> <li>• Establish chain of evidence.</li> <li>• Have key informants review draft of case study findings.</li> </ul>	<ul style="list-style-type: none"> <li>• Interviews and on-site field observations at all 23 stores.</li> <li>• Field notes from on-site field observations and critical event records to supplement interviews.</li> <li>• Transcript of interviews with MD verified by MD. Verbal summary of key case findings reviewed by interviewees.</li> </ul>
Internal Validity	<ul style="list-style-type: none"> <li>• Use pattern matching.</li> <li>• Build explanation.</li> <li>• Address rival explanations.</li> <li>• Engage logic models.</li> </ul>	<ul style="list-style-type: none"> <li>• Matched key concepts developed from MD interviews with those identified at interviews with store management team.</li> <li>• Cross-referenced emergent OOS &amp; OS management constructs with extant literature.</li> </ul>
External Validity	<ul style="list-style-type: none"> <li>• Use replication logic in multiple case studies.</li> </ul>	<ul style="list-style-type: none"> <li>• Used same interview protocol for all 23 stores.</li> </ul>
Reliability	<ul style="list-style-type: none"> <li>• Use case study protocol.</li> </ul>	<ul style="list-style-type: none"> <li>• Used same interview protocol for all 23 stores.</li> </ul>

Source: 1. Based on Yin (2003, p.35)

#### 3.5.1 Construct Validity

Construct validity ensures that adequate and effective means have been established for the concepts being studied (Yin 2009). This study established construct validity by using multiple methods of data collection. Face-to-face interviews and unobtrusive, on-site field observations were used to collect rich data on in-store operations and OOS and OS management. Interview transcripts and interpretations of key findings were communicated to interviewees. Guided tours of HQ warehouses and all 23 stores post-interview allowed additional opportunities to clarify unclear areas (Silverman 2001; Yin 2009).

### **3.5.2 Internal Validity**

Internal validity is where causal relationships are identified and explained (Miles and Huberman 1994; Yin 2009). It is typically addressed using open coding of interviews (Strauss and Corbin 1998; Charmaz 2006) and thematic analysis of coded results to identify key themes, which then lead to pattern-matching (Saunders, Lewis and Thornhill 2003; Veal 2005; Yin 2009; Joffe 2011). Here, this method was adopted to illustrate which themes were significant in the description of phenomena being investigated. In this study, the information for each store within each of the three OOS-occurrence groups was analysed systematically using Kotzab and Teller's (2005) model to identify a set of OOS management concepts, which were then compared with those of other stores in the grocery chain. Similarities and differences across the stores and across the three groups were also identified and cross-validated with findings from extant literature to ensure internal validity.

### **3.5.3 External Validity**

The intention to generalise findings is the main objective of external validity, i.e. the ability to apply findings in contexts dissimilar to the studied context (Ghauri and Grønhaug 2005; Veal 2005; Yin 2009). In this research, which used a case study approach, the intention was not to generalise the findings in relation to other similar contexts but to contribute towards building new theories.

According to Yin (2009), 'analytic generalization' (p.38) can be established in multiple case studies using replication logic. Analytic generalization refers to a situation where a previously identified pattern is matched with empirical findings of the case study (Yin 2009). Replication logic may be claimed when 'two or more cases are shown to support the same theory but do not support an equally plausible, rival theory' (Yin 2009, p.39). In this study, replication logic was established by comparing the OOS management practices of the stores both within and between each of the three groups.

### **3.5.4 Reliability**

Reliability tests look at the repeatability of the investigation process (Voss et al. 2002; Veal 2005; Yin 2009). In addition, the main objectives of reliability are to minimise misunderstandings and predispositions (Yin 2009). In this study, information reliability was achieved via the use of a standard interview protocol, secondary data and on-site guided tours 'to record observations consistently' (Neuman 2003 p184). The standard interview protocol was used in the interview process with senior management of all 23 stores within the supermarket chain. Secondary data on case supermarket chain was collected from case supermarket chain's corporate website, industry-related reports prepared by international research companies, websites of national newspapers and investment reports from leading banks in Singapore. On-site guided tours on all aspects of in-store processes of the 23 stores were also noted. Convergence of evidence from multiple sources of evidence led to the creation of a case study database (Yin 2009) post-interview in the form of a large Excel spread sheet of thirty-one pages, complete with photos illustration. In addition, data collected went through several rounds of analysis and discussions with primary PhD supervisor to 'minimise errors and biases in the study' (Yin 2009).

### **3.5.5 Conclusion**

This study is a qualitative research into stores of a single supermarket chain to explore both how and why OOS and OS occur. The stores of the case supermarket were studied to understand how they managed OOS and OS occurrences in the context of Singapore where the country's national business culture is well-known for its stringent management towards excellence in business. As this is a single case study in a specific context, the study aims to achieve "analytic generalization' (Yin 2009; p. 15) towards theory building in the area of OOS, OS and OSA. In addition, the study provides implications relevant to theory building and management practices in the contexts of OOS, OS and OSA.

## Chapter 4 Findings and Analysis

This chapter presents the case findings. The focus is on the manner in which the three groups of stores, i.e. stores with low, medium, and high OOS and OS occurrences, managed their in-store OOS and OS situations. All three groups of stores were from the same supermarket chain and shared many common operational characteristics, including the general standard operation procedures (GSOP) prescribed by the headquarters (HQ), which all stores are expected to follow. These common operations characteristics provide a backdrop against which differences in OOS and OS management can be readily discerned. For these reasons, this chapter is organised into five sections, beginning with an overview of the chain-wide operations characteristics in Section 4.1. This is followed by a discussion of the major common factors that could result in OOS and OS occurrences in-store in Section 4.2. These common factors include those external to the individual stores, such as picking and delivery errors made by HQ; errors occurring in stores due to their physical location and store layout; errors inherent in the legacy data capturing systems of the chain and issues relating to the use of barcoding; and errors due to supplier's negligence. The remaining three sections (Sections 4.3 to 4.5) are devoted to describing the range of OOS and OS management approaches employed by the three groups of stores. The presentation highlights the distinctive features of the approaches employed by the three groups, and culminates in a summary discussion that pinpoints the key differences between their OOS and OS management styles.

## 4.1 FS's Operational Characteristics

### 4.1.1 Overview

Operating in an intensely competitive environment (USDA Foreign Agricultural Service 2012), FS's in-store logistics activities were designed with a view that 'customers are boss'. FS regarded achieving reliable OSA as an important key performance indicator for all its stores. To meet its customer-centric operational goal, FS employed a range of technologies, including bar coding and radio frequency hand-held scanning systems or personal digital assistants (PDAs) (see Figure 4-1) for its receiving, ordering and inventory management functions; point-of-sale (PoS) system at its checkout stations; and electronic pricing display units (see Figure 4-2) for its shelved items.



Figure 4-1 Hand-held PDAs used for in-store ordering



Figure 4-2 Visual Display Units (VDUs)

The chain had a central warehouse of 9,300 sqm equipped with a limited two-level racking system. The majority of the stocks were block-stacked due to high turnover. About 70% of the suppliers delivered directly to the individual stores, while the remaining 30% delivered to

the central warehouse. The warehouse had twice-daily despatches to all stores. At the time of the semi-structured interviews, FS was building a new warehouse, five times larger than the existing central warehouse. Once completed, daily despatches would increase to five times daily, thus reducing the need for storage space at individual stores.

To encourage store staff to maintain reliable OSA, the HQ of FS offered continuous staff training and development for all its store employees. The training was intended to equip its store employees with the requisite skills to manage OSA as an important element in their daily work responsibilities. Outstanding performance was rewarded in the form of bonuses and internal promotions. Poor performance, on the other hand, resulted in verbal warnings, followed by letters of disciplinary actions.

FS practised a culture of quality supplier relationship management to foster a high level of trust with its suppliers, and took steps to ensure that its suppliers would obtain complete and timely payments. In return, FS expected its suppliers to deliver as per agreement. To minimise the likelihood of service failures, FS imposed monetary penalties of S\$100-S\$300 per occurrence on suppliers with persistent service failures.

FS's HQ established general standard operating procedures (GSOPs) to assist individual stores to manage OOS and OS occurrences. These GSOPs included procedures on receiving, ordering, replenishment, supplier management and basic level of customer service. Without exception, all the stores had customised some GSOPs to fit their own operating environments and to cover localised operational concerns that led to occurrences of OOS and OS. For instance, FS's GSOP stated that receiving staff was to key to hand-held PDA of any shipment anomalies. This procedure could be executed if the store had a designated loading and unloading area (see Figure 4-3). However, the procedure could not be adhered to for stores with mobile loading and unloading areas (see Figure 4-4).



Figure 4-3 An example of a designated loading/unloading area

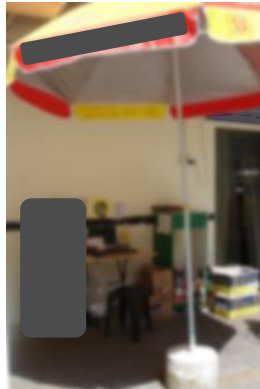


Figure 4-4 An example of a mobile loading/unloading area

FS's in-store processes, from planning, to ordering, receiving, replenishment and returns, will be discussed in the next five sub-sections.

#### **4.1.2 In-Store Process**

In FS's stores, in-store planning activities included product planning, inventory ordering, receiving, replenishment (storage areas and display shelves) and returns. In-store planning also covered support processes, such as product assortments (HQ product list combined with localised assortment), value-adding services (e.g. re-packaging and services of a butcher or fishmonger), shelf space allocation and management and promotions management.

## **Product Planning and Space Allocation**

Although FS's in-store planning did not involve the use of Planograms, plans were designed to meet two objectives: to optimise customer requirements and display floor space. Standard product assortment offered in each of the 19 stores consisted of both 'wet and dry shopping options' (FS Corporate website 2011), which included an extensive assortment of live, fresh and chilled produce, such as live seafood, meat, vegetables, and fresh and preserved condiments normally found in wet markets. Other product categories offered in the stores included consumer packed foods, beauty and healthcare products, household cleaning products and related accessories. Some stores also offered electronic products and Do-It-Yourself (self-assembled) furniture to meet the specific needs of customers. In 2009, stores located in residential areas of mixed income levels began to offer cuisine cuts of fresh produce, a range of organic foods and imported wine, beer and other alcohol.

Individual stores also offered a varied range of value-added services (VAS), such as re-packaging of loose items (e.g. biscuits, condiments, fruits and vegetables). The larger stores tended to offer services normally found in wet markets, such as de-scaling of fish and special handling for halal meat.

*"Many of our customers are from the younger generation where they prefer to shop for fresh groceries in a clean and dry environment. Traditional wet markets, well, tend to be wet and smell of different types of meat. So we provide similar produce and services, such as butchering and cleaning of fishes that are also offered in wet markets but in a dry and much cleaner environment. But we have find new ways to attract them (customers) because the newer wet markets are starting to pay more attention to their ambience (e.g. displaying fresh meat in chilled cabinets to keep meat fresh and their stalls free of 'fresh-meat-smell') in order to attract customers back to them and away from us." Manager, E-2-B*

Shelf space allocation and management were conducted at HQ. New brand manufacturers or producers had to liaise with buyer and merchandiser at HQ if they wanted FS to distribute their brand and products. It was also common for customers to approach store managers with requests to stock products found from another supermarket chain, providing samples in



the form of product packaging or pictures. Store managers would then forward the information to the HQ buyer or merchandiser to identify the manufacturer or producer. Upon identification, the HQ buyer would proceed to invite the identified manufacturer or producer to submit an application for FS to distribute their products in the stores.

*“Most products offered in our stores are stipulated by HQ. But we do offer products that our customers have requested. Usually they come with wrappings, packaging or pictures and ask us to stock it because want to complete their shopping in just one store. It is good that they want to shop just with us. But as you can see, we don’t have a lot of space. Therefore, it is a challenge for us to meet every customer’s request for their favourite assortment. But we do try – we use consignment-based distribution, which means we bring in one shipment and we tell our customers to buy them while stocks last. So far, it has been alright. We managed to please most of our customers without the need of renting more space.” Manager. E-5-B*

There were two types of product promotions in the stores, one organised by suppliers, and the other by the store. Product promotions organised by the suppliers were managed by HQ. Suppliers had an administrative discussion with HQ on product promotions and then HQ conveyed the information to the stores. Suppliers that delivered direct to stores worked closely with store managers on the operational procedures of their product promotion. Promotions organised by the stores tended to be ad-hoc and were managed by store managers with the dual aims of stimulating movement of slow-moving stocks and of creating space in the stores.

*“Whenever HQ pushes stocks to us, we will organise ad-hoc events to promote those stocks so that we can maintain order in our back room and not over-stack the display shelves.” Supervisor, E-3-B*

Promotional products were commonly displayed in shelves located in high-visibility areas within the store. However, aisle spaces were also been used to accommodate several promotions running simultaneously.

*“With promotional items, we had to be vigilant because most of them were block-stacked at the end of aisles or along the aisles. Very often, products could fall due to customers taking stock from behind or bottom of the stack, thereby causing the stacked items to be unstable. That is why we don’t block stack promotional items very high to avoid injuries and damage...Yes, some customers can be unreasonably particular with what they pick from the stacked items. For example, with shampoos – they would open to smell the contents. If they liked the smell and decide to buy the shampoo, they would proceed to search the entire stack for a bottle with the highest level of shampoo.” Manager, E-1-B*

### ***Inventory Ordering***

Inventory ordering was conducted in two ways: manual and automated. Under the manual inventory ordering process, stackers<sup>6</sup> were required to maintain paper-based records of products under their responsibilities. Stackers were also required to obtain additional information on inventory levels, and sale records of products under their charge as well as those of other stores under the chain from HQ’s Purchasing Department. Under the automated process, stackers tracked and monitored stocks via hand-held PDAs when replenishing display shelves. In addition, stackers conducted physical checks at display shelves to ensure adequate stock levels of their allocated products.

FS adopted two strategies to achieve accurate and timely in-store ordering – fixed-order quantity ordering and ‘Warehouse 99’. Under the fixed-order quantity re-ordering strategy, a pre-set stock level was assigned to all SKUs in the stores. When stocks reached the set stock levels in the PoS system, the inventory management system triggered re-orders to replenish stock levels. ‘Warehouse 99’ was a virtual warehouse established by HQ to facilitate stock level adjustments. Historically, stackers completed forms to reflect

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<sup>6</sup> Stackers were store staff responsible for replenishing display shelves. Each stacker was allocated a few shelves to manage, monitoring the stock levels and turnover of product assortments under different brands.

discrepancies in stock levels. Whenever such discrepancies were resolved, additional forms were filled out to document the outcomes of the investigations. As the process was time-consuming and tedious, HQ decided to establish a virtual warehouse (referred to as Warehouse 99) to streamline the process. However, monitoring of stock levels was not confined to the automated re-ordering process. While the automated re-ordering system managed stock levels, physical checks of display shelves via walkabouts were conducted by store supervisors and store managers at regular intervals throughout the day. In addition, when stackers noticed stocks on the display shelves were low or empty, they checked for stock levels in the inventory management system as well as in Warehouse 99. When stock levels were low, stackers informed the store managers, who then checked if the system had triggered re-orders for the affected products accordingly.

*“The system is supposed to trigger orders when the stock levels reached their pre-set levels but sometimes, there were mistakes in the scans, either at receiving or at the checkout stations. The automatic re-ordering systems don’t work properly due to inaccurate information. So we have to investigate and then correct the stock levels in the system so that it can do its job. That’s why we cannot rely just on the system. We have to perform manual checks (on stock levels) as well.” MD*

### **Receiving and Replenishment**

In-Store receiving was conducted in makeshift or designated areas, typically at the back of stores. The process began with stocks received, being placed inside a painted yellow box to inform staff that the stocks were ready to be processed. Receiving staff used hand-held Radio Frequency (RF) scanners, which doubled as PDAs, to scan the barcode of each item in different types of packaging, such as carton boxes or cardboard trays. With generic orders, the bar code of each item was scanned and the staff would indicate on the touch-screen of the scanner that x amount of the scanned bar code had been received. In mixed-SKU orders, the barcode of each item was scanned separately. After scanning, stocks were pushed into the store or into the back room. With deliveries from the HQ warehouse, store staff were on-hand to help move the stocks into the store or into the back rooms. With deliveries from

suppliers, the chain's practice was for the suppliers' drivers or their assistants to place the stock inside the store, on the aisle(s) where they would be displayed. Store staff would then replenish the stocks in their respective locations, i.e. on the display shelves and/or storage spaces above display shelves.

*"Our staff will push the stocks into the store when HQ delivers. But for supplier deliveries, either the driver or their helper will push the stocks into the store. Our staff will then replenish the shelves. But whenever it rains, or if the driver is alone, we will ask our store staff to help push stocks inside the store. After all, we don't want the carton boxes to get wet and we want to prevent congestion in the receiving area...it is a win-win situation." Supervisor, C-2-C*

In-store replenishment of stocks occurred on a daily basis. Some stores replenished display shelves at different times of the day. Stores with ample aisle spaces replenished display shelves during operating hours, while smaller stores replenished display shelves only during off-peak times to ensure safety and to avoid disrupting customers. Some stores replenished three times per day – one hour before and one hour after opening hours, as well as during off-peak periods.

Replenishment of ambient foods and non-food items was carried out on a daily basis. There were two deliveries from HQ warehouse – once in the morning with deliveries of orders received the night before, and one in the afternoon with deliveries of orders received in the morning. Suppliers of ambient foods were permitted to deliver their stocks between 7am and 4pm each day. Replenishment was conducted as soon as deliveries from both HQ warehouse and suppliers were received.

The flow of replenishment for deliveries from HQ and suppliers is illustrated in Figure 4-5. S1 indicates deliveries from suppliers. Upon completion of the receiving process, stock was pushed by suppliers to the aisles where they were replenished on their respective display shelves (S2). Excess stock was stored on top of the display shelves (S3). Stock delivered from HQ warehouse to stores with no back stores was replenished directly onto the display

shelves (HQ-D1). Stores with no back rooms used roller cages to store HQ-delivered stock (HQ-R1), and stock from these roller cages was used to replenish the display shelves (HQ-R2). HQ-B1 indicates HQ-delivered stock to be moved to stores' back rooms. Replenishment of display shelves were conducted with stocks retrieved from back rooms (HQ-B2). Excess stock from replenished display shelves was moved to the top of the shelves, as indicated by HQ-D2, B3 and R3.

When a product's allocated display shelf required replenishment, stackers replenished from the top of the shelves as indicated by ToDS in Figure 4-5. When there was no stock of the OOS item, stackers would place a yellow 'out-of-stock' label over the product's price label as they retrieved stocks from back rooms or roller cages. When there were no stock of the OOS item within the stores' premises (i.e. not in storage areas or other display shelves), four practices were used by the store: (1) to keep the OOS item display shelves empty; (2) to leave the yellow OOS label on price label; (3) to remove the OOS item's price label and (4) to expand the display of neighbouring substitute products or replace the empty shelves with promotional substitute products.

*"When a shelf is empty and there are no stocks above the display shelf, we will put a yellow label to cover the price label of OOS item. Regular customers know that my staff is taking replenishment stock from the back room. So they normally shop for other items and come back a few minutes later. Customers who are unfamiliar with the yellow label will ask our staff and we will explain to them." Acting Manager, W-5-C*

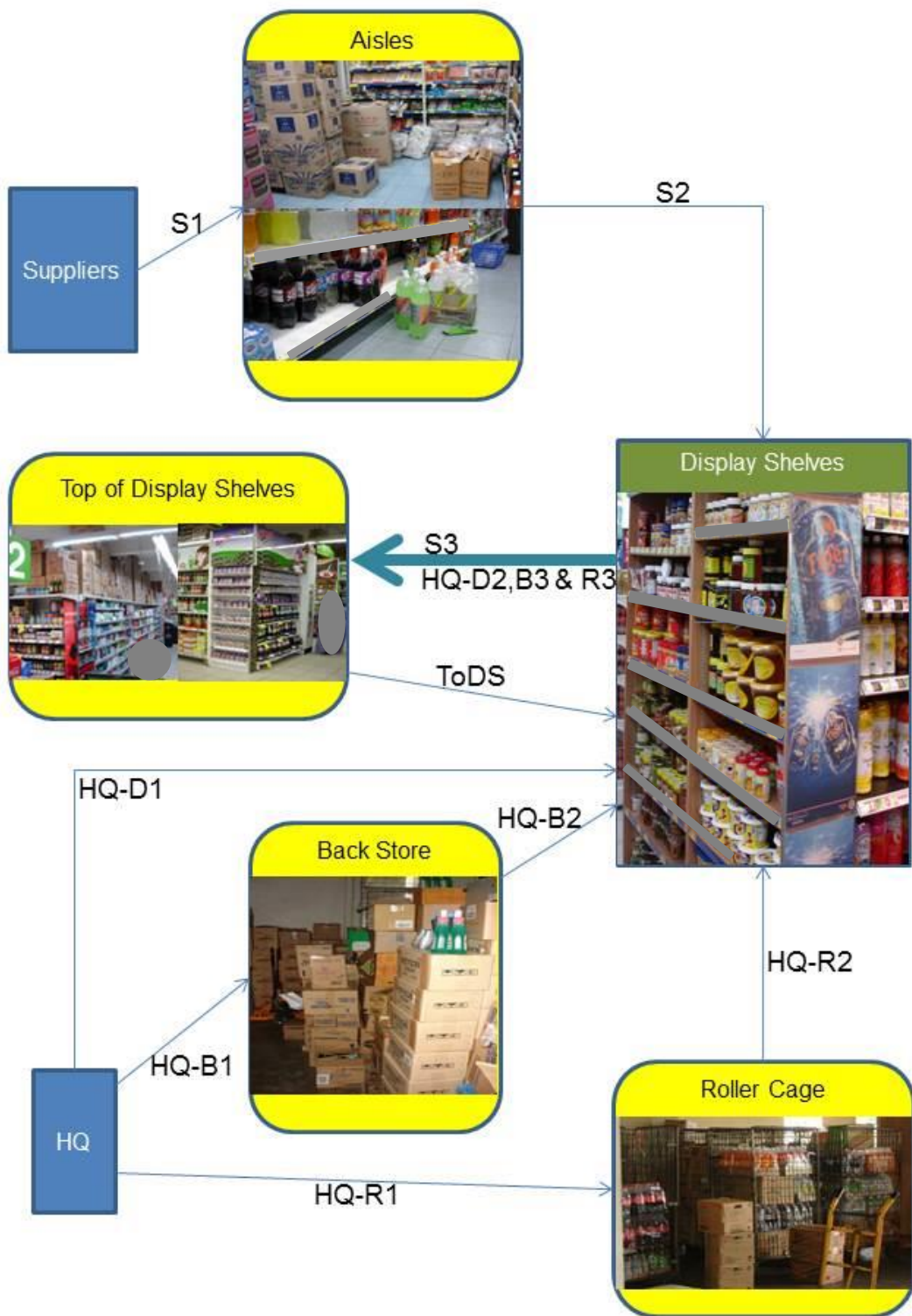


Figure 4-5 Replenishment flows from different sources of storage

## Returns Processing

FS had a relatively liberal product-return policy. All stores accepted returns from dissatisfied customers, so long as a receipt accompanied the returns. The reason(s) for returns was secondary. Procedurally, returned products were packed into plastic bags, labelled and placed in mobile shelves near the receiving area (see Figure 4-6). Once recorded, the returned products were sent back to either the concerned suppliers or HQ for evidential purposes.

*“Our returns policy is common in that if you have the receipt, we will exchange the product for you or give you a refund. Usually we ask customers why they return and use it as feedback to the suppliers. But it also depends on the product. Once we had a customer who bought a watermelon from our store, came back with the watermelon all cut up and complained it wasn’t sweet enough. So we invited him to select a watermelon where one of our staff cut it and offered to the customer for tasting. Lucky for us, the one he chose was sweet enough for him and so we exchanged the watermelon.” AGM, E-4-A*



Figure 4-6 Returns management in FS's stores

## 4.2 Antecedents of OOS and OS in stores

OOS and OS occurrences were noted by store management but were not measured. The majority of the causes of OOS and OS were human-related and technology-linked.

*“Our product range is very wide because our customers expect it. As such, we will have many similar products and products with similar packaging. Therefore, mistakes at the cashiers are common, especially when the queues are long and cashiers are pressured to quickly scan the items.” MD*

Each of the 19 store managers had different attitudes towards OOS and OS occurrences. To gain a better understanding on ‘where’ and ‘how’ OOS and OS occurred within the stores, factors causing OOS and OS were clustered into four areas of concern: headquarters, store outlets, suppliers, and the data capture systems used.

### 4.2.1 Headquarters

Errors made at HQ had significant ramifications on store operations. With order-picking at the HQ warehouse, wrong picks in product, quantity and packaging led to delivery errors. Stores could only amend their own records and report back to HQ; the incorrect deliveries would still have to be accepted by the stores.

*“We will also check deliveries from HQ because they have delivered wrong products or under deliver. It is because we check; we could also identify which stocks were being pushed to our store. Complaint? Of course we complained to HQ but it still happens. So we establish additional checks from our side and then amend the inventory records accordingly.” Acting Assistant Manager, N-3-A*

The stores, in general, viewed inventory management at HQ as ‘poor’, due to inaccurate forecast of fresh produce, under ordering, missing orders and stocks being pushed to the stores to clear space in the central warehouse. When goods were ordered, a Purchase Order (PO) was generated, which, upon delivery, was converted into a Good Inward Document (GID) so that payment to the correct suppliers could be arranged accordingly.



However, this process was not consistently carried out at HQ. There were instances where POs were not converted to GID in a timely manner, causing discrepancies in the stores' inventory records. While many factors contribute to delays in conversion (e.g. where HQ staff were too busy or where clarification was required due to incorrect details on documentation), the underlying cause was poor staff diligence.

*"We submit the information (about errors in deliveries) to HQ and ensure our records are updated. But when the next load (delivery) comes, we see that there are mistakes. We called HQ and they said they haven't had time to update. Therefore, we have to accept the 'wrong' deliveries, adjust our records and if necessary, quickly make space to accommodate the excess stocks of some items, and put in urgent delivery of OOS items." Manager, N-1-C*

Returns from stores were not diligently updated in the HQ system and this led to inaccurate information in the HQ and stores' systems. When store orders were not delivered, HQ compensated the affected stores accordingly. However, during peak seasons, such as Chinese New Year, when records were not updated on time or were lost, HQ did not compensate the affected stores.

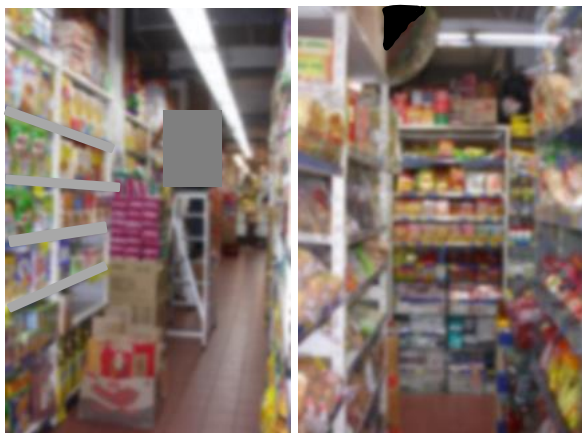
*"When HQ doesn't deliver our orders properly, we record down and tell them. Sometimes, they bring the missing orders in the next trip. If they don't, they have to compensate us. But during holidays, like Chinese New Year or Hari Raya, where everybody is very busy and there are missing orders, we have no time to tell them immediately. But eventually when we do, they would say they are too busy or lost the document, so we get no compensation. What to do, no choice, just have to adjust our records." Store Manager, E-5-B*

#### **4.2.2 Store Outlets**

The accounting process at the stores required store staff and suppliers to conduct physical counts of the stock. Errors that occurred during this process (e.g. when both store staff and suppliers made errors in their stock keeping records), caused inaccurate information in the inventory system.

Single-storey stores located at residential areas experienced a significant challenge with their in-store operations due to limited space and store layout. For example, some of these

stores had aisle spaces so narrow that only basket shopping (see Figure 4-7 and read Box 4-1) was possible. As such, replenishment activities conducted during operating hours in such stores had to be done very quickly with erroneous consequences, such as putting the wrong products on the display shelf or putting the products in the wrong shelf space. Incidence of products damage during replenishment was also higher amongst these stores.



**Box4-1**

*"Our store is very small and we have so many SKUs. So suppliers of chilled products will usually come very early in the morning to stock up their products and quickly go to other small FS stores. When HQ deliveries arrive, the driver and another HQ delivery staff would quickly offload the stocks in front of our store. As they offload, we have to quickly stack the boxes into roll cages and if not enough roll cages, we block stack in an unsheltered open space in front of the store temporarily. When customer traffic is low, we quickly move the stocks into the store. But during rainy season, we can't use the unsheltered space and so we had to block stack on the walkway...yes, we had to work 'super' fast because we're worried residents complain."* Assistant Store Manager, C-1-C

Figure 4-7 Narrow aisles affected replenishment

The receiving process also encountered many errors because different barcodes, item barcodes and packaging barcodes were scanned at this stage. Errors that typically occurred included scanning cartons with supplier packaging and scanning products with similar packaging. In addition, GSOP stated that incorrect receipts had to be recorded on PDAs, yet the stores recorded them manually. The original intention was to update the system in real-time but this was omitted due to pressure to reduce or prevent congestion at the receiving area. The situation was exacerbated at stores with no designated goods receiving or 'private' (away from pedestrian movement) area for receiving activities (see Figure 4-8 and read Box 4-2). Another challenge faced by such stores was heavy rain, which caused both staff and (delivery) drivers to seek shelter, thereby delaying the receiving process. As suppliers were allowed to deliver stocks between 7am to 4pm on a daily basis, this also posed a problem at the receiving stations when too many deliveries arrived at the same time, and caused congestion.

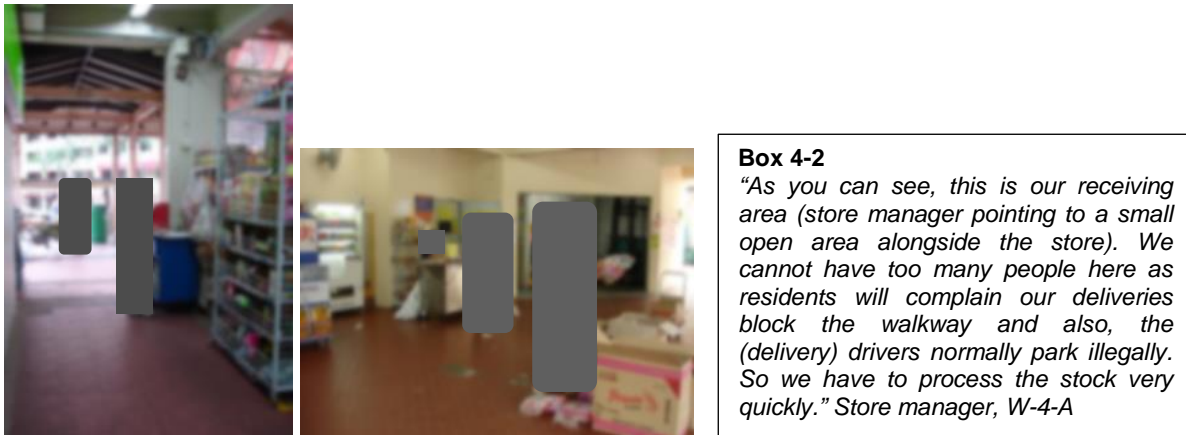


Figure 4-8 Example of stores without private areas for receiving activities

OS at stores were common and caused by both internal factors (e.g. HQ warehouse pushing excess stocks onto stores) and external factors (e.g. unsuccessful product promotions). To manage OS occurrences, stores with back rooms had to quickly reorganise their back rooms to accommodate the stock. When more space was needed, a system of mobile storage equipment (e.g. roller cages, mobile racks and shelves) was adopted. Stores with no back rooms relied heavily on these mobile storage equipment, not only as extended display shelves but also to manage OS occurrences.

A common cause of OOS and OS occurrences at stores was pilferage: theft of loose items, such as fruits, vegetables and condiments; theft of packaged goods and theft committed by ‘professionals’. Most stores had more than four entries/exits points, so it was easy for theft to occur, despite the existence of CCTV and strategically-located internal security staff (senior store staff doubling up as security officers).

*“There will be some people, mostly ‘aunties’ (middle age to elderly housewives), who will cook curry or something and they only need one onion or chilli, so they come into the store and put a chilli in their pocket and walk out.” Store Executive, S-1-C*

*“We often see customers go to the fresh fruits area, put grapes into a bag and while they are shopping in the store, they also eat the grapes. By the time they reach the cashier, they only pay for the remaining grapes in the bag.” Acting Assistant Manager, E-5-B*

Serious cases of pilferage were conducted by 'organised crime syndicates' (term coined by SS store managers), where higher-value items were stolen by the coordinated efforts of gangs comprising of foreigners on tourist visas. While GSOP stated that thieves had to be detained and police be contacted, it did not prescribe how to handle the situation safely. It was here that cohesiveness of all store managers was observed. When one store manager successfully apprehended organised crime in their store, the effective tactics used were shared with other stores immediately via personal calls to each other. FS store managers would meet informally on a regular basis to exchange experiences on their respective store operations to improve their SSOPs accordingly.

*"We experienced a string of 'broad daylight robbery' where we had groups of tourists, normally from China, coming in and stealing expensive items, such as perfume, cologne, small electronic products. Normally, they come into the store in a group of 4-5 people where 1 person will use pocket knife to cut out the security tag while the others position themselves as look outs and to block line-of-sight of staff." Assistant General Manager, E-4-A*

Another example of 'professional' thieves at work was situations when a 'customer' had paid for their purchases but walked back into the store and put unpaid items into their shopping bags.

FS adopted a range of strategies to minimise pilferage in stores. The most common approach used in all stores was to reward employees who apprehended culprits. A second approach common among stores that rented external space at store-front as display area was to station staff in the display area outside the store where products were placed in mobile carts and shelves. CCTV equipment installed in stores could only monitor entrance, exits and corners within the store but not the outside areas. In some stores, a cashier was stationed outside but most stores required customers to pay only at checkout stations at store exits. The member of staff stationed in the extended areas (see Figure 4-9) was normally the store manager, who was equipped with a two-way hands-free communication system that all staff, except the cashiers, also carried. The number of staff stationed outside

increased as the area became busy. However, only the store managers typically kept watch, while other staff would be replenishing stock in the outside area.



Figure 4-9 Display shelves outside the stores

In-store ordering process required accurate information input from other in-store activities, such as receiving, frequent inventory checks and reconciliation, as well as product scanning at the checkout stations. Misplaced items, goods written off and damaged goods, if not tracked diligently, affected the accuracy of information. Misplacement of goods and write-offs also led to errors in inventory errors and occurred where stocks were found at the 'wrong' place, such as a bag of mince pork found amongst instant noodles or a bottle of shampoo found amongst bottles of cooking oil. Stackers, supervisors and store managers were tasked to locate misplaced items and returned them to their respective shelves, but such activities were time-consuming, especially at larger stores. Damaged goods, such as an opened Tetra Pack drink, which could not be sold, had to be written off. Sale of fresh durians had the highest risk of being written off because of the way in which they were sold. Customers selected unopened fresh durians (see Figure 4-10) and handed them to store staff who would break them open (durians are selected based on the smell, colour and taste of the fruit) and pack the durian meats into small Styrofoam take-away boxes (see Figure 4-11) when the sales were concluded. However, if a customer decided not buy the durians after opening, store staff would re-pack the opened durians and retail them at a discounted price. Unsold, opened durians were disposed of at the end of day.



Figure 4-10 Durians



Figure 4-11 Durians repacked in Styrofoam take-away boxes (Source: StinkySpikes 2009)

Another factor affecting in-store ordering was inaccurate forecasting, and the forecasting of certain products was particularly challenging. For example, the sale of fresh meat, vegetables and fruits was very difficult to monitor, as stocks were ordered and received by weight. The entire carcass of a pig, for example, was normally delivered to the stores, where the carcass would be cut into pieces, placed in Styrofoam trays, shrink-wrapped and sold (see Figure 4-12). Information pertaining to the customers' purchase was manually keyed into a stand-alone price-tag-printing machine. Although the price-tag listed the price, date and weight complete with a barcode, the PoS system would only scan the price and not the weight of the packed food, so OS of these food groups was common. Unsold stock was normally sold at a discounted price and any remaining old stock at closing time was discarded accordingly.



Figure 4-12 Whole pig carcass 'processed' into cuts and pre-packed for sale

*"Fresh meat stock is one of the hardest to forecast because we don't order and sell by piece. Although we sell by weight, it is still not very accurate. For example, we sell live frogs. We don't order by weight. We just tell the supplier how many frogs to deliver every day. A customer picks three live frogs and then, our staff clean the frogs, weigh them, key in details (items purchased are frogs and their weight) of the 'processed' frogs into a price tag printing machine. While it is printing the price tag, our staff will pack the 'processed' frogs into a plastic bag, stick the newly printed tag onto the bag so that customer can pay at the checkout station. The price tag will list the description of the content, i.e. frogs, weight and price of the 'processed' frogs. Therefore, how do you reconcile what you ordered and what you sold? It is hard. Another example is the fresh vegetables. We order and sell by weight. But during transportation, some vegetables may be bruised and cannot be sold. Again, what we ordered and what we sold, it will never match. So we just have to base our orders on past orders and estimate from there."*

*Store Executive, W-4-A*

Errors in data collection activities included under/over scans at checkout stations, especially during peak times; items sold but still 'appearing' in the inventory system and error scans due to similar packaging. For example, a customer may have picked five packets of different flavoured instant jelly mixes, where the packaging for all flavours was the same, except for a round sticker (1.5cm in diameter) affixed at the top right corner of the packet (see Figure 4-13). In this instance, if a cashier scanned one packet and multiplied by five, a stock level error would occur, because the customer did not buy five packets of the same flavour.

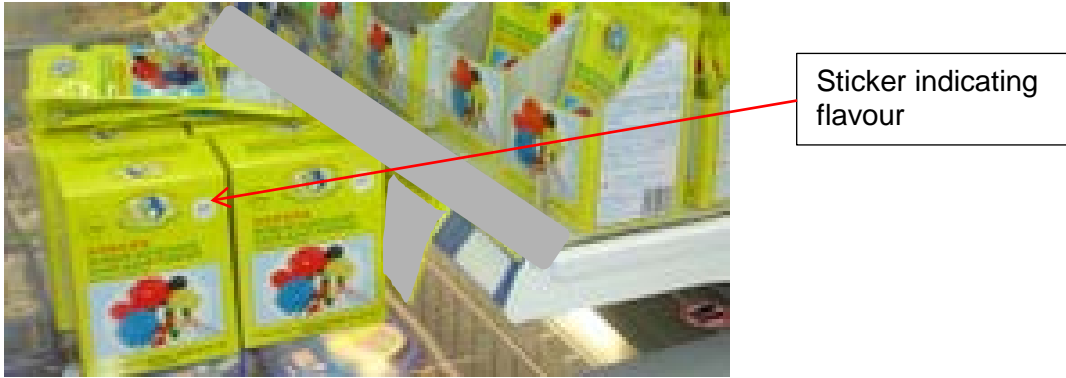


Figure 4-13 Sticker indicating flavour on packets of jelly crystals

*“The cashiers were supposed to scan every item. But there were times, especially when there were long queues at the checkout stations, cashiers have under scanned products, especially, products with similar packaging but have different flavours. For example, customer brought 12 canned drinks where the prices of each can were the same. Instead of scanning number of cans per flavour, cashier scans one can and keyed in number of cans for the purchase. When that happens, the stocks for the other un-scanned cans would become inaccurate.” Manager, E-1-B*

### 4.2.3 Data Capture Systems

The user interface of FS's data capture systems was frequently mentioned as a major cause of OOS and OS at stores. Although standard training were provided to all system users, errors still emerged due to the work attitudes of staff, especially during peak periods, where lines at the checkout stations were long. If an error scan occurred at a checkout station, it was the cashier's responsibility to correct the mistake in the PoS system and quickly resume processing customers' purchases. However, this GSOP was not diligently adhered to by cashiers in certain outlets, due to unfamiliarity with the system and pressure to reduce queue time at checkout stations. Such errors distorted the information captured by PoS, in turn affecting the accuracy of inventory forecasting.



*“When a cashier made an error in the PoS system, only we (store manager or assistant manager or acting manager) can over-write the system so the error can be amended. If errors were made during peak shopping time, we become very busy because we have rush around to the affected checkout station to over-write the system so that customers don’t have to wait too long to pay. We’ve had situations where impatient customers left their filled baskets at the start of the checkout stations and walked out. So that wasn’t good for the store. We try our best to be quick but there are eight checkout stations here and only two of us (who can over-write PoS system). We just do what we can.” Assistant Manager, S-2-A*

Most stores also experienced problems with the accuracy of item barcodes and barcodes related to various types of packaging. Problems experienced with barcodes of canned drinks, such as sodas and beer, were frequently mentioned. For example, a can’s individual barcode was often used in the ordering process, despite the fact that canned drinks could be sold both as individual cans (see Figure 4-14), or packaged into six, 12 and 24 cans. To entice customers to make bulk purchases, canned drinks sold in a tray of six (see Figure 4-15), a carton tray of 24 (see Figure 4-16) or a carton box of 24 (see Figure 4-17) were given attractive bulk purchase discounts. At the checkout area, if a customer purchased a pack of 6 cans, the GSOP required that the cashier scan the barcode of one can and then key into the PoS system that a six-pack was purchased. The PoS system then applied the bulk purchase discount accordingly. In reality, the PoS system might not do this and the cashier then had to call the supervisor to over-write the system and to key in the discount manually. The newer stores had their systems updated and overcame such problems, but this problem remained common among older stores.



Figure 4-14 Sale of individual canned drinks



Figure 4-15 Sale of six canned drinks wrapped in brand packaging



Figure 4-16 Sale of 24 canned drinks shrink-wrapped on cardboard tray



Figure 4-17 Sale of 24 canned drinks in a carton box

Problems with the in-store PoS systems were experienced by all FS stores, and store managers from the larger stores (e.g. N-2-A, N-3-A, S-2-A, E-4-A and W-4-A) had collectively approached HQ to collaborate in resolving problems with the PoS system.

*“There are definitely issues with our PoS and HQ’s system. Many of the conflicts at checkout stations are caused by different information in our system and HQ’s...HQ’s list of bar code was different from ours in the PoS so we had to call them (HQ) regularly. When the store is busy, we simply have no time for such confusion. Therefore, something had to be done to improve the situation...it is very frustrating....Some of the managers from other stores shared the same feelings with us...sometimes we catch up at the pub and we share stories. So there will be a few of us (store managers) going to HQ with some ideas on how to improve the design of the system.” Store Manager, E-4-A*

#### **4.2.4 Suppliers**

Supplier performance and deliveries also affected OSA of products in stores. Under- and over-packing of cartons, incorrect barcodes, incorrect deliveries and documentation were commonly cited as indicators of poor supplier performance. Errors also occurred when suppliers sent incorrect orders to the stores due to their failure to update the information on their systems. Senior management stipulated penalties to address problems with supplier performance in packaging and deliveries, but these penalties were not consistently applied (E.g. some store managers did allow suppliers to return the correct deliveries to the stores within the same day. By doing so, suppliers could bring accurate delivery confirmation documents back to their offices.).

*“When suppliers delivered incorrect products or quantity, HQ wants us to issue fine for the errors because our sales would be affected. But we give them (another) chance. Humans are not perfect...so we told them if they could deliver the correct orders before 4pm (suppliers’ daily delivery window to stores was between 7am to 4pm), we wouldn’t issue fines to them. These days, we don’t even have to say it as they already know what to do if they delivered the wrong products or quantity.” Manager, E-1-B*

The release of product barcodes from suppliers was another cause of inaccurate inventory information. Suppliers were required to submit a list of product barcodes to HQ before HQ’s operational hours and then HQ would release the list of product barcodes to all stores to update their PoS system before opening hours. Updates to the list of product barcodes (caused by promotional changes or reactions to suppliers’ competitors’ changes) had to be

communicated to HQ in real-time and HQ would then email the updated list of barcodes to the stores, followed by a phone call alert to store. Problems emerged when the list and changes to the list were not released in time by HQ or the suppliers or both.

*“Sometimes we have arguments with our customer about price differences, especially when the product is on promotion. The customer tells us the item is supposedly on offer but our PoS still lists the original price. Sometimes, our customer has to tell us the promotional price – (it is) so embarrassing. Most of the time, the customer tells us the truth. But sometimes, they lie and in order to avoid congestion at the cashiers’, we just accept what they say. Nowadays, we have no choice but to ask the customer to wait while we check the price ... not good for customer service.” Store Executive, W-3-C*

### **4.3 Store with Low Occurrence of OOS (Low-OOS)**

#### **4.3.1 Store Characteristics**

Of the eight stores with low OOS occurrences, five were located at the East of Singapore, with sizes ranging from 4,300 sqm to over 40,000 sqm. Store formats in this category comprised of single storey, single storey with mezzanine floor, 2-level and 3-level supermarkets (Refer to Table 4-1 for additional characteristics of stores with low-OOS). The average age of these stores was seven years and based on the number of SKUs carried and the floor space of the stores, this group had an average of 0.74sqm per SKU. The extent of OOS occurrences averaged less than 1% (0.96%) in this group. Pilferage and poor staff diligence were the most common causes of OOS occurrences in low-OOS stores. Most stores characteristics (e.g. age, location, size, number of SKUs) within this group were heterogeneous except that they all had back rooms.

#### **4.3.2 In-Store Processes**

The majority in-store processes of low-OOS stores are summarised in Table 4-2. In-store planning of product assortments and types of VAS offered were similar in all stores in this group, where wet market produce, grocery, beauty and health categories were amongst the most common items and repackaging of confectionery and fresh produce was provided. In-store ordering and receiving were practised in accordance to GSOPs and all stores in this group replenished their display shelves with stocks stored on the tops of display shelves and in back rooms.

Table 4-1 Characteristics of low-OOS stores

Store ID	N-2-A	E-2-B	E-3-B	E-4-A	E-5-B	E-6-B	W-5-C	C-2-C	Average or Generalised Characteristics for Group
Store Format	S-2	S-2	SS	S-2	SS-M	S-3	SS-R	SS-R	NA
SKUs	± 20,000	± 8,000	± 10,000	± 30,000	± 15,000	± 20,000	± 8,000	± 6,000	± 15,000
Size (sqft)	± 41,000	± 19,000	± 13,000	± 31,000	± 10,000	± 33,000	± 5,800	± 4,300	± 20,000
Back room	Y	Y	Y	Y	Y	Y	Y	Y	Y
Receiving Area	Designated	Designated	Makeshift	Designated	Designated	Designated	Makeshift	Makeshift	NA
Age	10	11	10	3	7	6	3	6	7
Nbr. of staff in one Internal Security Team (IST)	13	11	7	12	11	8	7	5	9
% of OOS	1.00	0.30	1.00	0.25	0.83	1.50	1.50	1.30	0.96
Top 3 Common Causes of OOS and OS	<ul style="list-style-type: none"> <li>• Pilferage</li> <li>• Store records not updated</li> <li>• Error scans due to similar packaging</li> </ul>	<ul style="list-style-type: none"> <li>• Pilferage</li> <li>• Error scans due to similar packaging</li> <li>• Under/Over scans</li> </ul>	<ul style="list-style-type: none"> <li>• Suppliers' list of barcodes do not match HQ's list barcodes</li> <li>• Pilferage</li> <li>• System design issue</li> </ul>	<ul style="list-style-type: none"> <li>• Pilferage</li> <li>• Damage &amp; Written Off goods</li> <li>• Misplaced items</li> </ul>	<ul style="list-style-type: none"> <li>• Pilferage</li> <li>• Wrong packaging</li> <li>• Wrong product &amp; quantity</li> </ul>	<ul style="list-style-type: none"> <li>• Pilferage</li> <li>• Incorrect receipts</li> <li>• Inaccurate forecast of fresh foods</li> </ul>	<ul style="list-style-type: none"> <li>• Pilferage</li> <li>• Error due to similar packaging</li> <li>• Store keeping error</li> </ul>	<ul style="list-style-type: none"> <li>• Pilferage</li> <li>• Incorrect receipts</li> <li>• Inaccurate forecast of fresh foods</li> </ul>	<ul style="list-style-type: none"> <li>• Pilferage</li> <li>• Poor staff diligence</li> </ul>
Location Characteristics	<ul style="list-style-type: none"> <li>• Within a central neighbourhood shopping area</li> <li>• Surrounded by small family-owned provisional stores</li> <li>• Majority of customers from low income group and also Malaysians working in Singapore but reside in Johor Bahru*</li> </ul>	<ul style="list-style-type: none"> <li>• Amongst residential flats</li> <li>• Customers from low to middle income group*</li> </ul>	<ul style="list-style-type: none"> <li>• Amongst residential flats</li> <li>• Customers from low to middle income group*</li> <li>• Many foreign workers from India and China*</li> <li>• Open 24hours</li> </ul>	<ul style="list-style-type: none"> <li>• Amongst residential flat</li> <li>• Customers from low to middle income group*</li> </ul>	<ul style="list-style-type: none"> <li>• Standalone old building</li> <li>• Deliveries easily affected by rain as receiving area not sheltered, poor road conditions resulted in 'puddles' formed in receiving area</li> <li>• Customers from middle income group*</li> </ul>	<ul style="list-style-type: none"> <li>• Refurbished old shopping centre</li> <li>• Customer from middle income group*</li> </ul>	<ul style="list-style-type: none"> <li>• Void deck of a residential block</li> <li>• Heavily dependent on external storage space (i.e. extensive use of mobile storage)</li> <li>• Customers from low income group*</li> </ul>	<ul style="list-style-type: none"> <li>• Void deck of a residential block</li> <li>• Heavily dependent on external storage space (i.e. extensive use of mobile storage)</li> <li>• Customers from low income group*</li> </ul>	NA

NOTE:

S-2 = Supermarket with two levels S-3 = Supermarket with three levels SS = Single storey SS-M = Single storey with mezzanine floor SS-R = Single storey below residential block

Designated = Loading/unloading bays or sheltered areas Makeshift = At the back of store or quiet end of store, limited shelter

\*As advised by store respondents

Table 4-2 In-store process of low-OOS stores

Store ID	N-2-A	E-2-B	E-3-B	E-4-A	E-5-B	E-6-B	W-5-C	C-2-C
In-Store Plann Product Assortment ing:	<ul style="list-style-type: none"> <li>• Wet market produce grocery</li> <li>• Beauty &amp; health</li> <li>• Electronic goods</li> <li>• Imported beer, wine &amp; other alcohol</li> </ul>	<ul style="list-style-type: none"> <li>• Wet market produce</li> <li>• Grocery</li> <li>• Beauty &amp; health</li> </ul>	<ul style="list-style-type: none"> <li>• Pre-packed fresh produce</li> <li>• Grocery</li> <li>• Beauty &amp; health</li> </ul>	<ul style="list-style-type: none"> <li>• Wet market produce</li> <li>• Grocery</li> <li>• Beauty &amp; health</li> <li>• Imported beer, wine &amp; alcohol</li> </ul>	<ul style="list-style-type: none"> <li>• Pre-packed fresh produce</li> <li>• Grocery</li> <li>• Beauty &amp; health</li> </ul>	<ul style="list-style-type: none"> <li>• Wet market produce</li> <li>• Grocery</li> <li>• Beauty &amp; health</li> <li>• Electronic goods</li> </ul>	<ul style="list-style-type: none"> <li>• Wet market produce</li> <li>• Pre-packed fresh produce</li> <li>• Grocery</li> <li>• Beauty &amp; health</li> </ul>	
In-Store Planning: Types of VAS	Re-packaging of fresh produce and biscuits		Re-packaging of biscuits	Re-packaging of fresh produce and biscuits	Re-packaging of biscuits	Re-packaging of fresh produce and biscuits	Re-packaging of biscuits	
In-Store Ordering	GSOPs adhered, Hand-held PDAs used							
In-Store Receiving	GSOPs adhered, Hand-held PDAs used							
In-Store Replenishment: Types of Storage <sup>7</sup>	<ul style="list-style-type: none"> <li>• Top of display shelves</li> <li>• Sponsored storage boxes</li> <li>• Back room</li> </ul>		<ul style="list-style-type: none"> <li>• Top of display shelves</li> <li>• Back room</li> </ul>	<ul style="list-style-type: none"> <li>• Top of display shelves</li> <li>• Sponsored storage boxes</li> <li>• Back room</li> </ul>	<ul style="list-style-type: none"> <li>• Top of display shelves</li> <li>• Sponsored storage boxes</li> <li>• Stairwells</li> <li>• Back room</li> </ul>	<ul style="list-style-type: none"> <li>• Top of display shelves</li> <li>• Mobile racks</li> <li>• Roller cages</li> <li>• Back room</li> </ul>		

<sup>7</sup> See Figure 4-18 for pictures of types of storage adopted in low-OOS stores.



Inside Stores

Types of Storages (Low-OOS stores)

Outside Stores



Figure 4-18 Types of storage used by low-OOS stores



### **4.3.3 Locations and Causes of OOS and OS in Stores with Low OOS**

Figure 4-19 maps occurrences of OOS and OS occurring at different stages in the flow of in-store processes at low-OOS stores on to Kotzab and Teller's (2005) in-store logistical process model. This figure also summarises the GSOPs and SSOPs designed to address the occurrences of OOS and OS at the respective stages of in-store processes.

Stores with low-OOS experienced most causes of OOS and OS due to errors caused by staff, which in turn affected accuracy of the PoS system at checkout stations. To make space for new stocks from suppliers, HQ's warehouse often pushed stocks onto the stores, and as a result, stores had to improvise ways to manage OS incidents. One method commonly used by low-OOS stores was to place excess stocks in roller cages when back rooms were full. Although this method helped to contain excess stocks, its downside was that stackers, who had forgotten about these stocks after replenishing display shelves with stocks in back rooms, placed new orders after stocks became low in the back room. OS occurred again when new stocks arrived and stocks stored in roller cages were rediscovered. Poor supplier performance, such as incorrect deliveries, caused incorrect stock levels thereby impacting on the quality of in-store replenishment activities as well as in-store ordering. Poorly maintained information related to stocks (such as updated list of barcodes or promotional activities not timely communicated), caused confusion about products' prices at checkout stations. Such confusion resulted in incorrect information being recorded at PoS.

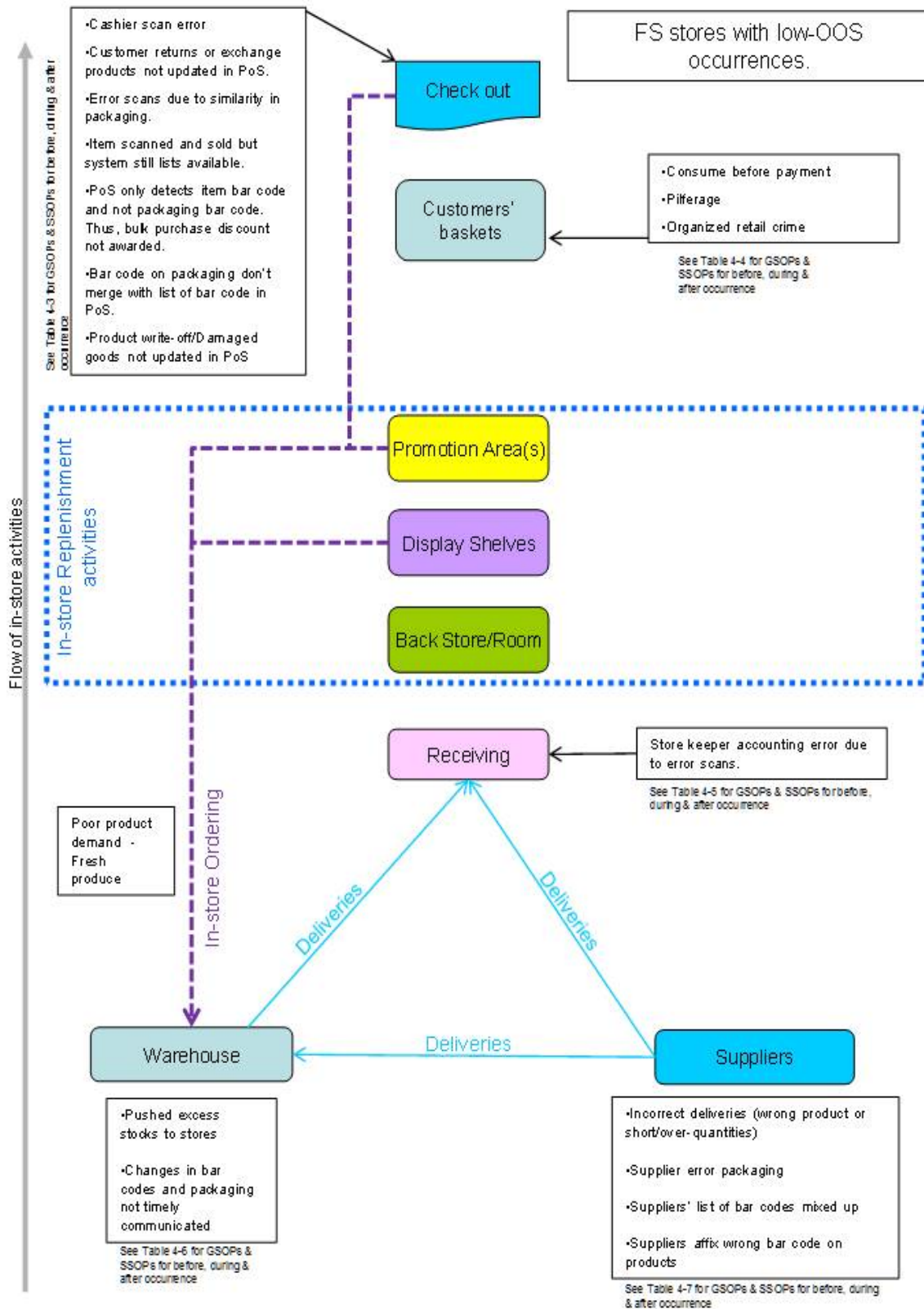


Figure 4-19 Locations and causes of OOS & OS in low-OOS stores

#### **4.3.4 GSOPs and SSOPs of Low-OOS Stores**

GSOPs and SSOPs to manage the occurrence of OOS and OS at respective stages of in-store processes are summarised in Tables 4-3 to 4-7.

From Tables 4-3 to 4-7, it can be seen that managers of this group of stores generally adhered closely to the GSOP established, in order to address OOS and OS occurrences consistently at all three stages (i.e. before, during and after).

##### ***Before OOS Occurrence***

At each stage of occurrence, most store managers in the group were proactive in minimising errors in in-store processes, such as positioning themselves at checkout stations to be on stand-by to help cashiers should any confusion arise. Most store managers also made personal calls to major suppliers to encourage accurate deliveries.

##### ***During OOS Occurrence***

While GSOPs stipulated that only store managers were to resolve issues, such as correcting error scans at checkout stations, some stores (e.g. E-3-B and N-2-A) included store executives as being responsible for resolving such issues. This flexibility of responsibility permitted store executives to assist if the store manager was unavailable. Thus, the issue were resolved faster and congestion at checkout stations was prevented.

##### ***After OOS Occurrence***

If the cause of OOS or OS occurrence could be identified as attributable to staff's lack of familiarity with store systems due to language inadequacy, the store manager provided systems training in Mandarin to help improve understanding. However, formal written warnings to staff with consistently poor performance were issued if such poor performance continued after training. While this strict approach was adopted by most store managers in

this group, a small number of store managers preferred to use counselling and encouragement as a means to correct inappropriate behaviour.

With regard to supplier errors, store managers in this group typically adopted personal communications and a collaborative approach to ensure that suppliers made correct deliveries and updated information in their inventory systems after the discovery of errors. They also worked closely with HQ on incorrect deliveries as well as updating data on their intranet systems.

In summary, most characteristics of stores in this group were heterogeneous. Store managers adopted a strict and proactive approach towards staff behaviour and advocated specialised training to improve staff performance when necessary. Store managers also used a proactive stance, via personal communications, to ensure suppliers and HQ warehouse performed the expected follow-up actions to update deliveries and stock information in their systems.

Table 4-3 GSOPs and SSOPs to address causes that occurred at checkout stations in low-OOS stores

CAUSES	BEFORE		DURING		AFTER	
	GSOP	SSOP	GSOP	SSOP	GSOP	SSOP
Cashier scan error.	<ul style="list-style-type: none"> <li>Cashier trained to scan each item.</li> <li>Factors scan accuracy performance into remuneration.</li> </ul>	C-2-C SM stood at checkout stations to keep close watch on their cashiers (only two check out stations) in order to minimise such an error.	SM to overwrite PoS so cashier rescans item(s).	<ul style="list-style-type: none"> <li>E-3-B &amp; E-5-B SM or SE would overwrite error.</li> <li>N-2-A, E-4-A &amp; E-6-B SE would overwrite error.</li> </ul>	Cashier to be counselled or disciplined. Sent for further training if necessary.	<ul style="list-style-type: none"> <li>E-2-B SM issued verbal warning followed by letter.</li> <li>Staff diligence was a serious issue with this store.</li> </ul>
Customer returns or exchange products not updated in PoS.	Cashier updates system by rescanning returned items and scanning exchanged items	C-2-C SM handled returns or exchanges, took new items & task cashier to rescan to update records.	<ul style="list-style-type: none"> <li>Error was undetected until inventory levels in system indicate discrepancy.</li> <li>Immediate investigation followed into cause of discrepancy.</li> </ul>		Cashier to be counselled or disciplined.	E-2-B SM issued verbal warning followed by letter.
Error scans due to similarity in packaging	Cashier trained to scan each item.	C-2-C SM positioned at checkout stations.	SM to overwrite PoS so cashier rescans item(s).	<ul style="list-style-type: none"> <li>E-3-B &amp; E-5-B SM or SE would overwrite error.</li> <li>N-2-A, E-4-A &amp; E-6-B SE would overwrite error.</li> </ul>	Cashier to be counselled or disciplined.	C-2-C SM issued verbal warning.
Item scanned & sold but system still lists available	<ul style="list-style-type: none"> <li>Physical inventory reconciled with inventory in system on a weekly basis.</li> <li>Immediate investigation when records show discrepancy.</li> </ul>		SM to confirm item is sold and then adjusted record in system.		System problems were currently being reviewed by SM at time of interview.	
PoS only detects item bar code & not packaging bar code. Thus bulk purchase discount not awarded.	System problem currently being reviewed by SM at time of interview but Cashier advised to be diligent to pick up occurrence.		Cashier to manually overwrite the PoS and keyed in bulk discount.	<ul style="list-style-type: none"> <li>C-2-C SM had to approve before cashier could overwrite.</li> <li>E-3-B &amp; E-5-B SM or SE to approve before cashier could overwrite.</li> <li>N-2-A, E-4-A &amp; E-6-B SE to approve before cashier could overwrite.</li> </ul>	System problems were currently being reviewed by SM at time of interview.	
Bar code on packaging do not merge with list of bar code in PoS (list is uploaded by HQ).	SM to collaborate with HQ to ensure list of barcodes are updated.	N-2-A, E-4-A & E-6-B SM calls HQ.	<ul style="list-style-type: none"> <li>SM to call HQ immediately.</li> <li>At the same time, Cashier to manually key in bar code on packaging into PoS in order to continue the sale.</li> </ul>		SM to collaborate with HQ to ensure list of barcodes were updated.	N-2-A, E-4-A & E-6-B SM called HQ.
Product write-off/Damaged goods.	<ul style="list-style-type: none"> <li>Efficient handling of products.</li> <li>Only good condition items are displayed.</li> </ul>	<ul style="list-style-type: none"> <li>E-2-B has a special space right next to store, similar to a void deck but dedicated case supermarket to sort &amp; repack fresh produce – prices are set based on quality.</li> <li>N-2-A, E-5-B &amp; E-6-B has a dedicated area (around 5mx5m) behind the store</li> </ul>	<ul style="list-style-type: none"> <li>If CPG, items would be processed by receiving staff as returns.</li> <li>If fresh produce, incident is reported to SM.</li> </ul>		Review handling or packaging of products if appropriate.	

SM = Store Manager SE = Store Executive CPG = Consumer Packaged Goods

Table 4-4 GSOPs and SSOPs to address causes that occurred at stage before checkout station (customers' baskets) in low-OOS stores

CAUSES	BEFORE		DURING		AFTER	
	GSOP	SSOP	GSOP	SSOP	GSOP	SSOP
Consume before payment – common in fresh fruits section	Staff to be diligent to spot such incidence.	<ul style="list-style-type: none"> <li>E-2-B had 11 staff as their Internal Security Team (IST), N-2-A had 10, E-3-B had 7, E-4-A had 12, E-6-B had 10</li> <li>W-5-C had 7 &amp; C-2-C had 5.</li> <li>N-2-A, E-2-B, E-3-B, E-4-A, E-5-B &amp; E-6-B printed out pictures of regular unreasonable shoppers and habitual thieves and pinned them onto notice board in SM office to help staff spot them.</li> </ul>	Encourage 'thief' to pay for products consumed.		Staff to be praised and rewarded for being diligent.	
Pilferage/Theft	Staff to be diligent to spot such incidence.	<ul style="list-style-type: none"> <li>E-2-B had 11 staff as IST, N-2-A had 10, E-3-B had 7, E-4-A had 12, E-6-B had 10, W-5-C had 7 &amp; C-2-C had 5.</li> <li>N-2-A, E-2-B, E-3-B, E-4-A, E-5-B &amp; E-6-B printed out pictures of regular unreasonable shoppers and habitual thieves and pinned them onto notice board in SM office to help staff spot them</li> </ul>	Apprehend and escort to SM office, encourage 'thief' to pay for stolen item. If not, contact police.		Staff to be praised and rewarded for being diligent.	
Organised retail crime	Staff to be diligent to spot such incidence.	E-2-B had 11 staff as IST, N-2-A had 10, E-3-B had 7, E-4-A had 12, E-6-B has 10, W-5-C had 7 & C-2-C had 5.	Apprehend and escort to SM office, contact police.		Staff to be praised and rewarded for being diligent.	

Table 4-5 GSOPs and SSOPs to address causes that occurred at receiving stations in low-OOS stores

CAUSES	BEFORE		DURING		AFTER	
	GSOP	SSOP	GSOP	SSOP	GSOP	SSOP
Error scans	Receiver trained to scan only item bar code. Scans to be checked with records on PDA.	N-2-A, E-2-B, E-4-A, E-5-B & E-6-B have dedicated receiving sections.	Error is undetected until inventory levels in system indicate discrepancy.		<ul style="list-style-type: none"> <li>Staff responsible was to be counselled and sent for retraining if necessary.</li> <li>If it occurred again, a warning letter would be issued.</li> </ul>	<ul style="list-style-type: none"> <li>E-5-B &amp; W-5-C receiving staffs were gently reminded to be more careful.</li> <li>N-2-A SM repeated training in-house in Mandarin to enhance understanding.</li> </ul>

Table 4-6 GSOPs and SSOPs to address causes that occurred at HQ warehouse of low-OOS stores

CAUSES	BEFORE		DURING		AFTER	
	GSOP	SSOP	GSOP	SSOP	GSOP	SSOP
Changes in packaging and bar code not timely communicated	<ul style="list-style-type: none"> <li>Any changes in packaging and barcodes to be announced at store opening.</li> <li>If change occur during opening hours, SM to inform all cashiers.</li> <li>SS replace shelf display tags if necessary.</li> </ul>		SM to inform cashiers of changes and simultaneously, SS to remove shelf display tags until new ones are available to be displayed.	N-2-A, E-4-A & E-6-B SE to inform cashiers.	SM/SE to ensure changes in packaging and barcodes were communicated accordingly.	

Table 4-7 GSOPs and SSOPs to address causes attributable to suppliers of low-OOS stores

CAUSES	BEFORE		DURING		AFTER	
	GSOP	SSOP	GSOP	SSOP	GSOP	SSOP
Wrong product	Stores to share information to ensure accuracy in both parties' systems.	<ul style="list-style-type: none"> <li>W-5-C &amp; C-2-C SMs call suppliers to ensure correct deliveries.</li> <li>N-2-A, E-2-B, E-3-B, E-4-A, E-5-B &amp; E-6-B SM calls major suppliers to encourage accurate deliveries</li> </ul>	Penalty for incorrect deliveries. However, if on good terms, allow supplier to correct delivery within the same day.	W-5-C & C-2-C SMs permitted same day to correct delivery.	<ul style="list-style-type: none"> <li>Remind suppliers the importance of accurate deliveries.</li> <li>If occurrences are high, feedback to HQ so that official warning can be issued.</li> </ul>	W-5-C & C-2-C SMs called suppliers to ensure correct deliveries.
Short-packed/wrong quantity	Stores to share information to ensure accuracy in both parties' systems.	<ul style="list-style-type: none"> <li>W-5-C &amp; C-2-C SMs call suppliers to ensure correct deliveries.</li> <li>N-2-A, E-2-B, E-3-B, E-4-A, E-5-B &amp; E-6-B SMs call major suppliers to encourage accurate deliveries</li> </ul>	<ul style="list-style-type: none"> <li>Accept quantity and allow supplier to bring the remaining quantity within the same day.</li> <li>Otherwise, raise documentation to note split-delivery.</li> </ul>	W-5-C & C-2-C SMs permitted same day to correct delivery.	<ul style="list-style-type: none"> <li>Remind suppliers the importance of accurate deliveries.</li> <li>If occurrences are high, feedback to HQ so that official warning can be issued.</li> </ul>	W-5-C & C-2-C SMs called suppliers to ensure correct deliveries.
Supplier error packaging	Receiver/Stacker to be diligent to spot such incident.	<ul style="list-style-type: none"> <li>W-5-C &amp; C-2-C SMs call suppliers to ensure correct deliveries.</li> <li>N-2-A, E-2-B, E-3-B, E-4-A, E-5-B &amp; E-6-B SMs call major suppliers to encourage accurate deliveries.</li> </ul>	<ul style="list-style-type: none"> <li>If serious error, report to SM &amp; stacker remove affected items from display shelf. SM contact supplier immediately.</li> <li>If minor, cashier to note error when scanning affected items.</li> <li>If necessary, supplier to delivers affected items with correct packaging immediately.</li> </ul>	W-5-C & C-2-C SMs permitted same day to correct delivery.	<ul style="list-style-type: none"> <li>Remind suppliers the importance of accurate deliveries.</li> <li>If occurrences are high, feedback to HQ so that official warning can be issued.</li> </ul>	W-5-C & C-2-C SMs called suppliers to ensure correct deliveries.
Suppliers' list of bar code mixed up	Receiver to be diligent to spot such incident.	<ul style="list-style-type: none"> <li>C-2-C SM calls suppliers to ensure correct deliveries.</li> <li>N-2-A, E-2-B, E-3-B, E-4-A, E-5-B &amp; E-6-B SMs call major suppliers to encourage accurate deliveries</li> </ul>	<ul style="list-style-type: none"> <li>SM call supplier for correct list to be sent to HQ, who will then upload into PoS.</li> <li>SM to obtain a copy of the list and overwrites PoS with correct bar code when necessary.</li> </ul>		SM to feedback to supplier and collaborate to work on putting in checks to spot such incidents.	N-2-A, E-2-B, E-4-A, E-5-B & E-6-B SMs called supplier.
Suppliers affix wrong bar code on products	Receiver to be diligent to spot such incident.	<ul style="list-style-type: none"> <li>W-5-C &amp; C-2-C SMs call suppliers to ensure correct deliveries.</li> <li>N-2-A, E-2-B, E-3-B, E-4-A, E-5-B &amp; E-6-B SMs call major suppliers to encourage accurate deliveries.</li> </ul>	Receiver to reject affected consignments. Considered error delivery and effect penalty. However, if on good terms, allow supplier to correct errors within the same day.	W-5-C & C-2-C SMs permitted same day to correct delivery.	<ul style="list-style-type: none"> <li>Remind suppliers the importance of accurate deliveries.</li> <li>If occurrences are high, feedback to HQ so that official warning can be issued.</li> </ul>	<ul style="list-style-type: none"> <li>W-5-C &amp; C-2-C SMs called suppliers to ensure correct deliveries.</li> <li>N-2-A, E-2-B, E-3-B, E-4-A, E-5-B &amp; E-6-B SMs called major suppliers to encourage accurate deliveries.</li> </ul>



### **4.3.5 In-Store OOS and OS Management**

#### ***Store Managers' Influence on Range of Products***

As the product list was issued by HQ, all FS's stores basically offered a similar range of products, varying between 60 to 80 per cent of HQ-listed products. The remaining percentages of products were provided to meet local market environment or customers' requests.

*"...60% of the product categories and assortments we offered in our store were prescribed by HQ. They know which products were popular (in Singapore) so we just follow their list. However, we have been operating in this neighbourhood for over 10 years, so we have local knowledge and experience (requests from regular' customers for items not on HQ product list). Therefore, 40% of our product categories were for customers in this store (location)." Acting Assistant Manager, N-2-A*

#### ***Store Managers' Influence on Store Operations***

With in-store operations, GSOPs were adopted with minor customisations due to customer requirements, requests and the respective store managers' expectations of their in-store performance. For example, the acting Assistant Manager of N-2-A expected stackers to ensure display shelves 'looked' fully stocked, i.e. bottles had to be placed to the edge of display shelves, with products' front facing forward (see Figure 4-20). If there were insufficient bottles to fill the display shelf, bottles had to be moved to the edge. The space behind the bottles was deliberately left empty to help staff identify which items needed immediate replenishment. Display shelves that were not fully stocked were considered unacceptable by store managers of some stores (see Figure 4-21). This SSOP was implemented because customers provided feedback that they 'liked' to see well-stocked and neat display shelves. However, the Assistant Manager of C-1-C instructed stackers to fill empty spaces with other stocks to optimise space (see Figure 4-22). It was then the responsibility of stackers to remember which stock was placed at those 'floating' locations.

The different approaches and expectations towards on-shelf availability and display affected the efficiency of replenishment activities.

Store managers in this group experienced varied levels of pilferage. To manage inventory shrinkage caused by pilferage, various methods to increase security levels were established.



Figure 4-20 Display shelves to be fully stocked

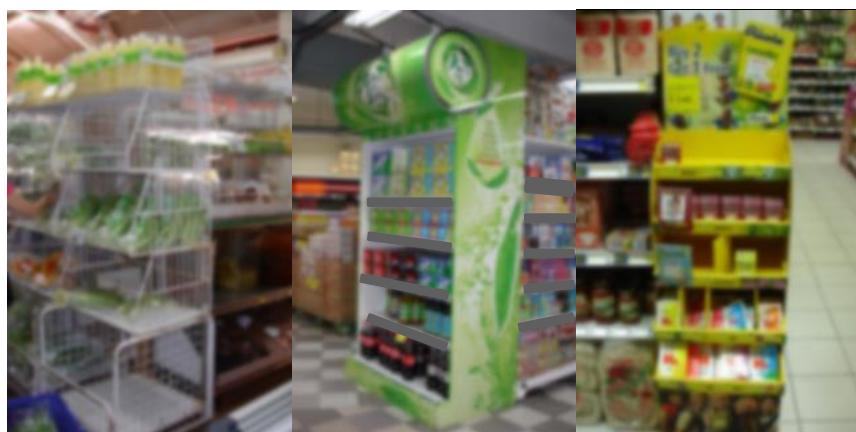


Figure 4-21 Display shelves not fully stocked



Figure 4-22 Shelf space being optimised

Store managers of single storey stores appointed staff to 'double-up' as security personnel, while the two- and three-storey supermarkets as well as the hypermarket used a combination of security teams and CCTV to monitor customer and staff activities.

*"We use our CCTV cameras to monitor customers shopping in our hypermarkets. As the store has different stories, sometimes, it takes time for us to get to the thief. So we take a screen shot of the thief, print out the image and put it on the notice board in our office so that all employees can keep an eye out for such people. ... By doing this, we can point out the 'regulars' who keep stealing our goods." Acting Assistant Manager, N-2-A*

### **Stores' Relations with Store Staff**

Store managers in this group maintained a strict compliance with HQ's approach towards staff lapses in performance. The store managers and supervisors did not hesitate to reprimand staff when mistakes occurred frequently.

*"We all work as a team. Therefore, everyone must be responsible and do their job properly. Otherwise, customers will complain or we may have to compensate customers for our mistakes". Assistant Store Manager, C-2-C*

*"All of us (store management levels) have done stacking and replenishment before we come to this position. So we know how the process is and what can be done to ensure good performance. That is why when staff make mistakes, we quickly investigate to see what is the cause of the mistake – is it because they don't know the process or they are too lazy to follow process. We train when we need to, we scold when we have to." Store Manager, E-5-B*

As mentioned in Chapter Three, the case supermarket chain had no set procedures to calculate either the cost of OOS and OS or the duration of OOS. However, store managers maintained a firm control on staff who committed mistakes that had implications to OSA, especially on high turnover products. In fact, one of the criteria for staff performance appraisal was the ability to minimize the number of mistakes that had a direct impact on inventory record.

*"Receiving is very important. If my staff makes mistakes, it will affect the inventory records of my store. If there are always mistakes, HQ will issue a "please explain" letter and that is not good for the performance record of my store." Acting Assistant Manager, E-6-B*

### **Stores' Relations with Headquarters (HQ)**

Store managers in this group maintained close reporting relationships with HQ, working with specific colleagues at HQ to discuss matters related to inventory levels, in-store ordering and incorrect deliveries (product or quantity) from HQ.

*"If there is a problem, we just call HQ. We will follow up with an email. But we normally call them first to see what happened and discuss how to resolve the matter. Usually, a phone call can settle everything...and it is fast. Sometimes, we also have to know 'who' to call...and then everything will settle very quickly."* Store Manager, E-5-B

The timely provision of the list of products and their barcodes was one of the causes of OOS and OS in stores. Despite store managers' regular communications with HQ, delays persisted in getting the list of product barcodes, as well as updates on the list before stores opened for business.

*"Sometimes, there are arguments at the cashier because the customer argues with the cashier on prices. The newspaper says it is on discount but because we didn't get the list on time, our system still shows the original price. We then have to quickly call HQ to verify and then charge the customer the correct price. Every time HQ don't give us the list (of updated barcodes), we experience such problems. We have spoken to HQ several times on this and they always blame the suppliers (for being late)."* Manager, E-4-A

*".....because we know HQ is not always on time to give us the list, so we run around the store to update price tags and our system as soon as we get updates. It is tiring but blaming is not going to help. So we help ourselves to minimize customers' conflict. As our store is big, it is actually good exercise for us too so we don't mind doing it. But it gets difficult when the store is very busy."* Acting Assistant Manager, N-2-A

### **Stores' Relations with Suppliers**

Store managers in this group worked closely with their suppliers. In addition to access to the FS's inventory systems, they communicated with their suppliers regularly to investigate errors and resolve conflicts, and when necessary, they approached suppliers' sales representatives and discussed product promotions and customers' feedback on their

respective products and brands. It was also observed that store supervisors in this group helped suppliers' sales representatives to replenish or arrange stock on display shelves.

*"Sometimes, when customer traffic is low, we will help suppliers as they replenish stocks. While helping them, we would chat with them about the status of their company, about any new upcoming products or promotions. We do this to maintain good relationship with them. You see, these suppliers also 'service' our competitors. So with good relationships...if anything happens, for example, we need urgent stocks, they would put in extra efforts to meet our requirements. If the supplier was new to our store, we will also help them...guide them on how we want our display shelves to look. In our opinion, if we help them, (in hope) they will help us back. Suppliers were also happy to share product knowledge with us because they know if one of their products was OOS, we would promote substitute products or flavours or packaging (from the same supplier) to them. Suppliers were also aware that if their competitor brand was OOS, we would promote their products as substitutes. They also knew we tend to promote new products to our regular customers. So in a way, we are helping them (suppliers) to create awareness of their products." Manager, E-2-B*

However, despite such efforts, stores in this group still experienced noticeable errors caused by suppliers, such as incorrect deliveries and incorrect barcodes on packaging. These errors caused inaccurate information in the inventory systems of the stores as well as those of the suppliers.

*"Despite working closely with our suppliers, we still experienced inaccurate deliveries. Each time it (e.g. incorrect deliveries) happens, we would call the affected suppliers for clarification and we found that the information on our systems don't match those at suppliers' information system. I think problem will require some time to get it right. We will just have to continue to work closely with our suppliers." Manager, Acting Assistant Manager, E-6-B*

### **Stores' Relations with Customers**

Store managers in this group were diligent in 'spotting' customers that seemed to need their assistance or advice on products or brands. As the checkout stations were located near the entrances of the stores, store managers in this group proactively stationed themselves near the checkout stations, and attempted to greet customers entering the store. But it was their diligence in helping customers with product assistance that constituted the majority of their dealings with customers.

*“We have a lot of China foreign workers shopping at our store after their shift work. As they are unfamiliar with the brands common in supermarkets in Singapore, very often they would ask us for recommendations. In addition, they will ask us to recommend the cheaper range of food products and household items as well.”* Manager, E-3-B

*“My store is small so I know where the stocks are very quickly. Quite often, the maids (domestic helpers) would come with two young children and ask me to help them pick a few items because they struggle to control the children inside the store...so if we're not too busy, we will do it for them..even if the store is a bit busy, the maids can see, and so they will wait a little while...but we still help them...it is okay.”* Assistant Store Manager, C-2-C

## **4.4 Stores with Medium Occurrence of OOS (Medium-OOS)**

### **4.4.1 Store Characteristics**

There were four stores in this group, two of which were located in the North region and two in the West region of Singapore. Three stores were single-storied with the fourth being a two-storey supermarket (refer to Table 4-8 for additional characteristics of medium-OOS stores). Periods of operations for these four stores were relatively short with an average of only four years. Based on the number of SKUs carried and the floor space of the stores, this group had an average of 0.97sqm per SKU. Extent of OOS occurrences averaged less than 3% (2.70%). Error scans due to similar packaging was the most common cause of OOS occurrence in medium-OOS stores. Most stores characteristics (e.g. age, location, size, number of SKUs) within this group were heterogeneous except that they all had back rooms.

### **4.4.2 In-Store Process**

Table 4-9 summarises the major in-store processes of medium-OOS stores. Product assortment offered by stores in this group included fresh produce normally found in traditional wet markets (loose or pre-packed), beauty and health products and general groceries. Two stores also provided electronic goods for their customers. All four stores closely adhered to the GSOPs that covered in-store planning and receiving. In-store replenishment conducted in these four stores typically began with accessing stocks stored on top of the display shelves or sponsored storage boxes. Additional stocks were moved from the back store onto display shelves and excess stocks placed on top of the display shelves. Supplier-delivered stock was left along the aisles. Store staff also replenished display shelves with this stock (see Figure 4-23).

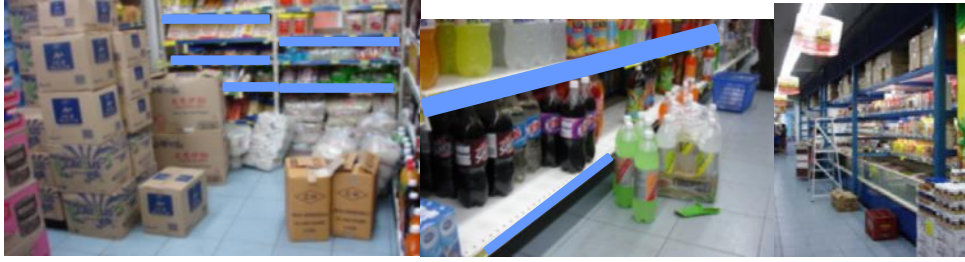


Figure 4-23 Supplier stock waiting to be processed



Table 4-8 Characteristics of medium-OOS stores

Store ID	N-3-A	N-4-C	W-3-C	W-4-A	Average or Generalised Characteristics for Group
Store Format	SS	SS-R	SS	S-2	NA
SKUs	± 28,000	± 9,000	± 10,000	± 20,000	± 17,000
Size (sqft)	± 25,000	± 9,000	± 7,000	± 28,000	± 18,000
Back room	Y	Y	Y	Y	Y
Receiving Area	Designated	Makeshift	Designated	Makeshift	NA
Age	5	2	6	4	4
Nbr of members in one Internal Security Team (IST)	5	4	5	13	7
% OOS	3.11	3.30	2.40	2.00	2.70
Top 3 Common Causes of OOS and OS	<ul style="list-style-type: none"> <li>• Inaccurate PoS data capture</li> <li>• Bar coding errors</li> <li>• Pilferage</li> </ul>	<ul style="list-style-type: none"> <li>• Pilferage</li> <li>• Stock keeping error</li> <li>• Error due to similar packaging</li> </ul>	<ul style="list-style-type: none"> <li>• Error deliveries from HQ</li> <li>• Error deliveries from suppliers</li> <li>• Under/Over scans</li> </ul>	<ul style="list-style-type: none"> <li>• HQ records not timely updated with store returns</li> <li>• Supplier records not timely updated with store returns</li> <li>• Error due to similar packaging</li> </ul>	Error due to similar packaging
Location Characteristics	<ul style="list-style-type: none"> <li>• Within an old shopping complex</li> <li>• Receiving area inside a multi-storey car park (connected to shopping centre)</li> <li>• Customers from middle income group*</li> </ul>	<ul style="list-style-type: none"> <li>• Within a central neighbourhood shopping area</li> <li>• Surrounded by provisional shop</li> <li>• Competitor supermarket chain store across a major pedestrian walkway</li> <li>• Customers from low income group*</li> </ul>	<ul style="list-style-type: none"> <li>• Amongst residential flats</li> <li>• Large and sheltered receiving area, also used as mobile storage</li> <li>• Large mosque nearby</li> <li>• Customers from low to middle income group*</li> </ul>	<ul style="list-style-type: none"> <li>• Standalone refurbished old building with very large sheltered area</li> <li>• Entire level 2 was 'back room'</li> <li>• Customers from low to middle income group*</li> </ul>	NA

**NOTE:**

SS = Single storey SS-R = Single storey below residential block S-2 = Supermarket with two levels

Designated = Loading/unloading bays or sheltered areas Make-shift = At the back of store or quiet end of store, limited shelter

\*As advised by store respondent

Table 4-9 In-store process of medium-OOS stores

Store ID	N-3-A	N-4-C	W-3-C	W-4-A
In-Store Planning: Product Assortment	<ul style="list-style-type: none"> <li>•Wet market produce</li> <li>•Pre-packed fresh produce</li> <li>•Grocery</li> <li>•Beauty &amp; health</li> <li>•Electronic products</li> </ul>	<ul style="list-style-type: none"> <li>•Pre-packed fresh produce</li> <li>•Grocery</li> <li>•Beauty &amp; health</li> </ul>	<ul style="list-style-type: none"> <li>•Wet market produce</li> <li>•Pre-packed fresh produce</li> <li>•Grocery</li> <li>•Beauty &amp; health</li> </ul>	<ul style="list-style-type: none"> <li>•Wet market produce</li> <li>•Pre-packed fresh produce</li> <li>•Grocery</li> <li>•Imported beer, wine &amp; alcohol</li> <li>•Electronic products</li> <li>•DIY furniture</li> </ul>
In-Store Planning: Types of VAS	Re-packaging of biscuits	Re-packaging of fresh produce	Re-packaging of fresh produce and biscuits	
In-Store Ordering	GSOPs adhered, Hand-held PDAs used			
In-Store Receiving	GSOPs adhered, Hand-held PDAs used			
In-Store Replenishment: Types of Storage <sup>8</sup>	<ul style="list-style-type: none"> <li>•Supplier Sponsored storage boxes</li> <li>•Back room</li> </ul>	<ul style="list-style-type: none"> <li>•Top of display shelves</li> <li>•Sponsored storage boxes</li> <li>•Back room</li> </ul>	<ul style="list-style-type: none"> <li>•Top of display shelves</li> <li>•Back room</li> </ul>	<ul style="list-style-type: none"> <li>•Top of display shelves</li> <li>•Below escalators</li> <li>•Back room</li> </ul>



Figure 4-24 Types of storages used by medium-OOS stores

<sup>8</sup> See Figure 4-24 for types of storage used by medium-OOS stores.

The back room of W-4-A, unlike the other three stores (see Table 4-9), was located above the store. They used a unique way of moving stocks from the back room down to the display areas (see Figure 4-25). The back rooms of the other three stores (see Figure 4-26) were used to store not only stock, but also display items of expired promotions (e.g. suppliers' display boards that promoted special 'deals') awaiting pick-up by suppliers.

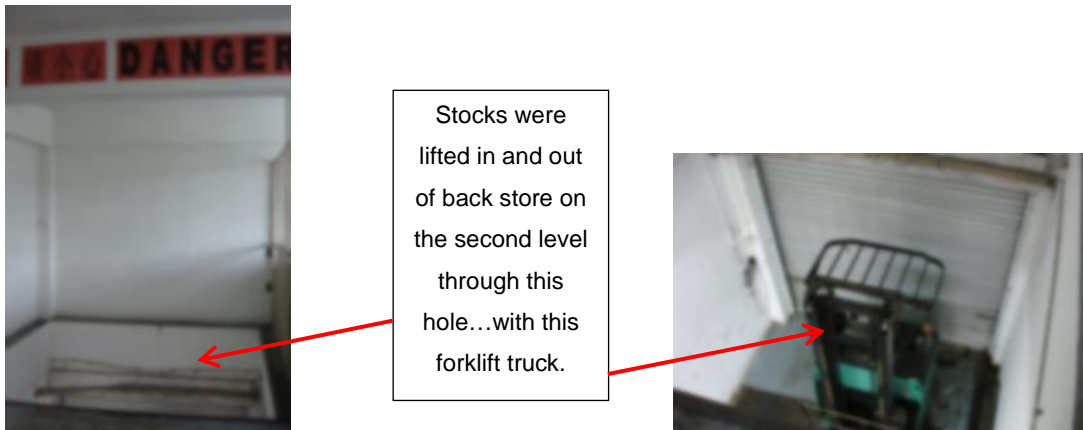


Figure 4-25 Replenishment from second level of store W-4-A

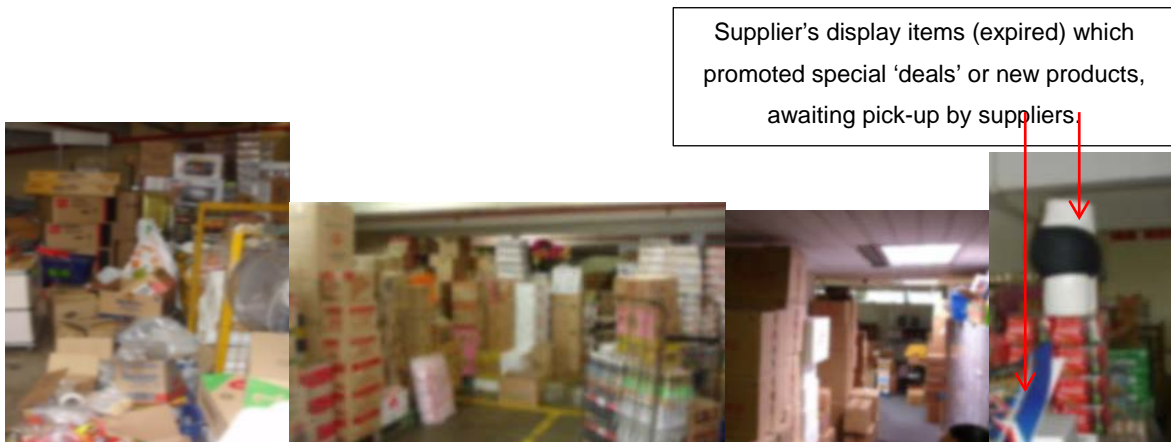


Figure 4-26 Back rooms of medium-OOS-OS stores

#### **4.4.3 Locations and Causes of OOS and OS in Medium-OOS Stores**

OOS and OS occurrences at various stages of in-store process at medium-OOS stores are indicated in Figure 4-27, together with the GSOPs and SSOPs designed to address their occurrences.

Error scans and confusion caused by inaccurate or out-dated barcodes of products in PoS resulted in mistakes at checkout stations. Poor staff diligence at the receiving stage resulted in inaccurate inventory information, especially in cases where incorrect receipts, while manually noted, were not recorded in a timely manner on the systems as staff became overwhelmed with the pressure to expedite incoming deliveries and avoid congestions at receiving areas. Poor supplier performance often caused confusion due to packaging mistakes and missing records of returns, which in turn affected inventory accuracy. Stores experienced OS due to HQ warehouse pushing excess stocks into the stores. Additional challenges caused by the HQ warehouse included, wrong deliveries, as well as missing records of product returns.

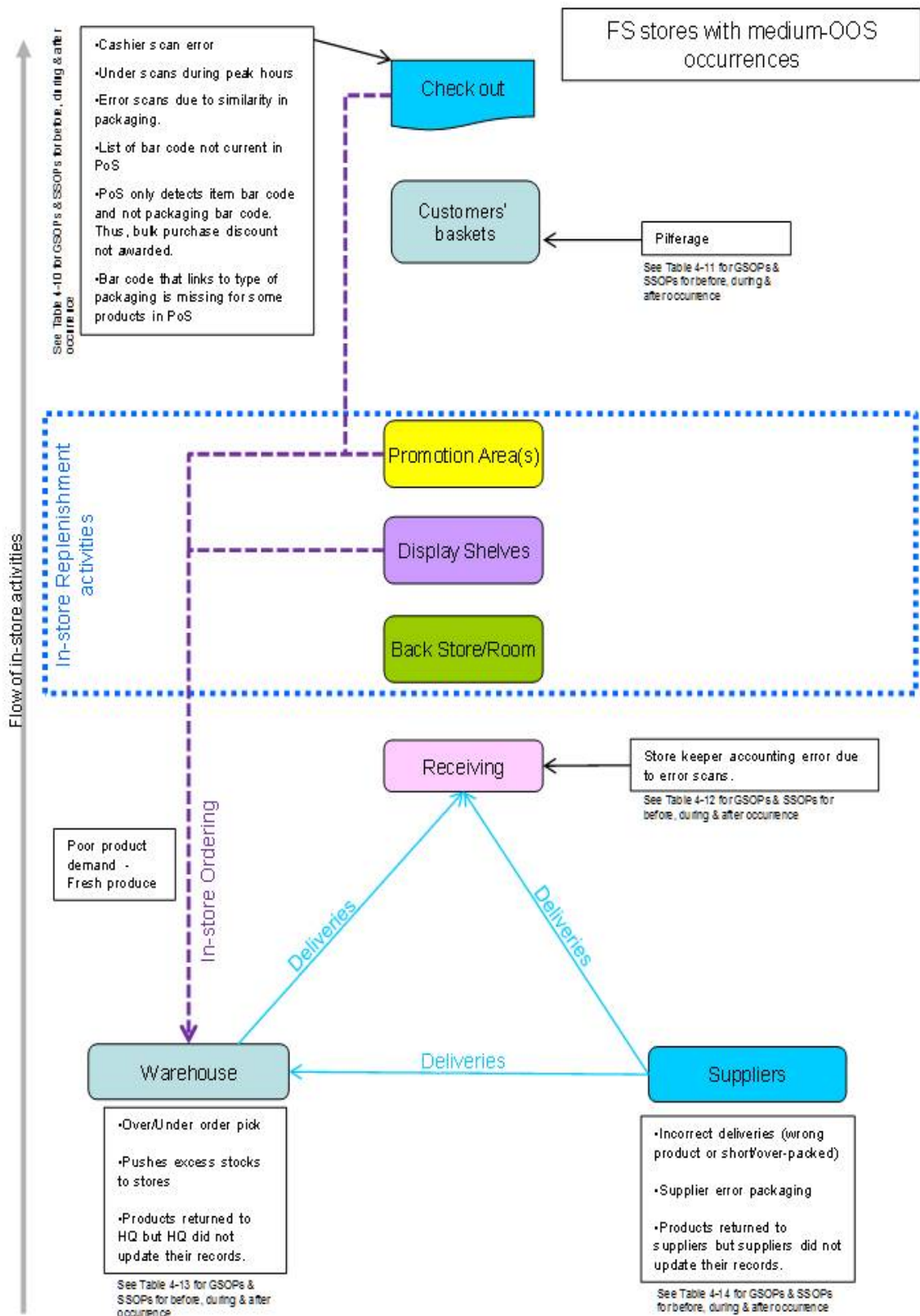


Figure 4-27 Locations and causes of OOS & OS in medium-OOS stores

#### **4.4.4 GSOPs and SSOPs of Medium-OOS Stores**

The GSOPs and SSOPs of medium-OOS stores are summarised in the following tables (See Tables 4-10 to 4-14). The majority of the stores in this group adhered to the GSOPs laid down by HQ.

##### ***Before OOS Occurrence***

HQ adopted 'preventative' strategies toward in-store operations. For example, GSOP for transaction scans at the checkout stations were to be fast and accurate. To encourage such performance, FS factored accurate (scans) performance in the calculation of cashiers' remuneration. Another GSOP related to maintaining accurate inventory information was on the timely release of the list products' barcodes. GSOPs required store managers to collaborate with HQ to ensure the list was accurate. One particular store, N-3-A, would make personal calls to HQ regularly to ensure that their list of product barcodes was accurate.

##### ***During OOS Occurrence***

Most stores in this group adhered to GSOPs as OOS or OS occurred at the different stages of in-store processes. . However, one store (N-3-A) extended GSOPs and established SSOPs that allowed quick resolutions, such as immediate correction of error scans at checkout stations or confusion caused by inaccurate information on product barcodes in the PoS system.

##### ***After OOS Occurrence***

After the occurrences of OOS or OS, store managers seemed to adopt a less strict approach towards errors caused by staff, suppliers and HQ warehouse. Their preferred approach was towards counselling and collaboration to improve the performance of staff, suppliers and HQ warehouse. Some store managers made personal calls to their suppliers to ensure inventory and delivery information was updated and accurate. GSOP for incorrect deliveries from

suppliers warranted a financial penalty of S\$200 to S\$300 per occurrence, but store managers did not enforce the rule. Instead, they withheld issuance of the fine if suppliers delivered correct stock within the same day. They also worked closely with HQ warehouse to ensure accurate information in all parties' systems so that supplier relationships were maintained.

In summary, most characteristics of stores in this group were heterogeneous. Three stores in this group adhered to most GSOPs in the management of OOS occurrences. One particular store, N-3-A, established SSOPs to ensure specific in-store activities (such as error scans), were quickly resolved. With regard to GSOPs to manage OOS occurrences that occurred in other in-store processes, N-3-A adhered to them accordingly.

Table 4-10 GSOPs and SSOPs to address causes that occurred at checkout stations in medium-OOS stores

CAUSES	BEFORE		DURING		AFTER	
	GSOP	SSOP	GSOP	SSOP	GSOP	SSOP
Cashier scan error	<ul style="list-style-type: none"> <li>Cashier trained to scan each item.</li> <li>Factored scan accuracy performance into remuneration.</li> </ul>		SM to overwrite PoS so cashier rescans item(s).	N-3-A & W-4-A SE overwrites PoS.	<ul style="list-style-type: none"> <li>Cashier is counselled or disciplined.</li> <li>Sent for further training if necessary.</li> </ul>	<ul style="list-style-type: none"> <li>N-3-A SM tolerated but will counsel if errors increased.</li> <li>N-4-C &amp; W-4-A SMs counselled.</li> </ul>
Under scans during peak hours	<ul style="list-style-type: none"> <li>Cashier trained to scan each item.</li> <li>Factored scan accuracy performance into remuneration.</li> </ul>		<ul style="list-style-type: none"> <li>Error was undetected until inventory levels in system indicated discrepancy.</li> <li>Immediate investigation by SM followed into cause of discrepancy.</li> </ul>		Cashier is counselled or disciplined.	N-3-A, N-4-C & W-4-A SMs counselled cashier, stressed remuneration incentive.
Error scans due to similarity in packaging	Cashier trained to scan each item.		SM to overwrite PoS so cashier rescans item(s).	N-3-A & W-4-A SE overwrites PoS.	Cashier is counselled or discipline	<ul style="list-style-type: none"> <li>N-3-A SM tolerated but will counsel if errors increased.</li> <li>N-4-C &amp; W-4-A SMs counselled.</li> </ul>
List of barcodes is not current in PoS	SM to collaborate with headquarters to ensure list of barcodes are updated.	N-3-A calls HQ to closely collaborate to ensure accurate information in both parties' systems.	<ul style="list-style-type: none"> <li>SM to call HQ to upload updated list into PoS.</li> <li>Print the updated list to manually overwrite on PoS when necessary.</li> </ul>	N-3-A, W-3-C & W-4-A SM tasks SE to manually overwrite PoS when necessary.	SM to collaborate with HQ to ensure list of barcodes are updated.	N-3-A called HQ to closely collaborate to ensure accurate information in both parties' systems.
PoS only detects item barcode & not packaging bar code. Thus bulk purchase discount not awarded.	<ul style="list-style-type: none"> <li>System problem currently being reviewed by SM at time of interview.</li> <li>Cashier advised to be diligent to pick up occurrence.</li> </ul>		Cashier to manually overwrite the PoS and key in bulk discount.		System problem currently being reviewed by SM at time of interview.	
Bar code that links to type of packaging is missing for some products in PoS	SM to collaborate with HQ to ensure list of barcodes are accurate.	N-3-A calls HQ to closely collaborate to ensure accurate information in both parties' systems.	<ul style="list-style-type: none"> <li>SM to call HQ to upload updated list into PoS.</li> <li>Print the updated list to manually overwrite on PoS when necessary.</li> </ul>	N-3-A, W-3-C & W-4-A SM tasks SE to manually overwrite PoS when necessary.	SM to collaborate with HQ to ensure list of barcodes are updated.	N-3-A called HQ to closely collaborate to ensure accurate information in both parties' systems.



Table 4-11 GSOPs and SSOPs to address causes that occurred at stage before checkout station (customers' baskets in medium-OOS stores)

CAUSES	BEFORE		DURING		AFTER	
	GSOP	SSOP	GSOP	SSOP	GSOP	SSOP
Pilferage/Theft	Staff to be diligent to spot such incidence.	<ul style="list-style-type: none"> <li>• N-3-A has 5 IST members, W-3-C has 6 &amp; W-4-A has 13.</li> <li>• N-4-C SM requires all staff to double as security team.</li> <li>• Print out pictures of regular unreasonable shoppers and habitual thieves.</li> <li>• Displayed them onto notice board in SM office to help staff spot them.</li> </ul>	<ul style="list-style-type: none"> <li>• Apprehend and escort to SM office.</li> <li>• Encourage 'culprit' to pay for stolen item.</li> <li>• If not, contact police.</li> </ul>		Staff to be praised and rewarded for being diligent.	

Table 4-12 GSOPs and SSOPs to address causes that occurred at Receiving Stations in medium-OOS stores

CAUSES	BEFORE		DURING		AFTER	
	GSOP	SSOP	GSOP	SSOP	GSOP	SSOP
Error scans	<ul style="list-style-type: none"> <li>• Receiver trained to scan only item bar code.</li> <li>• Scans to be checked with records on PDA.</li> </ul>	N-4-C & W-4A SM will visit receiving stations to assist in easing congestion when necessary.	Error was undetected until inventory levels in the system indicated discrepancy.		<ul style="list-style-type: none"> <li>• Receiver to be counselled and sent for retraining if necessary.</li> <li>• If poor diligence occurred again, a warning letter would be issued.</li> </ul>	N-4-C & W-4-A SMs counselled.

Table 4-13 GSOPs and SSOPs to address causes that occurred at HQ warehouse of medium-OOS stores

CAUSES	BEFORE		DURING		AFTER	
	GSOP	SSOP	GSOP	SSOP	GSOP	SSOP
Over/Under order pick	Stores to share information with HQ to ensure accuracy in both parties' systems.	N-3-A called HQ to closely collaborate to ensure accurate information in both parties' systems.	<ul style="list-style-type: none"> <li>• Raise &amp; submit documentation to note error deliveries to HQ.</li> <li>• SM to call for missing orders to be delivered in the next scheduled delivery.</li> <li>• If over stock, adhoc promotions to encourage movement of over stock.</li> </ul>	W-4-A restacked stock to make space.	Stores to share information with HQ to ensure accuracy in both parties' systems.	N-3-A called HQ to closely collaborate to ensure accurate information in both parties' systems.
Pushes stocks onto stores thereby causing over-stocking	Continuous planning possible space management strategies to anticipate such an occurrence.		<ul style="list-style-type: none"> <li>• Activate creative space management strategies such as, adhoc specials</li> <li>• Restack stock to accommodate extra-stock.</li> </ul>	W-4-A restacked stock to make space.	SM to feedback and remind to HQ about challenges related to space.	N-3-A called to HQ to minimize such occurrences.
Products returned to headquarters but the records were not updated	Stores to share information with HQ to ensure accuracy in both parties' systems.	N-3-A called HQ to closely collaborate to ensure accurate information in both parties' systems.	SM to remind HQ via personal call to update the records.	<ul style="list-style-type: none"> <li>• N-4-C SM mentioned about updating records to visiting HQ staff at the store.</li> <li>• W-3-C tolerated HQ's untimely updating of records.</li> </ul>	SM to feedback and remind the implications of inaccurate information on inventory forecasting.	N-3-A called HQ to closely collaborate to ensure accurate information in both parties' systems.

Table 4-14 GSOPs and SSOPs to address causes attributable to suppliers of medium-OOS stores

CAUSES	BEFORE		DURING		AFTER	
	GSOP	SSOP	GSOP	SSOP	GSOP	SSOP
Wrong product	Stores to share information to ensure accuracy in both parties' systems.	<ul style="list-style-type: none"> <li>N-3-A called suppliers to closely collaborate to ensure accurate information in both parties' systems.</li> <li>N-4-C, W-3-C &amp;W-4-A spoke to supplier representatives at the stores.</li> </ul>	Penalty for incorrect deliveries. However, if on good terms, allow supplier to correct delivery within the same day.		<ul style="list-style-type: none"> <li>Remind suppliers the importance of accurate deliveries.</li> <li>If occurrences were high, feedback to HQ so that official warning can be issued.</li> </ul>	<ul style="list-style-type: none"> <li>N-3-A called suppliers to closely collaborate to ensure accurate information in both parties' systems.</li> <li>N-4-C, W-3-C &amp;W-4-A spoke to supplier representatives at the stores.</li> </ul>
Short-packed/ wrong quantity	Stores to share information with suppliers to ensure accuracy in both parties' systems.	<ul style="list-style-type: none"> <li>N-3-A called suppliers to closely collaborate to ensure accurate information in both parties' systems.</li> <li>N-4-C, W-3-C &amp;W-4-A spoke to supplier representatives at the stores.</li> </ul>	<ul style="list-style-type: none"> <li>Accept quantity and allow supplier to bring remaining quantity within the same day. Otherwise, raise documentation to note split-delivery.</li> </ul>		<ul style="list-style-type: none"> <li>Remind suppliers the importance of accurate deliveries.</li> <li>If occurrences were high, feedback to HQ so that official warning can be issued.</li> </ul>	
Supplier error packaging	Receiver/ Stacker to be diligent to spot such incident.	<ul style="list-style-type: none"> <li>N-3-A called suppliers to closely collaborate to ensure accurate information in both parties' systems.</li> <li>N-4-C, W-3-C &amp;W-4-A spoke to supplier representatives at the stores.</li> </ul>	<ul style="list-style-type: none"> <li>If serious error, SS will remove affected items from display shelf, SM contacts supplier immediately.</li> <li>If minor, cashier to note error when scanning affected items.</li> <li>If necessary, supplier to deliver affected items with correct packaging immediately.</li> </ul>		SM to feedback supplier and collaborate to work on putting in checks to spot such incidents.	<ul style="list-style-type: none"> <li>N-3-A called supplier to work on preventing occurrence.</li> <li>N-4-C, W-3-C &amp;W-4-A spoke to supplier representatives at the stores.</li> </ul>
Products returned to suppliers but the records were not updated	Stores to share information with suppliers to ensure accuracy in both parties' systems.	<ul style="list-style-type: none"> <li>N-3-A called suppliers to closely collaborate to ensure accurate information in both parties' systems.</li> <li>N-4-C, W-3-C &amp;W-4-A spoke to supplier representatives at the stores.</li> </ul>	<ul style="list-style-type: none"> <li>Inaccurate information undetected until inventory reconciliation exercise was conducted. SM to call supplier for immediate action.</li> </ul>		SM to feedback and remind suppliers the implications of inaccurate information on inventory forecasting.	<ul style="list-style-type: none"> <li>N-3-A called suppliers to closely collaborate to ensure accurate information in both parties' systems.</li> <li>N-4-C, W-3-C &amp;W-4-A spoke to supplier representatives at the stores.</li> </ul>

#### 4.4.5 In-Store OOS and OS Management

Store managers in this group adopted a more tolerant attitude towards errors made by their staff and suppliers compared to low-OOS stores. Some store managers felt that there were unavoidable factors, such as makeshift receiving areas, while others preferred to encourage and counsel staff about the importance of reliable OSA. The different approaches were influenced by store managers' attitude towards employee welfare and retention.

##### ***Store Managers' Influence on Range of Products***

Stores with larger display floor area provided a wider range of products and services compared to smaller stores. For example, two-storied supermarkets had a wet market and groceries sections on the ground floor, health and beauty sections and electronic goods sections on the second floor. Such stores offered a wide array of live seafood (see Figure 4-28) and VAS, such as on-site services of a butcher and fish monger. With an extensive array of fresh food, the challenge to achieve accurate forecasting for this product category was highlighted by some store managers. Loss of stock due to damage and pilferage was high in this product category. Store managers used strategies, such as repackaging and heightened security to minimize losses. Loose products were repacked into set units and/or weight per packet, e.g., fresh fruits delivered in rattan baskets by suppliers, were repacked into small packets or shrink-wrapped on Styrofoam trays (see Figure 4-29, read Box 4-3).

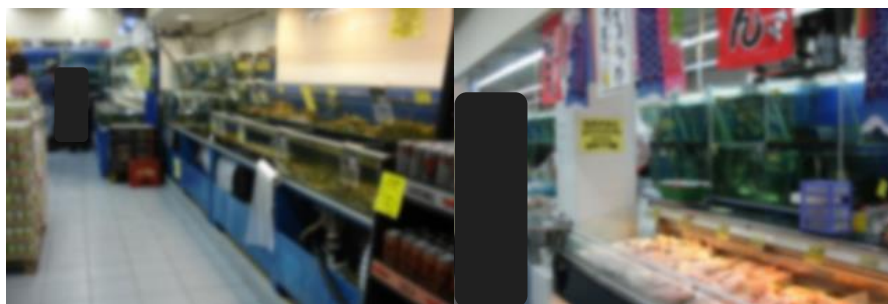


Figure 4-28 Wide range of live seafood



**Box 4-3**

*"We offer two types of packaging for some fruits to distinguish quality. When we receive the fruits from the suppliers, our staff will quickly sort out the ones that are in very good condition and pack them into the Styrofoam trays. The remaining fruits would be sold loose (unpacked) in the wooden fruit trays. Other reasons for re-packaging the fruits is to quick replenishment (due to easier handling compared to unpackaged fruits) and to minimize pilferage."*  
W-4-A

Figure 4-29 Repacked fresh fruits

Electronic goods (see Figure 4-30, read Box 4-4) were not part of the standard list of products issued by HQ but were offered in response to customers' requests. Customers' who requested electronic goods were international students or parents of international students that resided near one store (N-3-A). Foreign workers from India, China and Philippines were also buying electronic goods from the stores (N-3-A and W-4-A). Store managers explained that locals, i.e. Singaporeans, also purchased electronic products due to convenience and perceived reasonable prices.



**Box 4-4**

*"We didn't stock electronic goods such as rice cookers. But we noticed more and more foreign students and workers visit our stores. So we offered a small range of cheaper brands of rice cookers to see if they would be interested. To our surprised, the rice cookers were sold out very quickly. So we kept introducing new ranges of electronic goods. We noticed that even our local (Singaporean) customers were buying the electronic goods. Therefore, we decided to provide an extensive range of electronic goods in our store. Assistant Manager, N-3-A*



Figure 4-30 Electronic goods in two-storied supermarket

### **Store Managers' Influence on Store Operations**

While GSOPs were closely followed by store managers of stores in this group, these stores worked closely with HQ to establish and implement SSOPs. Store managers successfully convinced numerous suppliers to sponsor storage boxes (see Figure 4-31, read Box 4-5) because they found storage via such storage boxes was safer than block stacking stocks in open spaces on top of display shelves. As such, they actively approached suppliers to sponsor the installation and maintenance of storage boxes. In return, brands carried by these suppliers were advertised on the storage boxes. Another advantage of the storage boxes was that stackers improved their replenishment efficiency because of quick identification of stocks as well as ease in stock retrieval.



#### **Box 4-5**

*“Before having the supplier sponsored storage boxes, we block-stacked stocks on top of the display shelves. As we replenish the shelves during operating hours, sometimes there will be customers near the stackers. Therefore, stackers have to be careful not to drop the stock. So they took a longer time to replenish the shelves. Another problem we had before we had the boxes was customers who helped themselves with the stocks above the shelves.” Acting Assistant Manager, N-4-C*

Figure 4-31 Improved replenishment from supplier-sponsored storage boxes

### **Stores' Relations with Store Staff**

Stores in this group experienced staff diligence issues at checkout stations and receiving stage (see Figure 4-32). While HQ indicated corrective actions for mistakes made, store managers adopted a more tolerant and encouraging attitude toward compared to low-OOS stores. They preferred to investigate and send staff for training whenever mistakes occur.

*“We have one person in charge of receiving. Even before the store opens at 7am each day, the deliveries have already started. Suppliers will stop coming after 4pm but deliveries from HQ can sometimes sent deliveries just before we close for the day. We go through over 150 POs*

*(purchase orders) each day so it is very easy to make mistakes. Sometimes, we send more staff to help at receiving when too many suppliers and HQ deliveries, all come at the same time. We do what we can to help each other basically. But mistakes will happen.” Store Executive, W-4-A*

*“...our loading/unloading bay...is sheltered and quite spacious. So we can easily accommodate several deliveries coming in at the same. So receiving should be good, correct? No..we still have mistakes at this stage. We try talking to the staff in charge of this area and ask them why they make mistakes and they always blame the suppliers for inaccurate deliveries or stocks go missing. We will need to seriously review this process.” Supervisor, W-3-C*

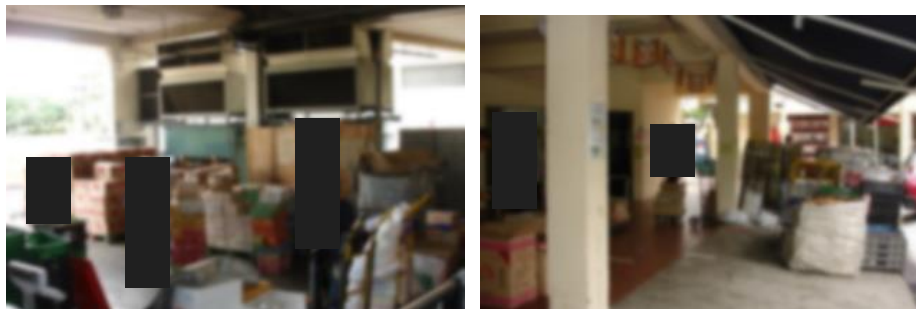


Figure 4-32 Dedicated and sheltered receiving areas

### **Stores' Relations with Headquarters (HQ)**

Stores in this group worked closely with HQ on in-store activities, especially activities related to inventory, forecasting, and in-store ordering. However, most stores experienced “dumping of excessive stocks” by HQ. This was done to make space in HQ’s warehouse for incoming stocks, new and/or promotional products. Stores had to establish creative ways to manage space, such as putting excess stocks in roller cages, so as to accommodate stocks that were not ordered and/or oversupply of stocks ordered.

*“Maybe because our store is quite big (2-stories) so HQ always deliver a lot of stocks to us...stocks which we didn't order. We called HQ to complain (about it) before but they still do it. So these days, we just accept it and get my 'people' (stackers) to find space to accommodate the excess stock.” W-4-A*

*“Sometimes, HQ would deliver more stocks than ordered. We called HQ to let them know such deliveries of extra stock caused us a lot of problems because we really don't have the space...to manage this problem, we just have many adhoc promotions to clear existing stock to make space for excess stocks.” N-4-C*

### **Stores' Relations with Suppliers**

Suppliers' performance for stores in this group had been poor with persistent incorrect deliveries and non-timely updates in their systems. For example, suppliers failed to update their systems of stores' returns of damaged goods or incorrect products. Instead of issuing penalties for poor performance, store managers arranged face-to-face meetings with incumbent suppliers to discuss ways to minimize and resolve issues.

*"Normally, Store managers don't meet vendors. Vendors deal only with our (HQ) buyer on new products, price negotiations, promotions and so on. However, if the deliveries were consistently having problems, then store managers can give feedback directly to vendors during deliveries."*  
MD

*"We (store managers) will try to meet the sales representatives of our suppliers when they visit the store to manage their stocks. We work closely with them on delivery issues...hoping to prevent or resolve problems, maybe caused by incorrect information and therefore, we get wrong deliveries." Acting Assistant Manager, N-4-A*

### **Store Relations with Customers**

Two of the four stores (N-3-A & W-4-A) were over 20,000 sqm. While they try to attend to customers' requests, the reaction times were not as quick as the smaller stores in this group. However, as both larger stores had wider aisle space, customers' experienced a more comfortable shopping experience and enjoyed a wider range of products and services compared to the other two smaller stores (N-4-C and W-3-C).

Store personnel of N-4-C were consistently reminded by its store manager to be attentive to customers because there was a store from a competitor supermarket chain located across a pedestrian walkway. Although customers continued to patronise their store, it was not uncommon for the same customers to walk over to the competitor store for periodic specials.



*“We have to be diligent with our customers’ needs. But with ABCD (competitor supermarket chain) so close to us, there is only so much we can do with our prices. So, we focus on customer service. We make sure we chat with them (customers) and be ‘super’ quick to offer assistance. ABCD also knows there is competition. But we cannot keep lowering our prices. So we monitor each other’s weekly specials to ensure we don’t have the same items or product category. In the end, we (FS and ABCD) will still have customers and the customers get the best prices for their grocery shopping. We are ‘okay’ about it.” Acting Assistant Manager, N-4-C*

## **4.5 Store with High Occurrence of OOS (High-OOS)**

### **4.5.1 Store Characteristics**

The seven stores within this group were located in different parts of Singapore where consumers came from varied income levels. The average age was ten years and size of stores was less than 10,000 sqm. Most stores had designated receiving areas and back rooms. Additional store characteristics are summarized in Table 4-15. Based on the number of SKUs carried and the floor space of the stores, this group has an average of 0.74 sqm per SKU (similar to low-OOS stores). Extent of OOS occurrences averaged less than 8% (7.56%) in this group. Pilferage and error scans due to similar packaging were the most common causes of OOS occurrences in high-OOS stores. Stores characteristics (e.g. age, location, size, number of SKUs) within this group were heterogeneous.

### **4.5.2 In-Store Processes of Stores with High-OOS**

Table 4-16 shows in-store processes of high-OOS stores. Products assortment offered by stores in this group included pre-packed fresh produce (four stores offered loose fresh produce as well), grocery, beauty and health products. Repacking services of fresh produce were offered by all stores, except one due to space limitations. GSOPs on in-store ordering and receiving were practised accordingly. However, stores with makeshift receiving areas were observed to improvise their receiving processes to prevent traffic congestions, such as when these areas were used as shelter from bad weather. In-store replenishment was conducted with stocks stored on top of display shelves. Additional stocks from back rooms and mobile storage<sup>9</sup> were retrieved when top shelves stocks were finished.

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<sup>9</sup> Stores with no backrooms relied mostly on different types of mobile modular storage methods to facilitate excess stocks and returns to be rolled in and out of stores before and after operating hours. Where possible, some stores rented additional space directly in front of the stores to extend its display areas.

Table 4-15 Characteristics of high-OOS store

Store ID	N-1-C	S-2-A	S-3-C	E-1-B	W-6-B	W-7-B	C-1-C	Average or Generalised Characteristics for Group
Store Format	SS-R	Hype	SS-R	SS-OC	SS	SS	SS-R	NA
SKUs	± 10,000	± 16,000	± 11,000	± 6,000	± 12,000	± 10,000	± 3,000	± 10,000
Size (sqft)	± 6,000	± 45,000	± 4,000	± 6,000	± 14,000	± 13,000	± 5,000	± 14,000
Back room	Y	Y	N	Y	Y	N	Y	Y
Receiving Area	Makeshift	Designated	Makeshift	Designated	Designated	Designated	Makeshift	NA
Age	15	7	5	11	3	3	25	10
% of OOS	7	4	5	18.7	6.32	4	7	7.56
Internal Security Team (IST)	5	7	4	4	6	5	5	5
Top 3 Common Causes of OOS and OS	<ul style="list-style-type: none"> <li>• Error deliveries from HQ</li> <li>• Stock keeping error</li> <li>• Error scans due to similar packaging</li> </ul>	<ul style="list-style-type: none"> <li>• Pilferage</li> <li>• Stock keeping error</li> <li>• Supplier records not updated with store returns</li> </ul>	<ul style="list-style-type: none"> <li>• Pilferage</li> <li>• Stock keeping error</li> <li>• Under/Over scans</li> </ul>	<ul style="list-style-type: none"> <li>• Pilferage</li> <li>• Inaccurate Forecasting</li> <li>• Error scans due to similar packaging</li> </ul>	<ul style="list-style-type: none"> <li>• Pilferage</li> <li>• Error scans due to similar packaging</li> <li>• Inaccurate supplier barcodes</li> </ul>	<ul style="list-style-type: none"> <li>• Pilferage</li> <li>• Inaccurate PoS data capture</li> <li>• Error Supplier deliveries</li> </ul>	<ul style="list-style-type: none"> <li>• Pilferage</li> <li>• Incorrect receipts</li> <li>• Inaccurate forecast of fresh food</li> </ul>	<ul style="list-style-type: none"> <li>• Pilferage</li> <li>• Error scans due to similar packaging</li> </ul>
Location Characteristics	<ul style="list-style-type: none"> <li>• Amongst residential flats</li> <li>• Customers from low income group*</li> </ul>	<ul style="list-style-type: none"> <li>• Within a large shopping centre near large Indian shopping precinct</li> <li>• Major public transport construction nearby</li> <li>• Customers from low to middle income group*</li> </ul>	<ul style="list-style-type: none"> <li>• Void deck of a residential block</li> <li>• Heavily dependent on external storage space (i.e. extensive use of mobile storage)</li> <li>• Customers from low income group*</li> </ul>	<ul style="list-style-type: none"> <li>• Part of a neighbourhood shopping precinct</li> <li>• Major hawker centre nearby</li> <li>• Provision shops of food and non-food product categories nearby</li> <li>• Customers from low income group*</li> </ul>	<ul style="list-style-type: none"> <li>• Below an industrial multistorey warehouse complex</li> <li>• Dormitory for construction workers nearby</li> <li>• Customers from low income group*</li> </ul>	<ul style="list-style-type: none"> <li>• Standalone single storey building</li> <li>• Food court nearby</li> <li>• Surrounded by residential flats</li> <li>• Dormitory for international students nearby</li> <li>• 2 primary schools nearby</li> <li>• Customers from low and middle income group*</li> </ul>	<ul style="list-style-type: none"> <li>• Void deck of a residential block</li> <li>• Customers from low income group*</li> </ul>	NA

**NOTE:**

Hype = Hypermarket SS = Single storey SS-OC = Single storey in old complex SS-R = Single storey below residential block

Proper = Loading/unloading bays or sheltered areas Makeshift = At the back of store or quiet end of store, limited shelter

\*Advised by store respondents

Table 4-16 In-store processes of stores with high OOS

Store ID	N-1-C	S-2-A	S-3-C	E-1-B	W-6-B	W-7-B	C-1-C
In-Store Planning: Product Assortment	<ul style="list-style-type: none"> <li>•Pre-packed fresh produce</li> <li>•Grocery</li> <li>•Beauty &amp; health</li> </ul>	<ul style="list-style-type: none"> <li>•Wet market produce</li> <li>•Pre-packed fresh produce</li> <li>•Grocery</li> <li>•Beauty &amp; health</li> <li>•Electronic goods</li> <li>•DIY furniture</li> </ul>	<ul style="list-style-type: none"> <li>•Pre-packed fresh produce</li> <li>•Grocery</li> <li>•Beauty &amp; health</li> <li>•Imported beer, wine and alcohol</li> </ul>	<ul style="list-style-type: none"> <li>•Wet market produce</li> <li>•Pre-packed fresh produce</li> <li>•Grocery</li> <li>•Beauty &amp; health</li> </ul>	<ul style="list-style-type: none"> <li>•Wet market produce</li> <li>•Pre-packed fresh produce</li> <li>•Grocery</li> <li>•Beauty &amp; health</li> <li>•Electronic goods</li> </ul>	<ul style="list-style-type: none"> <li>•Wet market produce</li> <li>•Pre-packed fresh produce</li> <li>•Grocery</li> <li>•Beauty &amp; health</li> <li>•Imported beer, wine &amp; alcohol</li> </ul>	<ul style="list-style-type: none"> <li>•Pre-packed fresh produce</li> <li>•Grocery</li> <li>•Beauty &amp; health</li> </ul>
In-Store Planning: Types of VAS	Re-packaging of fresh produce		Re-packaging of fresh produce and biscuits	Re-packaging of fresh produce			None
In-Store Ordering	GSOPs adhered, Hand-held PDAs used.						
In-Store Receiving	GSOPs adhered, Hand-held PDAs used.						
In-Store Replenishment: Types of Storage <sup>10</sup>	<ul style="list-style-type: none"> <li>•Top of Display Shelves</li> <li>•Back room</li> </ul>		<ul style="list-style-type: none"> <li>•Top of Display Shelves</li> <li>•Mobile Shelves, carts, trolleys</li> </ul>	<ul style="list-style-type: none"> <li>•Top of Display Shelves</li> <li>•Back room</li> </ul>		<ul style="list-style-type: none"> <li>•Top of Display Shelves (extra high ceiling)</li> <li>•Supplier sponsored storage boxes</li> </ul>	<ul style="list-style-type: none"> <li>•Top of Display Shelves</li> <li>•Mobile racks</li> <li>•Back room</li> </ul>

<sup>10</sup> See Figure 4-33 for types of storages in high-OOS stores.



Inside Stores

Types of Storages (High-OOS stores)

Outside Stores



Figure 4-33 Types of storages in high-OOS stores

### **4.5.3 Locations and Causes of OOS and OS in High-OOS Stores**

Consistent with the presentation of the earlier two groups of stores, the causes of OOS and OS occurrences at the various stages of the in-store process of high-OOS stores are illustrated in Figure 4-34, together with corresponding GSOPs and SSOPs designed to address the occurrences.

Similar to stores with low- and medium-OOS occurrences, stores in this group also experienced errors caused by staff and IT systems. However, the impacts of errors were heightened due to constant delay in detecting the errors, e.g. incorrect deliveries noted at the receiving stations but were not updated in a timely manner into the system. Other common causes of errors included packaging issues from suppliers as well as poor staff unfamiliarity with store systems. Error scans due to similarity of packaging and supplier mislabelling stocks also occurred in stores.

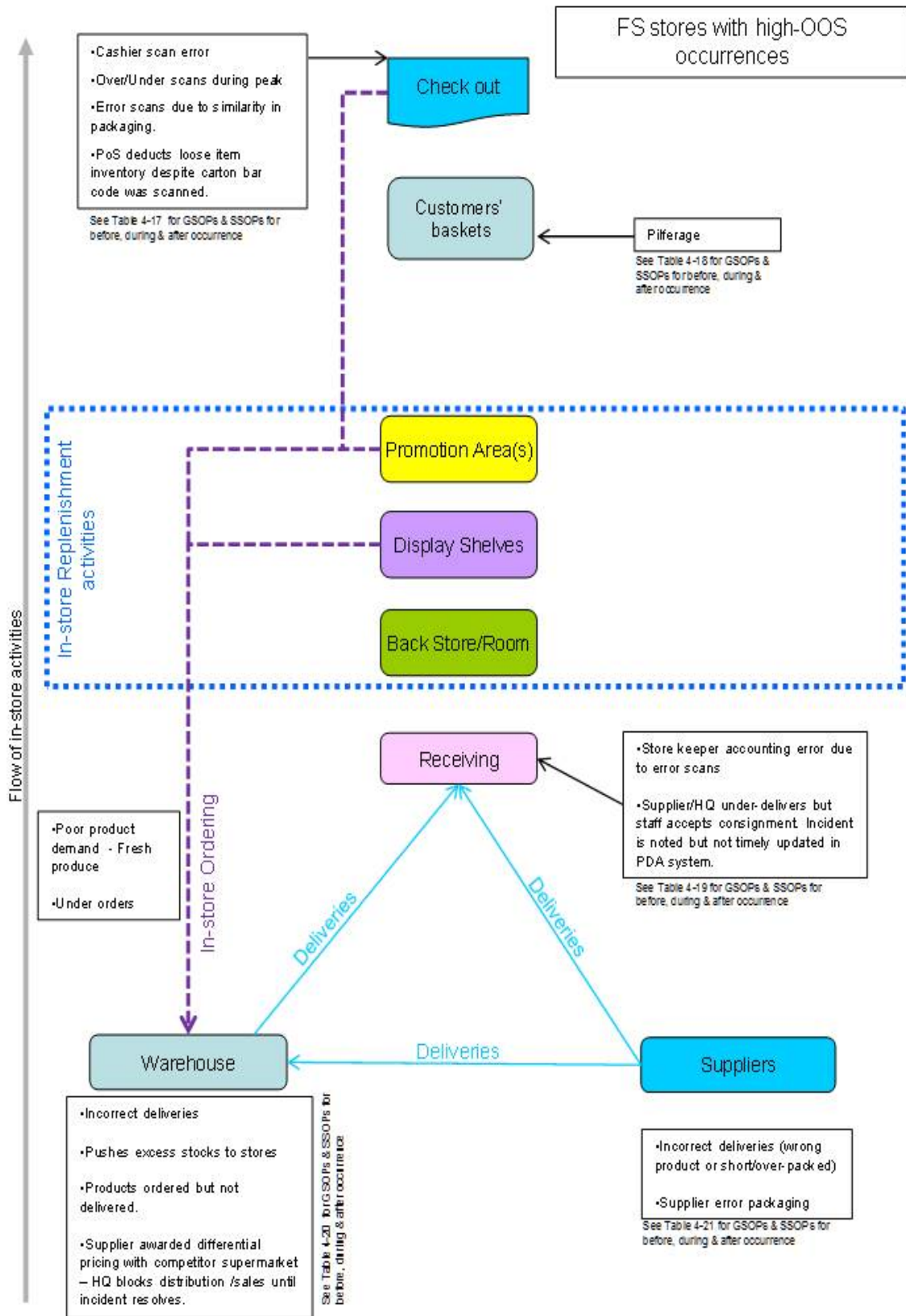


Figure 4-34 Locations and causes OOS & OS in high-OOS stores

#### **4.5.4 GSOPs and SSOPs of High-OOS Stores**

GSOPs and SSOPs to manage the occurrence of OOS and OS at respective stages of in-store processes are summarised in Tables 4-17 to 4-21.

It can be observed from Tables 4-17 to 4-21 that the stores in this group complied with some GSOPs but most store managers implemented SSOPs to minimise OOS and OS in their stores especially, to manage OOS occurrences caused by HQ warehouse and suppliers.

##### ***Before OOS Occurrence***

GSOPs were designed to ensure staff diligence executing in-store activities, accuracy in inventory information and the fostering of collaborative relationships with suppliers. Most GSOPs related to in-store performance were adhered to. However, with regard to relations with HQ and suppliers, most stores managers established SSOPs to ensure collaborative relations were consistent. Personal calls were made by store managers to both HQ and suppliers to ensure that both parties' inventory information and deliveries were updated and accurate.

##### ***During OOS Occurrence***

During OOS occurrences, most store managers were less strict with staff and suppliers that had poor performances. However, it was noted that detection of errors was after a period of time, resulting in increased implications to store inventory information.

##### ***After OOS Occurrence***

Compared with stores of low- and medium-OOS and OS occurrences, a noted difference was that most store managers in this group preferred to counsel their staff, despite frequent recurrence of mistakes. Some store managers even tolerated poor staff performances due to



concerns of availability of manpower. Store managers from this group preferred to collaborate with suppliers to resolve the latter's poor performance.

In summary, unlike stores from the other groups, i.e. low- and medium-OOS groups, where characteristics of most stores were heterogeneous, the characteristics of all stores in this group were heterogeneous. Store managers in this group, although conforming to most GSOPs, failed to enforce corrective actions to minimise or ease errors committed by staff, HQ and suppliers. For example, instead of enforcing GSOP to discipline staff when lack of diligence caused errors in checkout stations, some store managers (N-1-C, S-3-C and C-1-C) only counselled the staff, while others tolerated the poor performance due to concerns of availability of manpower. The result of such a lax approach may be the underlying reason why stores in this group experienced high OOS.

Table 4-17 GSOPs and SSOPs to address causes that occurred at checkout stations in high-OOS stores

CAUSES	BEFORE		DURING		AFTER	
	GSOP	SSOP	GSOP	SSOP	GSOP	SSOP
Cashier scan error	<ul style="list-style-type: none"> <li>• Cashier trained to scan each item.</li> <li>• Factored scan accuracy performance into remuneration.</li> </ul>		SM to overwrite PoS so cashier rescans item(s).	S-2-A SE overwrites PoS.	<ul style="list-style-type: none"> <li>• Cashier to be counselled or disciplined.</li> <li>• To be sent for further training if necessary.</li> </ul>	<ul style="list-style-type: none"> <li>• N-1-C, S-3-C &amp; C-1-C SMs only counselled.</li> <li>• S-2-A &amp; E-1-B SMs tolerated but if error increased, cashier would be counselled.</li> </ul>
Under scans during peak hours	<ul style="list-style-type: none"> <li>• Cashier trained to scan each item.</li> <li>• Factored scan accuracy performance into remuneration.</li> </ul>		<ul style="list-style-type: none"> <li>• Error was undetected until inventory levels in system indicate discrepancy.</li> <li>• Immediate investigation followed into cause of discrepancy.</li> </ul>		Cashier to be counselled or disciplined.	S-2-A & E-1-B SMs tolerated but if error increased, cashier would be counselled.
Error scans due to similarity in packaging	Cashier trained to scan each item.		SM to overwrite PoS so cashier rescans item(s).	S-2-A SE overwrites PoS.	Cashier to be counselled or disciplined.	<ul style="list-style-type: none"> <li>• N-1-C, S-3-C &amp; C-1-C SMs only counselled.</li> <li>• S-2-A &amp; E-1-B SMs tolerated but if error increased, cashier would be counselled.</li> </ul>
PoS deducts loose item inventory despite carton bar code was scanned.	System problem was being reviewed by SM at time of interview but Cashier advised to be diligent to pick up occurrence.		Cashier to manually overwrite the PoS and key in the correct information.		System problem was being reviewed by SM at time of interview.	

Table 4-18 GSOPs and SSOPs to address causes that occurred at stage before checkout station (customers' baskets) in high-OOS stores

CAUSES	BEFORE		DURING		AFTER	
	GSOP	SSOP	GSOP	SSOP	GSOP	SSOP
Pilferage/Theft	Staff to be diligent to spot such incidence.	N-1-C has 6 IST members, S-2-A has 7, S-3-C has 4, E-1-B has 4, W-6-B has 4, W-7-B has 5, & C-1-C has 5.	<ul style="list-style-type: none"> <li>• Apprehend and escort to SM office.</li> <li>• Encourage 'culprit' to pay for stolen item.</li> <li>• If not, contact police.</li> </ul>		Staff to be praised and rewarded for being diligent.	

Table 4-19 GSOPs and SSOPs to address causes that occurred at receiving stations in high-OOS stores

CAUSES	BEFORE		DURING		AFTER	
	GSOP	SSOP	GSOP	SSOP	GSOP	SSOP
Error scans	Receiver trained to scan only item bar code. Scans to be checked with records on PDA.		Error is undetected until inventory levels in the system indicate discrepancy.		<ul style="list-style-type: none"> <li>• Receiver to be counselled.</li> <li>• To be sent for retraining if necessary.</li> <li>• If it occurs again, a warning letter would be issued.</li> </ul>	S-3-C, E-1-B, W-6-B & C-1-C SMs only counselled receiver.
Headquarters/Suppliers under-deliver but staff accepts consignment. Incident is noted but not timely updated in PDA system.	Receiver trained to note error deliveries and update to PDA system immediately.		Receiver raise note but stops there so as to alleviate congestion in the receiving station. Error only detected when discrepancy arises from inventory reconciliation exercise is conducted.		Receiver to be counselled or disciplined.	S-3-C, E-1-B, W-6-B & C-1-C SMs only counselled receiver.

Table 4-20 GSOPs and SSOPs to address causes that occurred at HQ warehouse of high-OOS stores

CAUSES	BEFORE		DURING		AFTER	
	GSOP	SSOP	GSOP	SSOP	GSOP	SSOP
Wrong product delivered	Stores to share information with suppliers to ensure accuracy in both parties' systems.	S-2-A, E-1-B, W-6-B & W-7-B SMs called HQ to closely collaborate to ensure accurate information in both parties' systems.	<ul style="list-style-type: none"> <li>• Raise documentation to note error delivery.</li> <li>• SM to call HQ to put correct product onto next scheduled delivery.</li> </ul>	<ul style="list-style-type: none"> <li>• S-2-A, E-1-B, W-6-B &amp; W-7-B SMs called HQ</li> <li>• N-1-C, S-3-C &amp; C-1-C mention it in the next ordering cycle.</li> </ul>	SM to collaborate with HQ to ensure list of barcodes are updated.	S-2-A, E-1-B, W-6-B & W-7-B SM call HQ to closely collaborate to ensure accurate information in both parties' systems.
Products ordered but not delivered	Stores to share information with HQ to ensure accuracy in both parties systems.	S-2-A, E-1-B, W-6-B & W-7-B SMs called HQ to closely collaborate to ensure accurate information in both parties' systems.	<ul style="list-style-type: none"> <li>• Raise documentation to note missing deliveries.</li> <li>• SM to call HQ for missing orders to be on next scheduled delivery.</li> </ul>	<ul style="list-style-type: none"> <li>• S-2-A, E-1-B, W-6-B &amp; W-7-B SMs calls HQ.</li> <li>• N-1-C, S-3-C &amp; C-1-C mention it when someone from HQ visits the store.</li> </ul>	Stores to share information with HQ to ensure accuracy in both parties systems.	S-2-A, E-1-B, W-6-B & W-7-B SMs called HQ to closely collaborate to ensure accurate information in both parties' systems.
Supplier award differential pricing with competitor supermarket	Stores to collaborate with suppliers to ensure close relations and negotiate to get competitive pricing.	S-2-A, E-1-B, W-6-B & W-7-B SMs called suppliers.	Headquarters upon discovery would block distribution/sales of products under that supplier until incident was resolved. Stores disallowed to interfere.		Stores to collaborate with suppliers to ensure good relations and negotiate to get competitive pricing.	S-2-A, E-1-B, W-6-B & W-7-B SMs called suppliers.

Table 4-21 GSOPs and SSOPs to address causes attributable to suppliers of high-OOS stores

CAUSES	BEFORE		DURING		AFTER	
	GSOP	SSOP	GSOP	SSOP	GSOP	SSOP
Wrong product delivered	Stores to share information with suppliers to ensure accuracy in both parties' systems.	S-2-A, E-1-B, W-6-B & W-7-B SMs call suppliers to closely collaborate to ensure accurate information in both parties' systems.	Penalty for incorrect deliveries. However, if on positive terms, allow supplier to correct delivery within the same day.	E-1-B issued penalty.	<ul style="list-style-type: none"> <li>Remind suppliers the importance of accurate deliveries.</li> <li>If occurrences are high, feedback to HQ so that official warning could be issued.</li> </ul>	S-2-A, E-1-B, W-6-B & W-7-B SMs called suppliers.
Short-packed/wrong quantity	Stores to share information with suppliers to ensure accuracy in both parties' systems.	S-2-A, E-1-B, W-6-B & W-7-B SMs call suppliers to closely collaborate to ensure accurate information in both parties' systems.	<ul style="list-style-type: none"> <li>Accept quantity and allow supplier to bring the remaining quantity within the same day.</li> <li>Otherwise, raise documentation to note split-delivery.</li> </ul>	E-1-B issued penalty for wrong delivery.	<ul style="list-style-type: none"> <li>Remind suppliers the importance of accurate deliveries.</li> <li>If occurrences are high, feedback to HQ so that official warning can be issued.</li> </ul>	<ul style="list-style-type: none"> <li>S-2-A, E-1-B, W-6-B &amp; W-7-B SMs call suppliers to closely collaborate to ensure accurate information in both parties' systems.</li> <li>N-1-C, S-3-C &amp; C-1-C mentioned the error when suppliers' representatives visited the stores.</li> </ul>
Supplier error packaging	Receiver/Stacker to be diligent to spot such incident.	S-2-A, E-1-B, W-6-B & W-7-B SMs call suppliers to closely collaborate to ensure accurate deliveries.	<ul style="list-style-type: none"> <li>If serious error, remove affected items from display shelf and contact supplier immediately.</li> <li>If minor, cashier to note error when scanning affected items.</li> <li>If necessary, supplier has to deliver affected items with correct packaging immediately.</li> </ul>	E-1-B issued penalty for wrong delivery.	SM to feedback to supplier and collaborate to work on putting in checks to spot such incidents.	S-2-A, E-1-B, W-6-B & W-7-B SMs called suppliers.

#### **4.5.5 In-Store OOS and OS Management**

Store managers in this group adopted a collaborative approach towards managing OOS and OS occurrences. They counselled staff and made personal calls to suppliers to resolve conflicts or errors.

##### ***Store Managers' Influence on Range of Products***

The majority of products offered in stores under this group were prescribed by HQ. Similar to stores with low- and medium-OOS and OS occurrences, stores in this group also offered products requested by their respective customers.

*“As you can see, near to our store is a dormitory for construction workers. So they come in and ask for cheap “tilam” (meaning mattress in Malay), cheap furniture like foldable chairs and tables, pots and fans. So you will find such items in our store but not in other stores. We sell quite a lot of “tilam” actually. Even some locals (Singaporeans) also buy the “tilam”....maybe for their maids. With such wide variety of products offered, our stackers must ensure stocks are always available. But if HQ or suppliers don't deliver on time, we will lose customers to the other shops selling similar items near our store” Store Manager, W-6-B*

However, while the majority of the products prescribed by HQ were offered, store management of this group used varying packaging strategies to suit customers' buying habits as well as to minimise inventory shrinkage. The hypermarket had dedicated sections in non-display floor areas to perform repackaging of fresh food and vegetables. Single storey stores had small spaces on display floor areas dedicated to re-packaging products received in bulk directly from suppliers, such as fruits, vegetables, condiments and biscuits (see Figure 4-35). Repackaging loose items into standardised bags or shrink-wrapped on Styrofoam trays resulted in reduction of product damage and loose items repackaged into bigger packaging also deterred pilferage as handling larger packaging by customers was more visible. Larger packaging also proved more difficult to steal.



Figure 4-35 Re-packaging of fresh food

### ***Store Managers' Influence on Store Operations***

In-store operations of stores in this group were mostly guided by GSOPs. However, SSOPs were also established to cater for idiosyncratic elements of the market environment that affected in-store operations. For example, single storey stores located in residential blocks rolled out trolleys containing a variety of products, such as fresh produce (fruits and vegetables), confectionery, household cleaning products and low-value health and beauty products (facial tissues and toilet paper rolls) to rented display areas outside the stores. These trolleys were then rolled back into the stores when they closed. As trolleys of products were positioned outside, store managers allocated additional levels of security to deter pilferage. Store managers appointed current staff to 'double-up' as security officers while they carried out their normal responsibilities, especially staff at checkout stations. The hypermarket in this group also adopted security measures used by other large stores in the case supermarket chain, e.g. the use of internal security teams as well as CCTV-captured images of thieves printed and posted in main staff offices.

Although most stores in this group replenished display shelves from storage areas within the stores' premises (e.g. top of shelves or back rooms), one particular store (W-6-B) had longer replenishment lead times compared to the other stores because it had two back rooms – one located behind but within the premise of the store and a second back room that was a single storey building separated from the store, located approximately five minutes away (see Figure 4-36, read Box 4-6). The second back room stored excess stock that the

first back room could not manage, stocks of packaging materials and excess material handling equipment (e.g. empty fruit and vegetable baskets or used carton boxes).

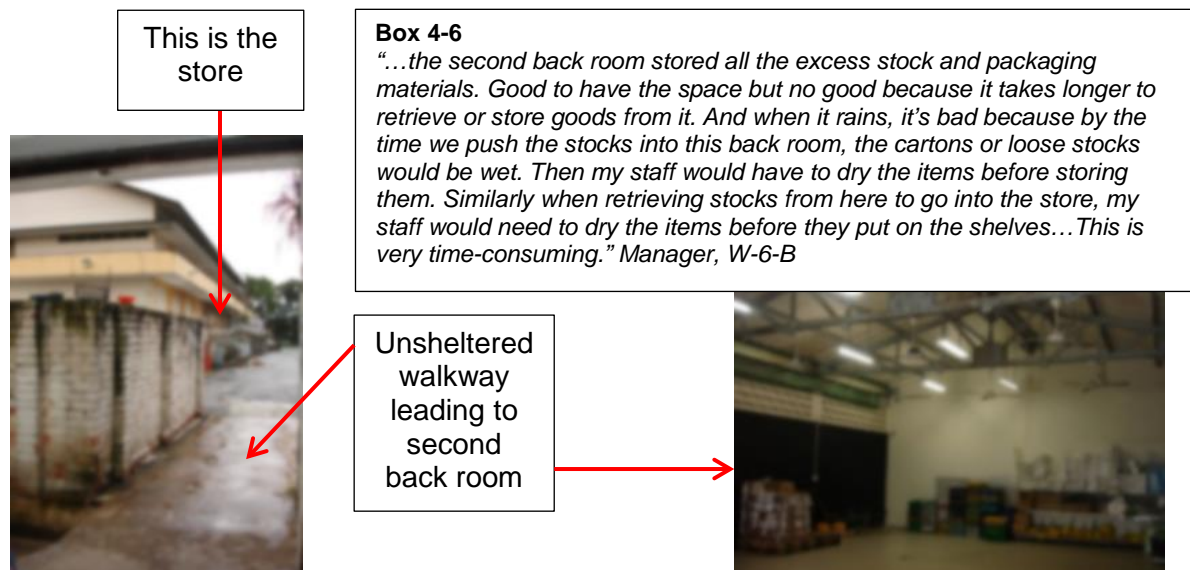


Figure 4-36 Walkway from main store leading to second back room

### **Stores’ Relations with Store Staff**

Stores in this group experienced errors occurring in checkout stations, in receiving as well as ordering activities. However, store managers in this group did not penalise their staff, instead adopting a tolerant approach towards poor staff performance. When asked if mistakes occurred at checkout stations, store managers acknowledged that mistakes occurred during peak times and also when they didn’t receive updated list of barcodes in the store system before store opening hours. Store managers believed that staff made mistakes due to unavoidable factors that affected their ability to perform well.

*“We don’t have a set place for receiving, as you can see. The only shelter the staff gets was that big umbrella. When it gets very hot or when there was a storm, that task was very hard to perform because there was no shelter and there was no loading/unloading bay. So mistakes would surely happen. We can only advise and caution the staff to be more careful in future.”*  
Assistant Executive, S-3-C

*“We were supposed to sack them after three times but we don’t because it is hard to find proper workers. Most locals don’t want to work in supermarkets because of long hours and poor pay. And also, they have to see customers’ face (i.e., deal with difficult and unreasonable*



customers). So they don't apply for the positions. So when a 'Johorian' (i.e. an applicant from Johor Bahru in Malaysia) apply, we take them. If you look around, most of the staff on the floor are from Malaysia. They worked for a while; found that it was good, so they called their family, relatives and friends to come over too. The only problem is their English is not very fluent. Luckily, they can speak Chinese and Malay, so not so bad." Assistant Store Manager, C-1-C

"Staff from Malaysia are easier to manage as they are more obedient and hardworking than the locals. Locals can get quite arrogant – sometimes, when they are not happy, they just walk out." Store Manager, N-1-C

"Quality workers are hard to find. Many Singaporeans don't want to work in supermarkets because of the long hours and that they have to face demanding customers. So we have no choice but to employ the Malaysians. Generally, they are very hardworking but their language skills and computer skills are inadequate. But if they are "trainable" that means, they are willing to be trained, follow instructions and so on, then, it is okay. But we have staff who make mistakes and don't admit it...they blame others...argue with customers...these are the ones that are not "trainable". Assistant Manager S-2-A

"I have this female staff, kept making mistakes. I gave her so many warnings, even written letters and also sent her for company training, but still cannot improve. In the end, one day, I watched what she was doing, and pointed out the mistakes to her directly. She seemed to improve. So I decided to train her myself and she improved a lot. So from that time onwards, I will train staff in my store myself as I found it much faster and effective. Also maybe because I use Chinese to explain to them the processes." Store Manager, W-6-B

### **Stores' Relations with Headquarters (HQ)**

The majority of the stores in this group worked closely with HQ, with some stores 'yearning' for more independence than others. The store management of such stores expressed such attitudes because they had been 'around' much longer and had established SSOPs that worked for their stores (but were not necessarily in line with GSOPs).

*"The way we run our store is a bit different from the other stores because we have been here a very long time and we know our customers very well and they know us very well too. What is important is that our store must operate profitably so that HQ will not come down on us. If we don't do well, then HQ can come to us and force us to follow back their policies."* Assistant Store Manager, C-1-C

As a majority of the stores were single-storey and located in residential areas, store managers paid more attention to customers' requests because competition was more intense in residential locations.

*“It is tough for us – there is Ang Mo Kio Hub (a shopping centre of 350,000 sqm retail space with a bus interchange at its basement) just down the road so we need to come up with ideas to attract customers to come in. Sometimes, it is not about prices – we try to make friends with them so that they feel more comfortable and friendly when they shop with us. Whereas if they shop there (Ang Mo Kio Hub), because the shops are big, they have to spend time to buy their things. Here, we try to make it more friendly and they can find us and ask questions about the products. Sometimes, we even suggest recipes for them.....no choice..just have to be more creative to attract them (the customers).” Assistant Store Manager, C-1-C*

Stores in this group commonly experienced errors caused by HQ deliveries and inaccurate information between HQ system and respective stores’ systems. For example, when HQ made wrong deliveries, stores were still required to accept them, with adjustments made in stores’ records, and when stores returned damaged goods to HQ, but HQ system did not register the transaction, it was still recorded by the stores’ systems.

Stores in this group also experienced OOS occurrences due to conflicts between HQ and suppliers. Because of this, HQ blocked the distribution of the products belonging to the incumbent supplier, causing OOS of those products within the stores. Suspension of these suppliers’ products also affected other stores in the supermarket chain. However, respondents from stores of the other two groups (i.e. low- and medium-OOS stores), felt that the conflict was managed at HQ level and that they had no involvement in the resolution. While the conflict was being resolved, some store managers of high-OOS stores (S-2-A, W-6-B and W-7-B) offered similar products at discounted prices. This SSOP was also established by some store managers of low- (N-2-A, E-2-B, E-3-B and E-6-B) and medium-OOS stores (N-3-A and W-4-A).

*“Sometimes, we can experience stockout in certain brands or assortment because HQ blocked the supply. Once, we found out that HQ blocked because they found out that the supplier was giving our competitors cheaper prices than us. The issue was quite serious because it was one of our major suppliers...even our MD became involved in the discussions. Anyway, we just let them handle the situation. When customers asked us about the OOS product, we just explained that supplier was having issues.” Supervisor, C-1-C*

*“When HQ blocked certain brands or product assortment, we will offer similar brands and products assortment with discounts or allocated bigger shelf space, so that customers will still buy from us. The grocery industry in Singapore is very small so news gets around and suppliers of similar brands and products assortment would exploit the situation and ‘run’ promotions to entice customers to switch to their brands and products.” Assistant Manager, S-2-A*

### **Stores’ Relations with Suppliers**

Store managers in this group worked closely with suppliers and their sales representatives, with frequent communications to improve forecasting and product performance. When errors occurred in deliveries and packaging, some store managers would feed back to suppliers via email while others would make personal calls to in order to resolve conflicts.

*“Our store offers a very wide range of products and our customers have given us feedback that they really like the wide range we offer. Therefore, we try very hard to minimize storage space inside the store to ensure display space was optimized and that aisles were wide enough for customers to shop in comfort. Therefore, we don’t want suppliers to give us wrong stock...we try to avoid being out-of-stock because our customers will complain to us. So we would call them regularly to ensure our orders were retrieved from their (suppliers’) systems were correct.” Manager, E-1-B*

### **Stores’ Relations with Customers**

Store managers from this group were proactive towards customers assistance because most stores were patronised by customers from low income groups. According to store managers, these customers were most likely to switch stores due to price differences.

*“Our stores do offer very competitive low prices but they are competitive compared to other supermarket chains and major convenience stores. Our customers are very price conscious so we make sure we do our market research adequately and ensure lowest prices for most items in the store. But we know that there are customers who are willing to pay a bit more for convenience, e.g. they rather buy a packet of sugar from the provision shop below their home rather than walk all the way here, even though if it was a five minutes’ walk. In that case (scenario), we cannot help it. What we can manage is to offer lowest prices and very good customer service. Talk to them like our friends rather than just customers. They are happy when they shop here and we are happy because we get to chat with them. So it becomes a friendly and happy store atmosphere.” Manager, N-1-C*

Store managers of three stores (S-2-A, W-6-B and W-7-B) were familiar with the needs of two different types of customer – foreigner workers and students. These three stores were located near construction sites as well as dormitories. Therefore, in order to attract and retain their patronage, store managers made efforts to ‘reach out’ to these customers and learn about their needs (food and non-food products) and limitations (budget and living space).

*“...because many of our customers are not local (Singaporean)...they are construction workers mainly from Bangladesh and China, so we try to stock items they’re familiar with, such as curry or turmeric powder. And because they tend to save money on food so that they send the rest back home, they usually buy the cheapest range of food items. So we stock those product ranges for them. We know them well because we talk to them. Initially, especially the Bangladesh workers were very shy...we tried to talk to them and they walked away. So we stopped and start again with body language – we just smiled at them. Over times, the smile became ‘hellos’ and then, we managed to chat with them. That’s how we come to be familiar with their buying behaviour. Manager, W-6-B*

Store managers of two stores (E-1-B and W-7-B) revealed that they also had customers who owned or worked in food stalls in the hawker center and food court located within minutes of the FS store. Although these customers procured most of their ingredients from wholesale markets, they also bought certain ingredients (e.g. garlic, onions and bean sprouts) from these two stores.

*“We have hawkers buying some of their supplies from us because they said the quality of our vegetables, such as, bean sprouts were better than their own suppliers. Besides, they said bean sprouts spoil easily so they’d rather buy smaller quantities and if they need more, they would need to walk less than three minutes to our store to buy them. Over time, we’ve become their regular supplier of highly perishable food items, such as bean sprouts.” Manager, W-7-B*

## 4.6 Summary Discussion

Close examination into how the 19 FS stores managed OOS and OS occurrences in their stores revealed that there was no patterns observed to the stores in each group by standard metrics, such as district, size, age, number of SKUs, receiving area and back rooms). Although there were standardised guidelines on execution of in-store logistical activities, there were major factors that affected the stores' ability to manage OOS and OS occurrences. While GSOPs and SSOPs provided insight on 'why' and 'how' OOS and OS occurrences were managed, it was also observed from the findings that '*when*' (i.e. at which point of the execution of in-store processes) those operating strategies were actioned had some influence on store performance.

### 4.6.1 Error Detection Lead Time

From the findings, it was noted that stores from the three groups experienced common causes of OOS and OS occurrences, such as poor staff diligence, especially amongst staff working in receiving and checkout stations. Error scans occurred in both stations, resulting in inaccurate inventory information in the systems. GSOPs stated that staff personnel had to be disciplined or given verbal warning, and most store managers from low-OOS stores (except the store manager from E-2-B) counselled and disciplined their staff. Store managers from medium- and high-OOS preferred to counsel and tolerate errors made by their staff, HQ and suppliers.

Another key observation on the rectification of scanning errors was the time taken to detect the error as well as to action the relevant GSOPs and SSOPs. Store managers from low-OOS stores adopted a proactive approach in the detection of errors at receiving and checkout stations. Store managers from medium- and high-OOS stores relied on their cashiers to be diligent in their scans because GSOP had factored in accurate scan performance in their remuneration. Error scans that occurred in medium- and high-OOS

stores were only detected when inventory system did not reconcile with the PoS system, meaning that error scans were detected and rectified much faster in low-OOS stores. However, an interesting observation noted that the time taken to detect errors at scan stations was affected by the size of the store. For instance, most stores had similar store features: one receiving station and at least three checkout stations. However, the larger stores had more than three checkout stations. To ensure adequate monitoring of scan stations, more senior staff would be required. The size of store also determined the number of senior management available per store (see Table 4-22). As such, the size of store and number of senior management available per store influenced the amount of time spent on error detection and resolution.

For example, while some stores managers (e.g. from low-OOS store C-2-C and medium-OOS store N-4-C) stated that they positioned themselves at checkout stations and receiving stations, it was not the situation that each checkout line had a store manager on hand to resolve any conflict that may occur. Store managers stationed themselves at checkout stations and waited for cashiers to 'signal' (i.e. either raise their hand, call for the store manager or speak into their two-way radios) for assistance. If a cashier failed to highlight the mistake, store managers would not be able to detect error immediately. Store managers could only be stationed at either the checkout station or the receiving station but not at both areas at the same time. Therefore the bigger stores with a store manager and more than one store executive were apparently better able to monitor checkout and receiving stations at the same time.

Table 4-22 Senior Management available per store

Store Size	Senior Management Per Store
Small stores (Category C - 4000 to 9000 sqm)	Store Manager x 1 Store supervisor x 1
Medium stores (Category B - 10,000 to 33,000 sqm)	Store Manager x 1 Assistant Manager or Acting Manager x 1 Store Executive x 1 Store supervisor x 2
Large stores (Category A - 25,000 to 45,000 sqm)	Store Manager x 1 Assistant Manager or Acting Manager x 1 (per department – e.g. Fresh food, Meat, Seafood, Grocery and Non-Food) Store Executive x 1 (per department) Store supervisor x 1 (per department)

Source: FS's MD (2010)

#### 4.6.2 Replenishment and Shelf Management

Another finding revealed in this study is that in-store replenishment performance varied across 19 stores due to factors such as types of storage (e.g. top of display shelves, sponsored supplier storage boxes and back rooms) and shelf space management. Most FS stores replenished display shelves from stocks stored in the space above tops of display shelves. This approach allowed fast and convenient display shelves replenishment. Small stores (e.g. S-3-C, C-1-C, N-1-C, and E-1-B, all from high-OOS groups) with narrow aisles could only replenish display shelves before and after stores' operating hours due to space constraint and to ensure safety of customers. However, as deliveries from suppliers were during operating hours, replenishment of display shelves became challenging and the situation was exacerbated for stores with no back room or extended space on the shop front. During one of the interviews, stackers were seen hurriedly stuffing stocks into any available space they could find in the small store (the store where this occurred had no back room) or in the extended space at the shop front to keep the aisles (very narrow) clear for customers.

Some store managers from the three groups (N-2-A from low-OOS stores, N-3-A from medium-OOS stores and S-2-A from high-OOS stores) established a SSOP that insisted that

products had to be placed to the edge of display shelves, with products' front facing forward. Benefits of products being placed to the edge of display shelves include, creating the illusion of OSA, and allowed stackers to improve management of stock levels on the shelves. However, replenishment lead time in these stores resulted longer than those who did not have this SSOP, which meant duration of item OOS was longer.

#### **4.6.3 Space to Manage SKUs**

An interesting observation in the findings was the amount of space available to manage the wide range of SKUs in stores. Looking at the average number of SKUs per store and average store size in the three groups, it was noted that both low- and high-OOS stores had, on average, 0.74 sqm per SKU and the medium-OOS stores had 0.97 sqm per SKU. From these results, it is fair to assume that medium-OOS stores had more space to manage SKUs compared to both low- and high-OOS stores.

To manage SKUs offered by each store, FS stores had different types of storage. The most common type of storage across all FS stores was above the display shelves, allowing for quick replenishment. The next most common type of storage space was in back rooms, although there were size differences as well as variations in back room location. Stores with back rooms mostly had access behind the stores, with the exception of two stores (medium-OOS store W-4-A and high-OOS store W-6-B) where the back room was located away from the store. This had the implication that the stackers in these latter stores took longer to replenish shelves with goods from their back rooms. Stores with no back rooms managed storage of stock using the tops of display shelves and a range of mobile storage equipment, such as roller cages, mobile shelves and mobile trolleys.

When space was still needed to manage excess stock, FS stores also used a range of mobile storage equipment, which could be rolled out of stores during store opening hours and rolled back into the stores when they were closed. The system of mobile storage



equipment was placed behind the store or out of pedestrian walkways during store opening hours. While the system of mobile storage equipment helped stores to manage excess stocks, replenishment lead time was lengthened due to time spent on 'search and retrieval' as there were no formal systems on how to arrange the stock inside the respective types of mobile storage equipment.

Another method used to manage excess stock was the implementation of creative management strategies, such as adhoc store specials and 'stock clearance specials'. Store managers from the three groups, especially from medium-OOS stores, used this method whenever HQ pushed excess stock into their stores.

#### **4.6.4 Level of Effort in Relationship Management**

GSOP stated that stores should share information with HQ and suppliers to ensure inventory records in all three parties' systems. In addition to the sharing of inventory information, GSOP also tasked store managers with communicating to suppliers the importance of accurate deliveries. Most store managers from low-OOS stores made personal calls to HQ and suppliers to ensure inventory records and deliveries were accurate. However, when an incorrect delivery occurred, most store managers from low-OOS stores made personal calls to HQ and suppliers to rectify the discrepancies as soon as they were discovered. One store manager from medium-OOS stores (e.g. N-3-A) and most store managers from high-OOS stores also made personal calls to HQ and suppliers to ensure accurate inventory information and deliveries. Other store managers only made it a point to stress to HQ staff or suppliers' representatives the importance of accurate inventory information and deliveries when they visited the store. Highlighting the importance of accurate inventory information to HQ staff or suppliers' representatives strongly suggests that the level of effort made by store managers towards ensuring accuracy in inventory information and operations has important ramifications on mitigating OOS and OS occurrences.

#### **4.6.5 Customer Reactions to OOS**

Collectively, store managers of the 19 stores agreed the need for high levels of customer service. As such, all store personnel were trained to be customer-centric: attentive towards customers' needs for assistance and helping customers to complete their grocery shopping needs. To achieve OSA, GSOPs were established to keep display shelves full (e.g. stackers and senior management were to conduct frequent physical walkabouts during operating hours to monitor stocks on display shelves). In the event that a display shelf was empty, GSOP tasked stackers to place yellow OOS labels over product display labels while retrieving more stocks from storage areas to replenish shelves. In addition, there were four possible actions (leave shelf, continue to display yellow label, remove OOS item product label and expand neighbouring products or replaced with substitute) to be taken if there was no stock of OOS item in store. In short, FS stores had established strategies to minimise customers' reactions to OOS, with the main aim being to ensure that customers complete their grocery shopping in their stores.

#### **4.6.6 Location Characteristics**

Location characteristics were found to affect how store managers managed OOS and OS occurrences in their stores. Findings revealed that not all store managers adopted HQ's list of products to be offered. The newer stores adopted a higher percentage of products listed by HQ and the reason given was the short length of operation and the fact that the stores were still gathering insights on customer buying preferences. The older, more established stores only adopted 60 (and at most 80) per cent of products listed by HQ and the remaining product assortment was provided to suit their customers' buying preference. For example, stores with a high proportion of customers from low income groups, tended to stock cheaper brands of groceries and wet market fresh produce. While this strategy sustained store patronage, the wide variations in product assortments adopted by the older stores posed a challenge for HQ to manage. Not only did they have to manage the supply chain of

prescribed products but also of those unique to the different stores. With increased product proliferation and high inventory levels, order-picking operations at HQ warehouses faced complexity and higher chance of mistakes (Skinner 1974). Such mistakes could flow into the stores and cause OOS and OS occurrences. In contrast, findings from this study have revealed that stores with higher SKUs had a lower extent of OOS occurrences when compared with stores with lower SKUs, which experienced higher extent of OOS occurrences (see Table 4-23).

Table 4-23 Comparisons of SKUs and extent of OOS occurrences in low-, medium- and high-OOS stores.

	<b>Low-OOS Stores</b>	<b>Medium-OOS Stores</b>	<b>High-OOS Stores</b>
SKU (Average)	± 15,000	± 17,000	± 10,000
% of OOS (Average)	0.98%	2.70%	7.56%

## 4.7 Conclusion

Within-group analysis revealed that some in-store processes experienced higher frequency of errors (e.g. receiving and checkout stations) compared to other in-store processes. Errors were caused by staff (e.g. under-scans at checkout stations, error scans due to similarity in packaging) and physical store factors (e.g. error scans at makeshift and unsheltered receiving stations to prevent congestion at the stations, longer replenishment times due to lack of back rooms). A system of mobile storage equipment (e.g. roller cages, mobile racks and shelves) was adopted to manage OS of products caused by internal factors (e.g. when HQ pushed excess stock onto stores) and external factors (e.g. unsuccessful product promotions). The time taken to detect and resolve in-store process errors by store managers also affected the integrity of stock level information in the stores' systems.

Store managers paid special attention to relationship management with HQ and suppliers, so as to enable quick resolution of errors in inventory information and prompt correction of inaccurate deliveries. Some of the initiatives taken by store managers to maintain good relations with HQ and suppliers included personal calls to HQ and supplier, assisting suppliers with replenishment when customer traffic was low and the store managers' keenness to improve product knowledge from suppliers. Store managers also adopted customer-centric strategies (e.g. being attentive to customers' need for assistance, replacing shelf-tags of OOS items with yellow OOS labels while stackers retrieved replenishment stock and frequent walkabouts by store staff to check stock levels of display shelves) to ensure the minimisation of customer reactions to OOS.

Finally, the adoption of micro-marketing strategy on offering localised product assortment caused HQ to experience challenges in managing their extensive product assortment ranges. HQ not only had to manage the 'chain-wide' list of products, but also had to manage product assortment specifically offered by stores to meet local customers' demands. This increase in

product complexity had resulted in a higher occurrence of mistakes made with orders and deliveries.

The next chapter will examine the above issues in further depth, together with a comparative analysis of OOS and OS management approaches employed by stores in the three groups.

## Chapter 5 Discussions

The within-group analysis revealed different levels of efforts expended by managers of low-, medium- and high-OOS stores in managing OOS and OS occurrences. Most store managers of low-OOS stores displayed high levels of diligence in the detection and resolution of errors. These managers also made their staff responsible for achieving and maintaining OSA by including incidence of mistakes made that had a direct, or perceivable indirect, impact on inventory record as an employee performance indicator. The exception was E-3-B, which took little proactive action to increase GSOP effectiveness, though it adhered closely to GSOP. On the other hand, most high-OOS store managers (except those of W-6-B and W-7-B, which adhered to GSOP) displayed tolerance and acceptance of mediocre outputs from staff, HQ and suppliers. To understand the effects of contrasting attitudes towards causes of OOS and OS occurrences in stores, this chapter cross-examines the findings of the within-group analysis to identify similarities and differences between OOS and OS management approaches used by store managers in the three groups.

The chapter is organised into three main sections, starting with Section 5.1, which presents the key findings of the cross-group analysis, including a discussion of the main similarities and differences in the management of OOS and OS causes common across the three groups. Section 5.2 discusses the management of OOS and OS occurrences in stores in each of the three groups. The discussion includes a list of propositions that provide insights on how FS's stores managed OOS and OS occurrences. Section 5.3 concludes the chapter with a summary discussion that highlights key considerations in the management of OOS and OS occurrences in the stores of supermarket chains.

## 5.1 Cross-Group Analysis

### 5.1.1 Key Findings

Findings showed that although the three groups of stores experienced different causes of OOS and OS, eight common causes were identified as those experienced by stores in all three groups (see Table 5-1).

Table 5-1 Causes of OOS and OS occurrences experienced by low-, medium- and high-OOS stores

Stage where Causes Occurred	Causes of OOS and OS Occurrences
Checkout Station	<ul style="list-style-type: none"> <li>• Cashier error scans</li> <li>• Error scans due to similarity packaging</li> </ul>
Customers' Basket	<ul style="list-style-type: none"> <li>• Pilferage</li> </ul>
Receiving Station	<ul style="list-style-type: none"> <li>• Accounting error due to error scans</li> </ul>
Ordering	<ul style="list-style-type: none"> <li>• Inaccurate product demand knowledge</li> </ul>
Suppliers	<ul style="list-style-type: none"> <li>• Wrong deliveries</li> <li>• Suppliers' error in packaging</li> </ul>
HQ Warehouse	<ul style="list-style-type: none"> <li>• Pushed excess stocks to stores</li> </ul>

Looking at the eight common causes as reportedly experienced by stores from the three groups, five were due to FS staff: cashier error scans, errors scans due to similar packaging, accounting error due to error scans and inaccurate product demand knowledge and HQ pushing excess stocks to stores. The remaining three causes were due to external factors where FS management had little or no control: pilferage, incorrect deliveries and suppliers' errors in packaging. It is therefore apparent that the most common causes of OOS and OS occurrences experienced by all stores were related to in-store logistical processes. It was also observed that the frequency of in-store errors increased during peak operational times (e.g. high customer traffic, several deliveries arriving at the same time and urgent replenishment of shelves during times of high customer traffic).

In addition to the eight causes faced by stores of the three groups, the findings also revealed that low-OOS stores cited the highest number of OOS and OS causes (18). Medium-OOS

stores reported 15 different causes, while high-OOS stores indicated 13 causes of OOS and OS occurrences. The reason low-OOS stores reported the highest number of OOS causes might have been because store managers from that group treated OOS and OS occurrences as major factors affecting their store performance. As such, store managers from low-OOS stores were more diligent towards managing OOS and OS occurrences, as compared to store managers of medium- and high OOS stores.

Another observation was related to how store characteristics (i.e. store size, number of SKUs and floor space to SKU ratio) influenced store managers' ability to manage OOS and OS occurrences. Extant literature suggests that the above store characteristics affected store managers' ability to manage OOS and OS occurrences. However, this does not seem to be the case with FS stores. For example, when compared with medium- and high-OOS stores, low-OOS stores had the largest average store size, managed the second-largest number of SKUs and yet experienced the lowest amount of OOS occurrences. High-OOS stores had the smallest average store size and number of SKUs but experienced the highest amount of OOS occurrences. Based on these observations, it could be inferred that these store characteristics were factors that store managers considered in managing OOS and OS occurrences. It is possible that the larger the store size and SKUs offered, the higher the pressure to ensure store performance. However, it could also be argued that regardless of the differences in the aforementioned store characteristics, store managers with a proactive attitude towards management of OOS and OS occurrences via strict adherence to GSOPs could improve store performance, as Ton and Huckman (2008) assert. Store managers from low-OOS stores were successful in keeping OOS occurrences down, despite high levels of SKUs, contradicting Skinner's (1974) suggestion that high levels of SKUs would increase operational complexity and result in higher operational problems. Store managers of low-OOS stores displayed positive attitudes towards management of OOS and OS occurrences with high levels of diligence in error detection and resolution. They also made consistent



efforts to work closely with HQ and suppliers to ensure information on inventory and deliveries were accurate.

### 5.1.2 Key Similarities in OOS and OS Management

Table 5-2 lists eight common causes of OOS and OS occurrences and approaches adopted by store managers of the three groups. As these eight common causes were well known to have the potential of causing OOS and OS occurrences, or were familiar to store managers, GSOPs and SSOPs were deployed, with the exception of a proactive approach adopted towards the improvement of the design of PoS system. This proactive approach emerged as a collective reaction from some store managers from larger stores (e.g. N-2-A, N-3-A, S-2-A, E-4-A and W-4-A) because they were frustrated with recurring mistakes caused by design issues of the PoS system.

Table 5-2 Key similarities in OOS & OS management

Causes of OS & OOS	Store Managers have Similar Approaches for:
Inaccurate information due to inherent design issues in PoS system	Proactive towards resolution. Store managers collaborated to provide suggestions to address and improve PoS system design.
Headquarters pushes stocks onto stores	Stackers were empowered by store managers to implement creative space management strategies, such as restacking stocks in storage areas followed by ad-hoc specials and 'clear stock' promotions, to accommodate the over-stocked items.
Inventory shrinkage of loose items in the fresh produce sections due to	Store managers positioned themselves in strategic areas as a deterrent.
Organized retail crime (ORC)	When apprehended, the police were always contacted.
Over-stocking of promotional items	Stackers tasked to monitor promotional stocks for planning and staging of ad-hoc specials to improve stock movement.

The approaches adopted to manage the eight common causes of OOS and OS occurrences reflected store managers' common attitude towards managing these causes despite

differences in store characteristics (i.e. store size, number of SKUs, location and length of operations).

Approaches to manage 'unknown' or unfamiliar causes varied due to the differing experience stackers and store managers had in dealing with unknown causes. In other words, stackers and store managers who had worked for FS, or had worked in the supermarket industry, might have been better equipped to manage unknown causes. However, information on stackers' and store managers' years of experience in the supermarket industry or length of service with FS was not included in the data collection exercise. This would be a factor for future research, i.e. to investigate the extent to which experience in supermarket operations could affect employees' (stackers and store managers) management of OOS and OS occurrences.

### **5.1.3 Key Differences in OOS and OS Management**

Cross-group analysis examined how stores from the three groups managed OOS and OS occurrences in their stores. Findings revealed that the way GSOPs and SSOPs were implemented could result in different extents of OOS and OS occurrences.

Table 5-3 lists the main factors that contributed to OOS and OS occurrences in stores under the three groups. The table also lists the various approaches undertaken by store managers in the three groups to manage factors contributing to OOS and OS occurrences.

Most factors were staff-related, such as competence levels, diligence and trainability. While the culture of FS stores embraced the importance of relationships and positive reinforcement strategies, such as encouragement and rewards, mistakes remained due to staff lacking due diligence.

Store managers of low-OOS stores adopted strict approaches towards staff who had demonstrated lack of diligence, such as verbal warnings, re-training and customised or personalised re-training when necessary. For example, an employee working at the checkout station had a poor command of the English language and therefore failed to improve her skills from re-training sessions conducted in English. Her store manager realised the problem and personally re-trained her on PoS specifications in Mandarin. Store managers in medium- and high-OOS and OS occurrence groups tended to adopt a more staff-friendly approach by counselling and encouraging staff to be more careful and attentive.

Though a lack of staff diligence was partly to be blamed, inaccurate product scans at the receiving stage and checkout stations were also unavoidable realities, due to the practical limitations faced by stores, such as lack of supervisory personnel to oversee the checkout stations. In many instances, errors were only detected when regular systems' updates produced discrepancies in reports, especially during inventory reconciliations. Error occurrences increased when several deliveries arrived at the same time and when the stores experienced peak patronage, such as weekends or before festive holidays.

Managers of low-OOS stores adopted proactive strategies to deal with this recurring issue, such as putting more staff at checkout stations during peak periods and stationing themselves near checkout stations to enable quick conflict resolution and avoid or minimise congestion. Some store managers examined the situation when mistakes occurred and instead of penalising the staff, encouraged and counselled.

Table 5-3 Key differences in OOS and OS management towards factors contributing to OOS and OS

Factors Contributing to OOS & OS	Low-OOS Stores	Medium-OOS Stores	High-OOS Stores
Number of factors	18	15	13
Attitude towards poor staff performance, especially staff with different levels of user competence of store systems	VW, CR, R, D	Varied between E & T amongst stores.	T followed by E
Attitude towards information accuracy at checkout stations	Pro towards quick resolution to prevent & ease congestion.	E	T followed by E
Under-scans at checkout stations due to staff's different levels of user competence of PoS system	VW, CR, R, D	E	T followed by E
Error scans at checkout stations due to packaging designs	VW	E	T followed by E
Error, over- and under-scans at receiving station	Varied between VW & E amongst stores.	E	E
Attitude towards inventory shrinkage	P & ED	P	P
Attitude towards information inaccuracy at receiving station due to staff's varied levels of PDA system competence	VW, CR but stores with mobile receiving stations will be varied between Pro & E.	E	E
Relationship with headquarters	PC to resolve issues.	Varied between PC & T amongst stores.	Varied between PC & E.
Attitude towards information accuracy with headquarters	PC to ensure records is updated on time.	SE to remind records was updated on time.	SE to remind records was updated on time.
Error deliveries by headquarters – wrong quantity and product	Immediate PC to ESDD. If serious, ad-hoc delivery to be arranged.	SE & FDD@HQ. RNSD	SE & FDD@HQ. RNSD
Error deliveries by suppliers – wrong quantity and product	Varied between VW & PC amongst stores. ESDD if possible.	Varied from VW, E & PC amongst stores. RNSD if possible. WWNSD if necessary.	Varied from VW to PC. RNSD if possible. WWNSD if necessary.
Attitude towards information accuracy with suppliers	PC to ensure records is updated on time.	Varied from PC and/or FSDR@S	PC and/or SE to ensure records are updated on time.

**NOTE:**

VW = Verbal Warning CR = Customised Re-training PC = Personal Calls E = Encouragement T = Tolerance  
 Pro = Proactive RT = Early Retrain D = Dismissal P = Prevention ED = Early Detection  
 ESDD = Expect same day delivery RNSD = Request next schedule delivery SE = Send email  
 FSDR@S = Feedback to suppliers' driver and representative at store  
 FDD@HQ = Feedback to delivery drivers from headquarters WWNSD = Will wait for next scheduled delivery

Store managers of medium- and high-OOS tolerated mistakes (because they understood the constraints faced by affected staff) or encouraged and counselled staff on the importance of how individual performance could affect the overall team performance of the store. Although these store managers appeared to have adopted a sympathetic style of management, they did not appear to have effectively curbed frequency of errors committed, as evident in the higher extent of OOS and OS occurrences they experienced compared to those of the low-OOS group.

Mistakes made due to inaccurate scans at receiving stations caused inaccurate inventory information in the stores' systems. Staff at receiving stations would record the error manually (on a piece of paper), with the intention to update the system while they waited for the next delivery. But it was common for staff to forget to follow up the task. In some instances, records were updated only after the next round of inventory ordering had occurred, and this delay caused OS in affected products. Store managers from low-OOS stores enforced strict management towards such incidences via verbal warnings or strong words of encouragement towards performance improvement. Store managers from medium- and high-OOS stores, on the other hand, tended to counsel and encourage staff to be more attentive and to seek help when needed.

Store managers of the three groups also exercised different levels of effort in order to manage relationships with HQ. Store managers of low-OOS stores would make regular personal calls to engage with HQ and to resolve conflicts. This approach was proven effective as problems tended to be resolved almost immediately. This finding corroborates with that of Fernie and Corcoran (2010), who found that lack of formal communication and inadequate training from HQ to store staff have a direct impact on OSA in stores. One store manager (N-3-A) from a medium-OOS store used personal calls to resolve conflicts, while other store managers in the same group tolerated mistakes made by HQ in the hope that HQ would in turn tolerate mistakes made by them. Four store managers from high-OOS stores

always made personal calls, whereas other store managers in the same group sent informal emails to specific staff at HQ to resolve conflicts. An important observation was the issue relating to 'who to call' at HQ office to report problems and achieve a quick resolution. Store managers from low-OOS group revealed that they've identified specific HQ staff that had the ability to resolve problems efficiently and effectively.

Incorrect deliveries from HQ were normally not tolerated by store managers in the low-OOS group. These managers noted that whenever mistakes occurred during order picking at HQ warehouse, their in-store operations would be affected, making it difficult to maintain OSA of products. Most of the low-OOS stores expected same-day re-delivery from HQ to rectify the mistake and would even issue strong requests for ad-hoc deliveries, especially if the affected stock was a high-turnover item. Store managers from medium- and high-OOS and OS groups, however, only emailed HQ about delivery errors and requested the corrected stock or corrected quantity of stock be delivered in the next scheduled delivery.

Similarly, store managers from low-OOS stores did not tolerate incorrect deliveries from suppliers. Verbal warnings of poor delivery performance were normally issued by store managers, followed by personal calls to suppliers' main office to demand correct deliveries be completed on the same day. Store managers from medium-OOS stores adopted different strategies to manage incorrect deliveries from suppliers. These strategies adopted included making personal calls to suppliers' main office, reminding suppliers of the consequences of incorrect deliveries and requesting a concerted effort from suppliers to ensure accuracy in the next scheduled delivery. However, most store managers from this group tolerated short lengths of OOS and waited for the next day's scheduled delivery. Four store managers from high-OOS stores made personal calls to the suppliers' main office and requested the next scheduled delivery. They also tolerated a short length of OOS and waited for the next day's scheduled delivery.

Accurate suppliers' inventory information was treated as an important issue by all store managers, and personal calls to suppliers' main office to ensure accuracy of information relating to inventory levels, forecasting and product performance were maintained. This practice reinforces what has also been observed in previous studies (e.g. Grant and Fernie 2008; Ettouzani et al 2012): lack of collaboration and unreliable performance (e.g. irregular system updates) from suppliers affected quality of deliveries and stores' ability to maintain OSA of products.

#### **5.1.4 Discussion of Key Findings**

##### ***Factors Contributing to OOS and OS Occurrences***

The aforementioned cross-group analysis shows that there were four main factors impacting on in-store logistical operations that led to the occurrence of OOS and OS in stores: inaccurate information in HQ's ERP system, inventory shrinkage, incorrect deliveries by suppliers, and scanning errors at receiving and checkout stations. These four issues were predominantly human errors due to lapses or negligence.

Inaccurate information in HQ's ERP system typically arose from HQ's attempt to push excess stocks to stores to accommodate incoming stocks at HQ's warehouse. Poor staff diligence to record such unexpected stock had been identified as a common cause of OOS and OS occurrences in stores. Inventory shrinkage was due to pilferage and excessive goods-handling by customers. Incorrect deliveries by suppliers were the result of suppliers' failure to update their stock levels, causing inaccurate inventory information and scanning errors at receiving stations in stores. Scanning errors at receiving and checkout stations were caused by poorly designed product packaging and other factors. However, failure to exercise diligence to detect the errors by check-out staff was the main cause of the problem. In short, the four main areas that led to OOS and OS occurrences in the case supermarket stores were predominantly human-related mistakes or lapses when performing in-store

operations. As revealed in the case findings, store managers in the three groups sought staff-related measures, such as recruitment of quality staff, induction training of in-store logistical processes and regular personal development training (especially on in-store systems) to improve the skills and level of diligence of store staff.

The results of the cross-group analysis therefore showed that majority of the OOS situations in supermarkets occurred as a result of some relatively trivial matters, such as pilferage or scanning errors, rather than due to unexpected major logistical or supply chain disruptions. This observation leads to the following two propositions:

*P1: OOS situations are not necessarily caused by major logistical or supply chain disruptions. They can be triggered by relatively trivial human errors or operational slips.*

*P2: Managing OOS requires an understanding of the implications resulting from various apparently trivial operational issues and an ability to deal with those issues effectively.*

The results of the cross-group comparison further revealed that the effective management of OOS lies in the manner in which GSOPs are enforced. For instance, store managers who adopted a proactive attitude toward rectifying information discrepancies and a disciplined approach toward correcting scanning errors tended to have lower OOS incidences. In contrast, store managers with an indifferent attitude toward resolving such discrepancies experienced a higher level of OOS incidences. This suggests that:

*P3a: Strict enforcement of GSOPs plays a crucial role in reducing the incidence of OOS.*

*P3b: A proactive stance toward error identification and a disciplined approach toward error rectification will result in lower OOS incidence, while a tolerant attitude toward such issues could promote, rather than mitigate, OOS occurrences.*



GSOPs related to HQ and suppliers' delivery errors were established to minimise OOS and OS occurrences and to facilitate reliable supplier performance. Although penalties were in place to deter poor supplier delivery performance, such penalties did not apply to deliveries from HQ. Therefore some store managers had adopted preventative SSOPs to ensure reliable deliveries from both HQ and suppliers. In addition, a proactive approach towards early resolution of supply or delivery errors also had the effect of preventing subsequent OOS occurrences. On the other hand, a lax attitude that procrastinated error resolution simply created a latent failure path that later surfaced in more complex ways with significant implications on inventory management, yielding the next proposition:

*P4: Early resolution of supply or delivery errors can prevent subsequent OOS occurrences. Deferring error resolution will not only result in OOS but can generate a host of unexpected inventory management problems.*

Furthermore, a proactive approach in dealing with supply or delivery errors may not be confined to operational adjustments alone. Soft, personable approaches, such as relationship management (e.g. a personal phone call), could readily dispel further propagation of errors, as evidenced from the ways in which low-OOS store managers dealt with these issues. These findings offer the following proposition:

*P5: A soft, personable approach to relationship building has the effect of limiting the complexities associated with OOS and results in a quicker resolution of the matter than a physical operational solution.*

Inadequate storage space was a common concern for all stores due to customers' insatiable demand for increasing product ranges and VAS. Continuous efforts were therefore focused on finding ways to create more floor space and optimise remaining space for storage purposes. Although OS occurrences could be managed via the creative use of space, findings from this study show that such an approach may cause further problems:

*P6a: Managing OS through innovative space creation is only a stopgap measure. It will degenerate to a situation of stock mismatch and inventory inaccuracy, creating a false OOS and leading eventually to the occurrence of an OS situation.*

When there were discrepancies in stock level information, stackers would make adjustments in a virtual warehouse called 'Warehouse 99' because although stock could appear to be low in the system, it didn't mean that the stock was sold. Instead, the stock could be in the customers' baskets, stolen or simply placed on another display shelf. The manner in which some of the FS stores, especially the low-OOS stores, dealt with the problem suggests that a virtual warehouse was a useful means of accounting for phantom stock, leading to the next proposition:

*P6b: Creating a virtual warehouse offers an effective means of resolving OOS situations arising out of innovative space creation.*

Literature has shown that OOS and OS occurrences were caused by external factors such as inadequate collaboration between distribution centres (Aastrup and Kotzab 2009) and retailers, and internal factors, such as inaccurate execution of in-store processes (Corsten and Gruen 2003). This study has found that despite collaboration with distribution centre and suppliers, effective execution of in-store processes and early detection of errors were important factors in managing OOS and OS occurrences in the stores.

### ***Store Managers' Attitudes toward Managing Causes of OOS and OS Occurrences***

#### Number of Causes Reported

Key findings of the cross-group analysis indicated that the attitude of store managers towards OOS and OS occurrences influenced their level of diligence and effort towards management of OOS and OS occurrences. This could be observed from the number of causes of OOS and OS occurrences reported by each store manager from the three groups.

Store managers in the low-OOS group exercised high levels of diligence in detection and resolution of errors, as well as greater level of effort in ensuring accurate inventory information and deliveries, suggesting that they possessed a concerned attitude towards the management of OOS and OS occurrences. Due to their keenness to minimise OOS and OS

occurrences in their stores, store managers of low-OOS treated each cause as important and therefore exerted a high level of effort to detect and address them.

Medium-OOS stores reported fewer causes, while high-OOS stores had the least number of OOS and OS causes reported among the three groups. It is therefore plausible to suggest that store managers of medium-OOS stores were less concerned than their low-OOS counterparts in managing the causes of OOS and OS occurrences, and that store managers of high-OOS stores were least concern among the three groups in dealing with potential OOS and OS occurrences in their stores. This interpretation is consistent with findings of previous studies (Gruen et al. 2002; Svensson 2002; ECR Europe 2003; McKinnon et al. 2007; Fernie and Grant 2008; Aastrup and Kotzab 2009), which have repeatedly indicated that senior management's proactive attitudes towards management of OOS and OS helped minimize their occurrences and improve OSA in stores. This study further reveals that a more concerned attitude also implies a higher level of diligence in detecting possible OOS and OS causes, leading, in turn, not only to more conscious efforts to deal with OOS and OS events but also an ability to devise more effective means to minimize, as well as handle, their occurrences. In sum, a concerned attitude towards OOS and OS occurrences tends to evoke a virtuous cycle of OOS and OS management, while a less concerned attitude would lead to a vicious cycle of OOS and OS occurrences. This leads to the next proposition:

*P7: A concerned attitude towards OOS and OS occurrences engenders a high level of diligence in detecting and addressing every possible OOS and OS cause, which also result in developing more effective means to manage OOS and OS events.*

#### Length of Operations, Store Size and Number of SKUs

Of the three groups of stores, the average length of operations of medium-OOS stores was the shortest. Store managers from newer medium-OOS stores also confirmed that their

stores, being 'new to the neighbourhood', adhered closely to GSOPs to enable standardised (FS) store operations. Yet unlike their low-OOS counterparts, medium-OOS store managers were reluctant to enforce GSOPs that involved strict disciplinary actions (e.g. issuing verbal warnings or warning letters) when staff made mistakes. These store managers felt that their store personnel, regardless of whether they were new recruits or transferred from another FS store, were 'still settling into the new environment'. In addition, store managers from medium-OOS stores were concerned that strict disciplinary approaches might lead to high staff turnover. Furthermore, managers of the newer medium-OOS stores were trying particularly hard to cultivate their relationship with HQ to seek the latter's forbearance due to their 'unfamiliarity' with the new environment. This observation suggests that length of store operations is a factor influencing store managers' attitude towards enforcement of GSOPs that involve disciplinary actions, and which inevitably affects management of OOS and OS occurrences in stores.

Though the low-OOS stores were not as new as the medium-OOS stores, they were still relatively young in history of operations, and were larger in size and offered a wider range of SKUs compared to medium- and high-OOS stores. Store managers of new stores preferred to follow closely the HQ's list of products to offer as well as the GSOPs on store operations because they needed to enrich their experiences in the new store environment (e.g. local customers' assortment preferences and locational characteristics). At the same time, these new stores were also closely monitored by HQ, which wanted to ensure that the larger, new stores in their chain could quickly establish store loyalty among residents in the new environment. This observation suggests that, in addition to length of operations, size of store and SKUs also affect store managers' attitude towards managing the causes of OOS and OS occurrences.

Compared to low- and medium-OOS stores, high-OOS stores had the longest store operations history. Store managers from this group were mostly tolerant towards errors

caused by their staff, HQ and suppliers. As expected, stores that had been around for a long time (e.g. high-OOS stores N-1-C and C-1-C had been in operations for 15 years and 25 years respectively) had well and truly settled into their operating environment. They had rich knowledge of local preferences in product assortment and the necessary experience in dealing with challenges caused by physical constraints (e.g. makeshift receiving areas and no back rooms) and locational characteristics (e.g. shopping and product preferences of local residents). High-OOS stores were also generally smaller in size compared with low-OOS and medium-OOS stores and carried fewer SKUs. It appears, therefore, that the combination of the three factors – length of store operation, store size and SKU size – could influence the way in which store managers viewed the seriousness of causes of OOS and OS occurrences. In the case of FS's high-OOS stores, the relatively long history of store operation, small store size and narrower range of SKUs might have made their store managers feel complacent, which, in turn may have resulted in their comparatively lax attitude (compared with their counterparts in the low-OOS and medium-OOS groups) towards managing the causes of OOS and OS occurrences.

Another point to note is that the smaller stores in the high-OOS group had a smaller management team compared to larger stores, implying that 'there was only so much they could do' given the limited management resources on-hand. While complacency was the trigger, small team size (i.e. limited management resources) added further fuel to reinforce the lax attitude among managers of high-OOS stores towards managing the causes of OOS and OS occurrences. This inference leads to the following two related propositions, which complement Proposition 3:

*P8a: Length of store operation, store size and range of SKUs offered, coupled with management resources, could influence store managers' attitude towards the causes of OOS and OS occurrences.*

*P8b: A long history of store operations coupled with a narrower range of SKUs offered (due to small store size) could trigger a complacency attitude among store managers, which, when combined with the constraint of limited management resources, could descend into a lax approach toward managing the causes of OOS and OS occurrences.*

Literature has indicated that formats of stores, range of products offered, size and age of stores affected store operations, particularly in store replenishment (Uusitalo 2001; Burt and Spark 1994; 1995 and Messinger and Narasimhan 1997). The findings of this study have shown that while these factors affect in-store processes, the store managers were still instrumental to lead store staff on effective execution of in-store processes.

#### Process Conformance

Another observation derived from the cross-group analysis was the store managers' level of adherence to GSOPs. Store managers from low-OOS stores who adhered closely to GSOPs, despite having the largest average store size, managed the second-largest average number of SKUs (as compared to medium- and high-OOS stores) and achieved the lowest average extent of OOS occurrences. In contrast, store managers from high-OOS stores who adopted a lax attitude to implementing GSOPs, despite having the smallest store sizes and managing the smallest average range of SKUs (as compared to low- and medium-OOS stores), were confronted with the highest average extent of OOS occurrences among all stores in the chain. The intensity of enthusiasm towards managing the causes of OOS and OS occurrences thus appears to be positively related to the degree of process conformance, i.e. an attitude of high enthusiasm leads to a higher degree of process conformance in managing the causes of OOS and OS occurrences, giving the following proposition:

*P9: The stronger the store manager's level of enthusiasm and concern toward OOS and OS occurrences, the greater their tendency toward ensuring process conformance.*

Having said this, it must be appreciated that store managers from medium- and high-OOS stores were concerned that strict adherence of GSOPs that involved disciplinary actions against staff could result in higher staff turnover. As such, a challenge observed from this discussion was the need to determine the point where strictness in process conformance would turn a positive effect into a negative one.

## **5.2 Managing OOS and OS Occurrences in Stores**

One of the major findings from the within-group analysis of the FS supermarket stores shows that managing OOS and OS events is not confined to managing their causes, i.e. taking actions to prevent or minimize OOS and OS occurrences, but also managing these events when they occur, which poses the biggest challenge, and after they occurred. Previous studies have explored how the use of standard operating procedures and process conformance improved the execution of in-store processes (Raman et al. 2001; Fisher et al. 2006; Ton and Huckman 2008). However, these studies typically analysed OOS events after their occurrence. This study examined how OOS and OS events were managed before, during and after their occurrences in-store. This section discusses the management approaches used by the OOS-concerned versus the OOS-lax store managers in managing OOS and OS occurrences.

### **5.2.1 In-Store Operating Environment**

From the perspective of OOS and OS management, findings from the within-group analysis indicate that stores of the case supermarket, FS, typically operated under four major forms of retail environment, defined by 'in-store retailing dynamics' (see Table 5-4) and 'knowledge of OOS and OS causes' (see Table 5-5). In-store retailing dynamics refers to the type of activities – shopping, product delivery and receiving and shelf replenishing, amongst others – happening within the store. Knowledge of OOS and OS causes refers to the store manager's and staff's knowledge or awareness about in-store events, including the actions of other colleagues, which could lead to OOS and OS occurrences. Broadly, both in-store retailing dynamics and knowledge of OOS and OS causes can be divided into two categories. In the case of in-store retailing dynamics, the two categories are labelled as 'high' and 'low'. In the case of knowledge of OOS and OS causes, they are referred to as 'known' and 'unknown' causes.



High in-store retailing dynamics refers to those times when the store is exceedingly busy, characterised by situations in which store staff are facing competing demands simultaneously from numerous quarters – customers, suppliers, and store management. The typical scenario requires store staff to leave their scheduled tasks in order to attend to those situations that need their ‘urgent’ attention. A typical example is the sudden arrival of stock during peak shopping hours that leads to stock piling up in aisles, and that requires rapid reorganisation of work to shelve and store goods. Another example is a sudden downpour of torrential rain, which causes customers to loiter within the store (increasing shopping traffic), deliveries to be hurriedly received and hastily pushed to aisles by suppliers, and stackers asked to quickly replenish shelves to clear aisle space.

Table 5-4 In-store operating environment

<b>In-Store Retailing Dynamics</b>	<b>Definition</b>	<b>Examples</b>
High	A vibrant shopping atmosphere with competing demands placed on store staff who have to be redeployed from their assigned duties to undertake unscheduled tasks or to resolve unexpected issues.	<ul style="list-style-type: none"> <li>• A sudden arrival of stock during peak shopping hours, leading to stock piling up in aisles, requiring rapid reorganisation of work to shelve and store goods.</li> <li>• Workers at stores with no designated loading/unloading area who have to remove stocks from busy walkway during peak shopping hours.</li> <li>• Sudden rain causing customers to loiter within store, deliveries to be hurriedly received and hastily pushed to aisles by suppliers, and stackers to quickly replenish shelves to clear aisle space.</li> </ul>
Low	A sedate shopping period when store staff are able to carry out their assigned duties with little or no distractions.	<ul style="list-style-type: none"> <li>• Staff replenishing shelves during off-peak shopping periods as scheduled.</li> <li>• Staff organising stock in storage areas (e.g. back rooms or roller cages) according to schedule.</li> <li>• Stackers arranging shelves to look presentable and fully-stocked during quiet shopping periods.</li> </ul>

Low in-store retailing dynamics refers to those times when stores are relatively quiet and store staff are able to carry out their assigned duties with little or no disturbance. Staff replenishing shelves during off-peak shopping periods as scheduled and staff organising stock in storage areas (e.g. back rooms or roller cages) without having to be asked to come to the store front to assist customers are two of the most common examples.

Table 5-5 Known and unknown OOS causes

Knowledge of OOS & OS Causes	Definition	Examples
Known	<p>OOS events of product items expected by store managers and staff.</p> <p>OOS and OS situations where store managers and staff were aware of the full background of its occurrences, i.e. how, where, when and why they occurred.</p>	<ul style="list-style-type: none"> <li>• Items becoming OOS because of supplier delivery delay or OOS at suppliers' warehouse.</li> <li>• OS of some products due to inaccurate store forecast, especially at newer stores where information on customer product preferences were still being collected.</li> <li>• OS of some products due to HQ pushing stock onto stores.</li> </ul>
Unknown	<p>OOS and OS of specific product items that store managers and staff did not expect and were unaware of.</p>	<ul style="list-style-type: none"> <li>• An item becoming OOS unexpectedly due to mis-shelving by new staff or misidentification because of very similar packaging with another item in backroom.</li> <li>• External factors triggering excessive or panic buying (e.g. producer's sudden announcement in ceasing production of a popular product; SARS epidemic)</li> <li>• OS of some products due to product recall announced by manufacturer or health authorities (e.g. possible contaminated chilli oil from China).</li> </ul>

'Known' knowledge of OOS and OS causes mean that store managers and staff are very familiar with, or have full knowledge of, those events that have a high chance of resulting in an OOS and/or OS situation (e.g. when store managers know full well that a delivery failure or warehouse OOS situation has occurred, and therefore an OOS situation will most likely

ensue in-store). Such events are be classified as 'known' under 'knowledge of OOS and OS causes'.

'Unknown' knowledge of OOS and OS causes, on the other hand, is OOS and OS of events that surprise store managers and staff, e.g. OOS of product items which the store managers did not expect. These events include undetected mis-shelving of products by new staff, resulting in phantom stock in-store and the misidentification of a product item during shelf replenishment due to similar packaging that eventually results in an OOS or OS situation.

FS Supermarket had GSOPs in place and its stores had their own SSOPs to manage known causes of OOS and OS occurrences. For example, the GSOP to deter pilferage in stores was to install CCTV at strategic locations within the stores. The SSOP to deter pilferage was for selected store staff to be a part of the internal (within-store) security team. As unknown causes referred to OOS events occurring unexpectedly (e.g. when the system indicated presence of stock but stock could not be found in the storage areas), no GSOP or SSOP was in place to deal with these situations. Store managers, however, still had to manage them quickly to minimise any negative impacts filtering to store operations and customer service.

### **5.2.2 Managing OOS and OS Occurrences**

To effectively manage OOS and OS occurrences under the four operational environments, store managers who were OOS- and OS-concerned were observed to use different management approaches to deal with each of the four operating situations (see Figure 5-1). When in-store dynamics were low and OOS and OS causes were known to stores, OOS- and OS-concerned store managers would implement strict SOP adherence (Strict SOP Adherence). However, when in-store dynamics were high and OOS and OS causes were known to stores, these OOS- and OS-concerned store managers would tolerate and, to a limited extent, encourage some minor deviations, typically as temporary measures, from SOPs, engaging in flexible SOP enforcement (Flexible SOP Enforcement). When in-store

dynamics were low and OOS and OS causes were unknown, the OOS- and OS-concerned store managers would direct store staff to search for possible phantom stocks and restore stock levels of display shelves (Search and Restore). Lastly, when in-store retailing dynamics were high and OOS and OS causes were unknown, the OOS- and OS-concerned store managers would lead or direct store staff to quickly improvise some stopgap measures to rectify the problem in order to minimise negative impact on store operations and customer service levels. All staff were required to inform the store manager as well as other senior staff of the improvised actions (Accountable Improvisation).

<b>In-store Retailing Dynamics</b>	<b>High</b>	<i>Flexible SOP Enforcement</i>	<i>Accountable Improvisation</i>
	<b>Low</b>	<i>Strict SOP Adherence</i>	<i>Search and Restore</i>
		<b>Known</b>	<b>Unknown</b>
<b>Knowledge of OOS &amp; OS Causes</b>			

Figure 5-1 Management approaches adopted by OOS-concerned store managers

In contrast Figure 5-2 describes the four management approaches implemented by store managers with a lax attitude towards managing the causes of OOS and OS occurrences. When OOS and OS causes were known, the OOS-lax store managers adopted the Flexible SOP Enforcement approach, regardless of the state of in-store retailing dynamics. When in-store retailing dynamics were low and OOS and OS of product items were unknown, though these OOS-lax store managers would also adopt a Search and Restore approach, they would not instruct store staff to immediately search for the phantom stock and restore stock levels of display shelves. Instead, store staff would be asked to search for phantom stocks and restore stock levels of display shelves after they had completed their scheduled tasks. When in-store retailing dynamics were high and causes of OOS and OS were unknown, the OOS-lax store managers would allow their staff to use their own discretion to deal with OOS and OS situations without necessarily following up to ensure that the improvised actions were made known to other staff (Phantom Improvisation).

<b>In-store Dynamics</b>	<b>High</b>	<i>Flexible SOP Enforcement</i>	<i>Phantom Improvisation</i>
	<b>Low</b>		<i>Search and Restore</i>
		<b>Known</b>	<b>Unknown</b>
<b>OOS &amp; OS Causes</b>			

Figure 5-2 Management approaches adopted by OOS-lax store managers

Taken together, the contrasting OOS- and OS management approaches between those adopted by OOS- and OS-concerned store managers and those employed by OOS- and OS-lax ones point to the following propositions:

*P10a: When causes of OOS and OS are known, OOS- and OS-concern managers would adhere rigidly to SOPs to deal with the OOS and OS event, but would tolerate SOP deviations when in-store retailing dynamics become high.*

*P10b: When causes of OOS and OS are known, OOS- and OS-lax managers tend to adopt a flexible approach to deal with the OOS and OS event, allowing staff to deviate from SOPs even when in-store retailing dynamics are low.*

*P11a: When causes of OOS and OS are unknown, OOS- and OS-concern managers would take proactive actions to quickly address the OOS and OS event, including allowing staff to improvise accountable means to deal with the situation when in-store retailing dynamics are high.*

*P11b: When causes of OOS and OS are unknown, OOS- and OS-lax managers would take their time to address the OOS and OS event, including allowing staff to improvise means to deal with the situation when in-store retailing dynamics are high but would not be concerned about the traceability of such improvised actions.*

Details of the different OOS and OS management approaches used by both OOS- and OS-concerned as well as OOS- and OS-lax store managers are given in Table 5-6.

Table 5-6 OOS and OS management approaches

<b>OOS &amp; OS Management Constructs</b>	<b>Description</b>	<b>Illustrative Evidence</b>
<b>Strict SOP Adherence</b>	<ul style="list-style-type: none"> <li>• Sticking closely to prescribed processes of both GSOPs and SSOPs with no tolerance for deviation.</li> <li>• Viewing SOPs as a blueprint.</li> <li>• Putting emphasis on discipline and re-training, where necessary.</li> </ul>	<ul style="list-style-type: none"> <li>• Issuing verbal warning to staff (e.g. E-2-B) responsible for scanning errors at check-out stations or at receiving stations (e.g. C-2-C) followed by formal warning letter, as per GSOP.</li> <li>• Re-training staff persistently making similar procedural mistakes (e.g. N-2-A), as per GSOP.</li> </ul>
<b>Flexible SOP Enforcement</b>	<ul style="list-style-type: none"> <li>• Tolerating staff who deviate from following prescribed procedures of GSOP and SSOP, especially at busy periods or due to abnormal circumstances.</li> <li>• Viewing SOPs as guide.</li> <li>• Emphasising employee relationship building.</li> </ul>	<ul style="list-style-type: none"> <li>• Counselling staff responsible for mistakes and reminding them of monetary incentives for accurate performance (e.g. N-3-A, N-4-C and W-4-A).</li> <li>• Ignoring minor procedural errors and counselling staff if similar errors persist (e.g. S-2-A and E-1-B).</li> </ul>
<b>Search and Restore</b>	<ul style="list-style-type: none"> <li>• Directing staff to explore means of rectifying OOS and OS issues.</li> <li>• Continuously monitoring OOS situations and correcting errors as they were discovered.</li> </ul>	<ul style="list-style-type: none"> <li>• Placing yellow OOS labels over shelf-tag of OOS items to initiate search and retrieval of replenishment stock.</li> <li>• Placing OS stock in mobile storage equipment (e.g. roll cages) as a stopgap measure.</li> </ul>
<b>Accountable Improvisation</b>	<ul style="list-style-type: none"> <li>• Empowering staff to improvise innovative means to resolve OOS and OS issues, especially on instances not covered by GSOPs or SSOPs.</li> </ul>	<ul style="list-style-type: none"> <li>• Allowing staff to fill an agreed substitute product or a promotional product on shelf spaces vacated by OOS items.</li> <li>• Staging ad-hoc promotions, e.g. 'hourly specials', of OS items or substitute products of OOS items.</li> </ul>
<b>Phantom Improvisation</b>	<ul style="list-style-type: none"> <li>• Allowing staff to use their discretion to resolve OOS and OS issues, especially in instances not covered by GSOPs or SSOPs without necessarily following up to ensure that the improvised actions were made known to other staff.</li> </ul>	<ul style="list-style-type: none"> <li>• Allowing staff to use excess display shelf space to store an assortment of excess stock.</li> <li>• Allowing staff to expand display area by hanging stocks via metal hooks at the sides of display shelves indiscriminately.</li> </ul>

### **5.3 Conclusion**

Cross-group analysis into how stores in the three groups manage OOS and OS occurrences in their stores has revealed that senior FS management's (HQ and store managers) attitude towards the management of OOS and OS in stores influences the level of success in managing OOS and OS occurrences in FS stores. The results also show that the role of store managers is critical to the management of OOS and OS occurrences. This observation was also mentioned in DeHoratius and Raman's (2007) study on how store manager incentive design impacted on store manager behaviour and, eventually, on retail performance.

The results of the cross-group analysis further show that OOS- and OS-concerned store managers adopt strict SOP adherence when OOS and OS causes are known and deploy search and restore operations when OOS and OS causes are unknown. In contrast, OOS- and OS-lax store managers adopt flexible SOP adherence when OOS and OS causes are known and unknown, and engage in phantom improvisation when OOS and OS causes are unknown.

Instead of laying blame on who caused particular OOS and OS occurrences, OOS- and OS-concerned store managers exert high levels of diligence to detect errors and work towards quick resolutions of in-store problems. In addition, these proactive store managers also make keen efforts to identify key parties at HQ and at the suppliers to provide quick resolutions and assurance of accurate deliveries. A key observation from the cross-group analysis therefore seems to indicate that store managers' attitudes towards managing causes of OOS and OS occurrence is an important factor in the management of OOS and OS occurrences in stores.

## Chapter 6 Conclusions

The literature on OOS and OS is flooded with studies on the causes of OOS and OS occurrences. While an equally extensive range of studies have also been conducted to examine how OOS and OS occurrences may be minimised, or are managed in practice, operational details are generally lacking on how some of the recommended measures, such as process conformance (Ton and Huckman, 2008) and improving inventory accuracy (Gruen and Corsten 2003), are to be implemented. By means of a case study of 19 of the 23 stores of a progressive supermarket chain in Singapore, this thesis has revealed four OOS and OS management approaches employed by store managers with a dedicated focus on managing OOS and OS occurrences, which have been compared with those used by their less OOS- & OS-concerned counterparts. Because store managers with a dedicated OOS- and OS-focus were able to keep OOS and OS occurrences in their stores lower than others, their OOS and OS management approaches may serve as a benchmark of 'best' practice. The differences between their approaches and those of their less OOS- & OS-concerned counterparts also provide some finer points on how those 'best practice' measures ought to be carried out to achieve the desired results. These are two of the major contributions of this study, which not only has managerial implications but also theoretical significance. This chapter concludes the thesis by first presenting the salient findings in Section 6.1, highlighting the contributions of this study to the literature of OOS and OS occurrences. This is followed by a discussion on the theoretical implications of these findings in Section 6.2 and their practical implications in Section 6.3. Limitations of the study are identified in Section 6.4 with suggestions for further research in Section 6.5.



## 6.1 Key Findings

This study began with the objective of understanding how supermarket stores managed OOS and OS occurrences. It used a case study approach to examine how different stores belonging to the same supermarket chain, FS Supermarket in Singapore, differed in terms of their approach toward implementing the GSOP and SSOPs developed to manage OOS and OS occurrences. Dividing the 19 (of the 23) participating stores of FS Supermarket into three groups based on their level of OOS occurrences, this study found that stores with low OOS and OS occurrences did not differ from those with high OOS and OS occurrences in terms of store characteristics. All three groups contained stores with and without back rooms and while some had designated loading/unloading areas, others had only makeshift loading/unloading points. Likewise, the ratio of SKUs to store area (in terms of floor space) was equally heterogeneous between stores of the same group. In fact, stores in both the low- and high-OOS and OS groups had the same average SKUs to store area.

What emerges as a distinguishing feature that separates the performance of the three OOS and OS occurrence groups is the attitude of the store managers towards OOS and OS occurrences. Of the three groups, store managers of the low-OOS and OS group were more concerned with OOS and OS occurrences than their counterparts in the medium- and, in particular, the high-OOS and OS groups. The OOS- and OS-concerned store managers tended to adhere to the prescriptions of the GSOPs and SSOPs rigidly, especially during periods when in-store retailing dynamics were low and where failures to conform to GSOPs and SSOPs were known to result in OOS and OS occurrences. These store managers had little tolerance toward staff who failed to conform, though they also understood the need to be flexible in following SOPs at times, especially during periods when in-store retailing dynamics were high. But these store managers did not ignore the importance of steering the staff back on course to follow SOPs as soon as the in-store retailing dynamics subsided. This was evident from instances when these store managers reminded staff to re-store stock

temporarily left in storage cages as a stop-gap measure to ease congestion in aisles during busy shopping periods.

In addition, OOS- and OS-concerned store managers were quick in taking follow-up actions on instructions given to deal with potential issues of OOS and OS occurrence. A case in point was the follow-up phone calls to suppliers and HQ staff to check whether inventory discrepancies had been confirmed, and rectified, subsequent to the notification of a possible stock discrepancy during receiving.

Lastly, these OOS- and OS-concerned store managers also knew when to empower staff to use their ingenuity in dealing with situations not covered by SOPs. But they were also aware of the plausible pitfalls with such improvised efforts if left unchecked. These OOS- and OS-concerned store managers would make it a point to have the improvising staff communicate to them and to other staff what had been 'improvised'. The member of staff asked to 'create' space to temporarily store excess stock from HQ was a typical example of such improvisation. But OOS- and OS-concerned store managers would not allow staff to store excess items without notifying their colleagues of what they had done and where the excess items had been temporarily kept, a practice labelled as an 'accountable improvisation' in this study.

In sharp contrast, store managers in the high-OOS and OS groups were noticeably relaxed toward situations which could potentially result in OOS and OS occurrences. Although these OOS- and OS-lax store managers implemented GSOPs as well as established SSOPs to fit their store environment, they had the habit of allowing staff to deviate from the prescriptions of the SOPs. Not only were they comparatively tolerant toward SOP-incompliant behaviour, they were also lenient toward staff mistakes on matters such as repetitive scanning errors, which had grave consequences on inventory accuracy, a primary cause of OOS and OS occurrences. These OOS- and OS-lax store managers made little effort to change this 'bad'

habit amongst some of their staff. Their OOS- and OS-relaxed attitude extended beyond tolerating staff in-compliant behaviour; they procrastinated in taking follow-up actions on instructions given to staff in dealing with issues of possible OOS and OS occurrence. For instance, although the OOS- and OS-lax store managers also informed suppliers and HQ staff of possible stock discrepancies, they did not take timely follow-up actions to check and confirm whether the possible discrepancy had been identified and corrected. In a similar vein, although they were quick in empowering staff to improvise means of dealing with storage of excess stock, they did not bother to ensure that the improvised actions were conveyed to other store staff. This attitude was merely crisis problem-solving, rather than accountable improvisation. Their actions might be regarded as 'phantom improvisation'.

These attitudinal nuances between the two groups of store managers, i.e. the OOS- and OS-concern and the OOS- and OS-lax, underscore the key findings of this study and confirm the importance of store managers in influencing the management of OOS occurrences identified in mainstream OOS and OS literature (DeHoratius and Raman 2007; Ton and Huckman 2008; DeHoratius and Ton 2009; Raman et al. 2001; ECR Europe 2003; Fernie and Grant 2008; Aastrup and Kotzab 2009; ECR Asia Pacific 2011). In particular, these findings echo Fernie and Grant's (2008) observation that the key difference between high and low OSA levels depends upon 'management and staff commitment' (p.304) to address the problems. They also reinforce Ton and Huckman's (2008) argument that store managers' decision to exert strict adherence to standardised operating policies or to tolerate deviations from these policies impacted store performance. Aastrup and Kotzab (2009) drew a similar conclusion: the main distinguishing factor of low versus high OOS was store management's attention and dedication to resolving OOS issues.

This study not only confirms the significance of the store managers' attitudes, dedication and commitment in influencing OOS management performance, it also unravels a broad spectrum of operational details on how attitudes toward OOS and OS occurrences translate

into actions that shape the outcome of OOS management. Furthermore, this study has unveiled a number of unique insights, which either expand extant findings or add a new dimension to proposed OOS and OS management strategies. These insights are summarised in Table 6.1, in contrast with what have been documented in the literature. In addition, Table 6.1 also indicates the differences between what this study sought to address and what had been examined in previous studies. More significantly, the major contributions from this study, as summarised in Table 6.1, provide a number of operational details on how antecedents of OOS and OS occurrences could be managed. These operational details carry both theoretical and practical implications, which are discussed, respectively, in Sections 6.2 and 6.3.

Table 6-1 Comparison between past studies and present study

	Previous Studies	This Study
Field of Investigation	<ul style="list-style-type: none"> <li>• Focused on two streams: consumer responses to OOS where causes emerged from demand side (e.g. Emmelhainz et al. 1991 and Fitzsimons 2000), and extent and root causes of OOS emerging from supply side (e.g. Gruen et al. 2002 and Gruen and Corsten 2007).</li> </ul>	<ul style="list-style-type: none"> <li>• Focused on the extent and root causes of OOS and OS emerging from the supply side.</li> </ul>
Study Focus	<ul style="list-style-type: none"> <li>• Examined relationships of OOS and OS and how their occurrences affect OSA in retail stores belonging to different industries and retail chains (e.g. Corsten &amp; Gruen 2003 and Fernie &amp; Grant 2008). Ton and Raman (2010) is one of the few exceptions.</li> </ul>	<ul style="list-style-type: none"> <li>• Explored and investigated how stores of a supermarket chain in Singapore managed OOS and OS occurrences.</li> </ul>
Context of Analysis	<ul style="list-style-type: none"> <li>• Based largely on retail environments in Europe and USA (e.g. A.C. Nelson 1968; and Aastrup &amp; Kotzab 2009).</li> </ul>	<ul style="list-style-type: none"> <li>• Stores of a single supermarket chain in Singapore, which has a retailing culture that blends western practices with eastern flavour.</li> </ul>
Study Approach	<ul style="list-style-type: none"> <li>• Explored OOS and OS occurrences at specific locations (e.g. backroom and display shelves) within stores (e.g. Fisher et al 2000 and Walter et al. 2008).</li> </ul>	<ul style="list-style-type: none"> <li>• Systematically examined OOS and OS occurrences in-stores using Kotzab and Teller's (2005) grocery retail in-store logistical model as guide.</li> </ul>
Findings:	<ul style="list-style-type: none"> <li>• Store format, location and size, range of product variety and characteristics and execution of in-store processes were key factors influencing extent of OOS occurrences (e.g. Uusitalo 2001 and Ton &amp; Raman 2010).</li> <li>• Lack of OOS- and OS-specific KPIs to measure staff performance was a major cause of OOS events (e.g. Ton &amp; Huckman 2008 and Ton &amp; Raman 2010).</li> <li>• External coordination with distribution centres and suppliers affected in-store operations and OOS and OS occurrences (e.g. Gruen et al. 2002 and Aastrup &amp; Kotzab 2009).</li> <li>• Store ordering and shelf replenishment practices could contribute to inaccurate inventory information (e.g. ECR Europe 2003 and Hausrueckinger 2006).</li> <li>• Lack of direction and inadequate training from HQ to stores was a prime contribution to poor in-store OOS and OS management (e.g. ECR Europe 2003 and Trautrimis et al 2012).</li> <li>• Store management played a crucial leadership role in managing OSA (e.g. ECR Europe 2003 and Ton &amp; Huckman 2008).</li> </ul>	<ul style="list-style-type: none"> <li>• Locational factors and store characteristics had little effect on OOS and OS occurrences, which were heavily influenced by both trivial human errors and operational slips as well as the manner in which standard in-store operation processes was enforced.</li> <li>• Use of OOS- and OS-specific KPIs had little effect on staff's ability to handle OOS and OS occurrences</li> <li>• While external coordination with HQ and suppliers affected in-store operations, early resolution of errors, including a soft, personable approach to relationship building with suppliers and HQ, prevented OOS occurrences.</li> <li>• Purchase ready strategies, e.g. replenishment trigger mechanisms, minimized OOS and OS occurrences.</li> <li>• GSOP only provided broad guidelines for managing OOS and OS occurrences. Store management's attitude, commitment and ability to introduce and enforce SSOPs were crucial.</li> <li>• Store operation and size, range of SKUs offered, and organisational resources influenced store managers' attitude towards OOS and OS management, including use of virtual warehouses.</li> </ul>
Contributions	<ul style="list-style-type: none"> <li>• Offered solutions to resolve OOS occurrences in areas covering process improvement, operational accuracy, incentive alignment and human factors (e.g. ECR Europe 2003 and Aastrup and Kotzab 2010).</li> <li>• Examined post occurrences of OOS, with little operational details and recommendations for practice (e.g. Corsten &amp; Gruen 2003).</li> </ul>	<ul style="list-style-type: none"> <li>• Offered four approaches to manage OOS and OS occurrences based on knowledge of OOS and OS causes and in-store retailing dynamics.</li> <li>• Provided insights on operational details to manage OOS and OS events for different stages of in-store processes.</li> </ul>

## 6.2 Implications for Theory

Studies on the causes and management of OOS and OS abound, as noted in the literature review. Yet there appears to be no coherent approach to empirically examining OOS and OS issues and exploring solutions that have been attempted by retailers to reduce OOS and OS occurrences, as reflected in Raman et al.'s (2001) observation that operational execution remains one of the biggest challenges retailers face in achieving OSA. This study has pushed that literature a small step forward by unearthing how stores of a Singapore supermarket managed OOS and OS causes and how their dissimilar approaches led to different outcome effects.

From the cross-group findings, this study has derived 11 main propositions together with their variants to capture a host of relationships which link causes of OOS and OS occurrences to OOS and OS management measures. It has also identified the pivotal role of store managers' attitudes toward engendering contrasting OOS and OS management performance outcomes. These propositions offer the foundation for building a platform upon which an integrated theory of OOS and OS management could be developed.

Furthermore, most studies (e.g. Gruen et al. 2002; ECR Europe 2003; Corsten and Gruen 2003; Kotzab and Teller 2005; Gruen and Corsten 2007; Aastrup and Kotzab 2010) on OOS and OS management have tended to focus on managing the causes of OOS and OS occurrences. This study has gone beyond looking at causes, delving into the approaches store managers with different attitudes toward OOS and OS occurrences use to deal with OOS and OS events as they surface. While managing OOS and OS causes is important in minimising or preventing OOS and OS occurrences, it cannot eliminate OOS and OS events. As Chapman et al. (2003) point out, many OOS and OS causes are unknown to store staff. Lack of knowledge of OOS and OS causes mean that stores will continue to grapple with OOS and OS occurrences. Evidently, understanding how store managers deal with OOS

and OS events offers valuable insights into how OOS and OS occurrences could be managed effectively in practice. This understanding is also vital to providing a theoretical framework, where testable hypotheses could be developed for validation. This is a major theoretical contribution to the literature.

The contrasting approaches used by OOS- and OS-concerned and OOS- and OS-lax store managers also suggest that OOS and OS management cannot adopt a one-size-fit-all measure. OOS and OS management needs to be contextualised to the dynamics of the operating retail environment, a point which has not been given much attention in the literature.

In summation, from a theoretical perspective, findings from this study contribute to advancing knowledge of OOS and OS management in at least three significant ways. First, these findings provide a theoretical thread, which links the relationships between attitude, commitment and dedication toward OOS and OS management and OOS and OS performance. Second, it integrates a range of major findings in extant literature on OOS and OS causes, e.g. infrequent replenishment activities to store, shelf and storage (Fisher et al. 2000), occurrences, e.g. higher risk of pilferage and inventory obsolesces (Chandra and Kumar 2001), and management, e.g. physical checks and information technology systems (Corsten and Gruen 2003). Third and most significantly, this link takes many of the recommended OOS and OS measures from the broad strategic dimension (e.g. improving error scan through training) to the detailed operational level (e.g. improving error scan by giving personalised training to staff with a language barrier).

### 6.3 Implications for Practice

This study has unearthed many procedural and routine actions undertaken by the case supermarket stores to manage OOS and OS occurrences. Admittedly, not all of the actions practised by the case supermarket stores might be applicable to other grocery retail outlets or in other parts of the world (e.g. due to cultural differences). There are, however, four relatively obvious contributions that findings from this study make in terms of offering guidelines for best practice in OOS and OS management:

- 1) Role of Store Managers: Previous studies (Raman et al. 2001; DeHoratius and Raman 2007; Ton and Huckman 2008) have identified the pivotal role that store managers could play in influencing the outcomes of OOS and OS management. Findings from this study not only confirm this observation, but reveal how store managers could be effective in reducing OOS and OS occurrences. Having a concerned attitude towards OOS and OS occurrences, as recommended by Raman et al. (2001) and DeHoratius and Raman (2007), is a start. More importantly, store managers should take proactive actions to deal with recurring problems, such as making regular personal calls to HQ and suppliers to ensure inventory information is accurate and making extra efforts to identify the 'key' person to call to rectify errors immediately, and thus mitigate OOS and OS occurrences. Table 6.1 to 6.3 summarise the key proactive actions FS Supermarket store managers took to deal with OOS occurrences with respect to some of the common concerns raised in the literature for three of the major in-store processes – receiving and check-out, ordering and replenishment.

Given that execution is a nagging issue in retail operations (Raman et al. 2001), including supermarkets, some of the taken-for-granted operational details employed by the low-OOS stores (see Tables 6.2 to 6.4) could be used as a basis to develop a list of job responsibilities for inclusion into store managers' position descriptions.



Table 6-2 Key operational details for developing a best-practice framework (receiving and checkout)

<b>In-Store Process</b>	<b>Areas of Concern Regarding OOS and OS Occurrences</b>	<b>Examples of Good practices Based on Experiences of FS Stores</b>
<p>Receiving and Checkout</p>	<ul style="list-style-type: none"> <li>• Accounting mistakes due to incorrect receipts and error data capture at receiving station, resulting in inaccurate inventory information. (e.g. Gruen et al. 2002; Corsten &amp; Gruen 2003 and Kang &amp; Gershwin 2005)</li> <li>• Error scans at checkout stations due to similarities in products and to alleviate congestion at checkout lines, resulting in inaccurate information in PoS and inventory systems. (e.g. Raman et al. 2001; Gruen et al. 2002; Kang &amp; Gershwin 2005 and Hausruckinger 2006)</li> <li>• Incorrect suppliers' deliveries due to wrong packaging and inaccurate information about stock levels and orders, in suppliers' systems. (e.g. Kang &amp; Gershwin 2005; McKinnon et al. 2007; Morgan &amp; Dewhurst 2007 and Fernie &amp; Grant, 2008)</li> </ul>	<ul style="list-style-type: none"> <li>• Station supervisory staff at receiving stations for early resolution of error data capture to minimise inaccuracy in inventory management.</li> <li>• Station supervisory staff at checkout stations for early detection of error scans and immediate resolution to minimise inaccuracy in inventory management and alleviate congestion at checkout stations.</li> <li>• Make personal calls to key personnel, such as buyers at HQ, to obtain updated information to facilitate store operations (e.g. latest list of product barcodes, stock levels at stores and knowledge of new product assortments).</li> <li>• Make personal calls to suppliers to notify wrong delivery and request review of inventory records to identify possible inventory discrepancies, followed by subsequent phone calls to confirm results of inventory checks.</li> <li>• Provide feedback on identification and rectification of inventory errors to suppliers' representatives when delivering in-store orders.</li> <li>• Maintain close working relations with HQ and suppliers to resolve errors (e.g. wrong deliveries) quickly to mitigate negative impacts of OOS and OS occurrences.</li> </ul>

Table 6-3 Key operational details for developing a best-practice framework (ordering)

<b>In-Store Process</b>	<b>Areas of Concern Regarding OOS and OS Occurrences</b>	<b>Examples of Good Practices Based on Experiences of FS Stores</b>
Ordering	<ul style="list-style-type: none"> <li>• Inaccurate demand knowledge due to wide product assortment and variable product promotions. (e.g. Raman et al. 2001; Gruen et al. 2002 and Ettouzani et al. 2012)</li> <li>• Inaccurate orders due to pilferage committed by customers, staff or suppliers. (e.g. Miller 1997; Turcsik &amp; Summerour 2001 and Verhoef &amp; Sloot 2006)</li> </ul>	<ul style="list-style-type: none"> <li>• Store manager to make regular personal calls to key personnel at suppliers' office for close collaboration on promotions management.</li> <li>• Store manager to brief all floor personnel before store opening hours on changes in list of products and promotions.</li> <li>• Install CCTV at strategic locations within the stores.</li> <li>• Establish proactive methods to deter theft in stores by:               <ul style="list-style-type: none"> <li>• (1) forming internal security team to comprise senior store management and rostered full-time floor personnel; and</li> <li>• (2) stationing store managers and supervisory staff in suspected high theft sections.</li> </ul> </li> </ul>

Table 6-4 Key operational details for developing a best-practice framework (replenishment)

In-Store Process	Areas of Concern Regarding OOS and OS Occurrences	Examples of Good Practices Based on Experiences of FS Stores
Replenishment	<ul style="list-style-type: none"> <li>• Disorganised frequency of replenishment activities due to:               <ul style="list-style-type: none"> <li>➢ No, or lack of, trigger mechanism to replenish shelves; (e.g. Corsten &amp; Gruen 2003)</li> <li>➢ Long distance from back store to display shelves; and (e.g. McKinnon et al. 2007 and Fernie &amp; Grant 2008)</li> <li>➢ Misalignment of ordering schedule, delivery schedule and replenishment schedule. (e.g. ECR Europe 2003)</li> </ul> </li> <li>• Store size and space management influenced product assortment management. OS occurred frequently due to wide array of product assortment (national list of product assortment combined with local list of product assortment). (e.g. Campo &amp; Gijbrecchts 2004 and Aastrup &amp; Kotzab 2009)</li> </ul>	<ul style="list-style-type: none"> <li>• Senior store staff (e.g. store managers, assistant managers, executives or supervisors) to conduct regular physical walkabouts within stores to monitor stock levels of display shelves.</li> <li>• Reduce travelling distance from back store to display shelves by utilising space on top of shelves as storage.</li> <li>• Have supplier sponsored storage boxes installed above display shelves for storage.</li> <li>• Conduct replenishment an hour before and an hour after store closes, and during quiet operating hours.</li> <li>• Only urgent replenishment conducted when customer traffic is high to minimise disturbances to customers' shopping experience.</li> <li>• Adopt a system of mobile display equipment, such as mobile display trays and trollies, to extended display area to spaces at shop front.</li> <li>• Run adhoc store promotions of targeted products to increase turnover (e.g. 'hourly specials', 'buy one get one free' specials).</li> </ul>

Another important finding of value to practice is the two approaches FS store managers adopted to deal with potential pilferage and theft occurrences within their stores. The first was positioning themselves in vantage locations within their stores, which enabled FS store managers to increase the visibility of in-store operations and

customer traffic. The second was the appointment of store staff to double up as internal security team to monitor customer shopping movements. Equally worth noting is the regular informal information exchange on security practices and pilferage incidents among FS store managers.

- 2) Adherence to SOPs: Ton and Huckman (2008) suggest that discipline in implementing standard policies and procedures is necessary to ensure process conformance. This study has found that adhering rigorously to SOPs works well only when in-store dynamics are low and factors known to have the potential to contribute to OOS occurrences are identifiable, such as error scans at checkout stations. When the operating environment in store is not so, flexibility in implementing SOPs is needed, as shown by the four OOS and OS management approaches exercised by managers of low-OOS stores. This study finds that quick conflict resolution is essential in dealing with OOS and OS events. Instead of laying blame on the causes of OOS and OS occurrences, positive-thinking store managers should focus on seeking quick solutions, e.g. developing creative space management ideas to accommodate excess stock. Quick decisions and flexibility in adapting SOPs to suit changing store operating environments could help avert possible disruptions to store operations, the latter of which could eventually degenerate into an OOS or OS situation. The four OOS and OS management approaches employed by managers of low-OOS stores of FS Supermarket offer a pragmatic guide for grocery retailers to deal with different operating conditions.
- 3) Supplier Relationship Management: OOS and OS literature does not strongly recommend supplier relationship management as a means of reducing OOS and OS occurrences, though ECR Asia Pacific (2011) has noted that having close collaboration with supply chain partners is the most successful OSA initiative for retailers. Findings from this study show that FS store managers embraced the notion

that maintaining good relationships with suppliers would improve flow of information on product assortment, promotions, orders and deliveries. The proactive actions taken by store managers of the low-OOS group to make personal calls to suppliers and also the initiative they took to get to know the key person to call to achieve their objectives of immediate error rectification underscore the importance of supplier relationship management in OOS and OS management.

Kotzab and Teller (2005) state that their empirical investigation did not acknowledge the flow of goods and information to and from the stores. This study has found that information related to movement of goods to and from stores plays a key role in OOS and OS occurrences. Many OOS and OS occurrences at FS stores were caused by inaccurate inventory information in the management information systems at HQ, suppliers and FS stores. The initiatives taken by FS store managers suggest that supplier relationship management could be used as a weapon to combat OOS and OS occurrences and should not be overlooked. Besides, supplier relationship management also carries a host of other business benefits for retailers, including getting suppliers to give them preferential treatment and sharing 'exclusive' product and promotional information. One way to cultivate supplier relationship management is the reciprocal help exhibited by FS store managers in promoting the products of some supporting suppliers when items from other competitors' suppliers were OOS.

- 4) Effects of Contextual Factors; While contextual factors (e.g. store size, number of SKUs carried, number of brands, availability of back room and designated receiving areas) have been found to cause OOS and OS events (ECR Europe 2003; ECR UK 2007; Aastrup and Kotzab 2009; Reiner et al. 2013), this study has found that these factors do not affect the management performance of stores in terms of achieving OSA. The three groups of FS stores possessed heterogeneous store and contextual characteristics (e.g. store size, number of SKUs, makeshift versus designated

receiving areas and length of operations). Yet, this study found these heterogeneous stores and contextual factors did not affect store managers' management of OOS and OS. Aastrup and Kotzab (2010) also observed that contextual factors, such as store size and number of SKUs, did not affect OOS occurrences. These findings reaffirm the effectiveness of the management approaches used by stores in the low-OOS group vis-à-vis their counterparts in the other two groups.

#### **6.4 Limitations of this study**

This research has certain limitations despite the rigor exercised in the data collection and data analysis processes. A common limitation in case study research is its inability to generalize its findings to other contexts. This study is no exception.

Another notable limitation is related to the influence of context. This study was conducted in the context of one supermarket chain where a particular corporate culture may exist. This culture would form the basis of their business strategies and attitude towards employee management. Another supermarket chain in Singapore, or elsewhere, could possess a different operational culture which translates into different OOS and OS management methods but could be equally, if not more, effective.

This research can be readily enhanced, if there were opportunities to focus on detailed in-store operational and stock handling process over the span of a week as well as to conduct interviews with operational staff to obtain "front-line" information on in-store process and operational issues. The request to interview FS stackers was refused by FS HQ because they "did not want their stackers to be interrupted from their duties" was the reason given by the MD. However, these additional interviews could provide a more in-depth understanding of the actual execution of in-store activities as well as offer a better understanding of when, why and how lapses in the procedure adherence sometimes occur.

Another limitation of this study was its inability to secure information relating to OOS and OS occurrences by stock value classifications from FS HQ and its stores. Classifying OOS and OS occurrences by stock value could offer store managers a more refined means to determine effective approaches to managing OOS and OS occurrences.

## 6.5 Recommendations for Future Research

There are a number of ways to minimise the limitations mentioned and to further extend the contributions of this study. First, to test the generalizability of the findings, this study could be replicated in other supermarkets chains in Singapore and in other geographical locales. Extending the study to other locations with different corporate cultures and social contexts would validate the effectiveness of FS's OOS and OS management approaches.

Replicating this study in retail chains of other industries where the impact of OOS could also result in losses (e.g. brand and store loyalty), such as home improvement retail chains (e.g., Bunnings) would be another logical extension of the present study. It would contribute to increasing our understanding of how retail chains in different industries manage OOS and OS occurrences in their stores.

As mentioned in the previous section, it is suggested that opinions be solicited from floor staff about detailed in-store operational and stock handling processes to obtain 'real' information on in-store issues. This would allow execution issues be revealed and processes likely to experience lapses in procedural conformance be identified. At the store manager level, an interactive game-based experimental approach to assess how they react to a range of OOS and OS situations could also be scope for further study.

Future research could also benefit from examining the frequency of OOS and OS occurrences in supermarkets and other retail outlets in different cultural settings. The question of how management followed up the results of remedial actions taken to deal with OOS and OS occurrences would also be a fruitful area for future exploration.

Lastly, examining OOS and OS occurrences by stock value classifications and drivers of store execution problems is another possible avenue for further study. Such a study has the



potential of helping HQ or store managers to direct appropriate resources to alleviate the OOS and OS problems relating to specific products. When drivers of store execution problems are identified, HQ and store managers would be in an informed position to establish SOPs to manage those drivers to mitigate the negative impacts of OOS and OS events.

### **Concluding Remarks**

In their review of 40 years of OOS research, Aastrup and Kotzab (2010) commented that “OOS rates largely seem to fall into an average level at about 7 to 8% despite 40 years of research” and “despite clear evidence of the store as the major contributor to OOS situations, the store has largely remained a ‘black-box’ in OOS research” (p. 147). The experience of the low-OOS stores of FS supermarket chain in Singapore suggests that it is possible to achieve an OOS rate even below 1%. By plying inside the ‘black-box’, this study has shown that the key to minimizing OOS occurrences lies in the level of attention placed on trivial operational hitches. In conclusion, this study surmises that more fruitful revelation of best OOS and OS management practices could be gleaned from the operational level, an area left largely untouched in mainstream OOS and OS literature. While this study may be far from perfect, its findings have demonstrated that weaving the handling of trivial slips and lapses into strategic OOS and OS research offers promise to building a much-needed operational theory of OOS and OS management practice. After all, breakdown of many in-store processes does begin with a less noticeable frivolous mistake.

# References

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Aastrup, J & Kotzab, H 2009, 'Analysing out-of-stock in independent grocery stores: an empirical study', *International Journal of Retail & Distribution Management*, vol. 37, no. 9, pp. 765-89.

Aastrup, J & Kotzab, H 2010, 'Forty years of Out-of-Stock research - and shelves are still empty', *International Review of Retail, Distribution & Consumer Research*, vol. 20, pp. 147-64.

Abu, N K 2004, 'Service Quality Dimensions: A Study on Various Sizes of Grocery Retailers - A Conceptual Paper', *Proceeding of International Borneo Business Conference*, pp. 633-42.

Abu-Shalback Zid, L 2004, 'When less is more', *Marketing Management*, vol. 13, no. 1, pp. 4.

Amato-McCoy & Deena, M 2009, 'The 'Not-So-Sweet' Side of Retail Loss', *Chain Store Age*, vol. 85, no. 7, pp. 38-9.

Anand, S & Cunnane, C 2009, 'Inventory Optimization: Retail Strategies for Eliminating Stock-Outs and Over-Stocks', *Apparel Magazine*, vol. 50, no. 12, pp. 22-4.

Anderson, E T, Fitzsimons, GJ & Simester, D 2006, 'Measuring and Mitigating the Costs of Stockouts', *Management Science*, vol. 52, no. 11, pp. vi-vi.

Andres, F 2008, 'Demand Planning And Forecasting With PoS Data: A Case Study', *Journal of Business Forecasting*, vol. 27, no. 4, pp. 29-32.

Ba, S, Stallaert, J & Whinston, AB 2001, 'Research Commentary: Introducing a Third Dimension in Information Systems Design-The Case for Incentive Alignment', *Information Systems Research*, vol. 12, no. 3, pp. 225-39.

(Hans) Bakker, J 2010, 'Interpretivism', in AJ Mills, G Durepos, & E Wiebe (eds), *Encyclopedia of case study research*, SAGE Publications, Inc., Thousand Oaks, CA, pp. 487-94, viewed 28 September 2013, doi: <<http://dx.doi.org/10.4135/9781412957397.n180>>

Balakrishnan, A, Pangburn, MS & Stavroulaki, E 2004, "'Stack Them High, Let 'em Fly": Lot-Sizing Policies When Inventories Stimulate Demand', *Management Science*, vol. 50, no. 5, pp. 630-44.

Bamfield, J 2004, 'Shrinkage, shoplifting and the cost of retail crime in Europe: a cross-sectional analysis of major retailers in 16 European countries', *International Journal of Retail & Distribution Management*, vol. 32, no. 4/5, pp. 235-41.

Beck, A 2004, 'Shrinkage in Europe: A Survey of Stock Loss in the Fast Moving Consumer Goods Sector', ECR Europe, Brussels, Belgium.

Blaikie, N 2004, 'Interpretivism', in MS Lewis-Beck, A Bryman, & TF Liao (eds), *Encyclopedia of social science research methods*, SAGE Publications, Inc., Thousand Oaks, CA, pp.509-11, viewed 28 September 2013, doi: <<http://dx.doi.org/10.4135/9781412950589.n442>>.

Blose, J E, Tankersley, W B & Flynn, L R 2005, 'Managing Service Quality Using Data Envelopment Analysis', *Quality Management Journal*, vol. 12, no. 2, pp. 7-24.

Broniarczyk, S M, Hoyer, WD & McAlister, L 1998, 'Consumers' Perceptions of the Assortment Offered in a Grocery Category: The Impact of Item Reduction', *Journal of Marketing Research*, vol. XXXV, no. May, pp. 166-76.

Broniarczyk, S M 2008, 'Product Assortment', in CP Haugtvedt, PM Herr & Fr Kardes (eds), *Handbook of Consumer Psychology*, Laurence Erlbaum Associates, pp. 755-79.

Buchanan, D A 2010, 'Case Studies In Organizational Research', in G Symon & C Cassell (Edn), *The Practice of Qualitative Organizational Research: Core Methods and Current Challenges*, Sage Publications, London.

Burt, S & Sparks, L 1994, 'Structural change in grocery retailing in Great Britain: a discount reorientation?', *International Review of Retail, Distribution & Consumer Research*, vol. 4, no. 2, p. 195-217.

Burt, S & Sparks, L 1995, 'Understanding the arrival of limited line discount stores in Britain', *European Management Journal*, vol. 13, no. 1, pp. 110-9.

Business Monitor International Ltd 2013, 'Singapore Food & Drink Report Q3 2010', Business Monitor International Ltd, London

Business Monitor International Ltd 2013, 'Singapore Food & Drink Report Q2 2013', Business Monitor International Ltd, London

Buxey, G 2006, 'Reconstructing inventory management theory', *International Journal of Operations & Production Management*, vol. 26, no. 9, pp. 996-1012.

Cachon, G 2001, 'Managing a retailer's shelf space, inventory, and transportation', *Manufacturing & Service Operations Management*, vol. 3, no. 3, Summer, p. 211-29.

Campo, K, Gijsbrechts, E, Goossens, T & Verhetsel, A 2000, 'The impact of location factors on the attractiveness and optimal space shares of product categories', *International Journal of Research in Marketing*, vol. 17, no. 4, pp. 255-79.

Campo, K, Gijsbrechts, E & Nisol, P 2000, 'Towards Understanding Consumer Response to Stock-Outs', *Journal of Retailing*, vol. 76, p. 219-42.

Campo, K, Gijsbrechts, E & Nisol, P 2003, 'The impact of retailer stockouts on whether, how much, and what to buy', *International Journal of Research in Marketing*, vol. 20, pp. 273-86.

Campo, K, Gijsbrechts, E & Nisol, P 2004, 'Dynamics in Consumer Response to Product Unavailability: Do Stock-Out Reactions Signal Response to Permanent Assortment Reductions?', *Journal of Business Research*, vol. 57, no. 8, pp. 834-43.

Campo, K & Gijsbrechts, E 2004, 'Should retailers adjust their micro-marketing strategies to type of outlet? An application to location-based store space allocation in limited and full-service grocery stores', *Journal of Retailing and Consumer Services*, vol. 11, no. 6, pp. 369-83.

Chandra, C & Kumar, S 2001, 'Taxonomy of Inventory Policies for Supply Chain Effectiveness', *International Journal of Retail & Distribution Management*, vol. 29, no. 4, pp. 164-75.

Channel News Asia 2013, "SingPost the top postal agency in the world: Study", *Channel News Asia*, viewed 20 March 2013

Charmaz 2006, *Constructing grounded theory: A practical guide through qualitative analysis*, London: Sage.

Chapman, P, Harrison, A & Beck, A 2003, *Shrinkage: A Collaborative Approach To Reducing Stock Loss in the Supply Chain*, ECR Europe, Brussels, Belgium.

Chapman, P & Templar, S 2006, 'Scoping the contextual issues that influence shrinkage measurement', *International Journal of Retail & Distribution Management*, vol. 34, no. 11, pp. 860-72.

Che, H, Chen, J & Chen, Y 2012, 'Investigating Effects of Out-of-Stock on Consumer Stockkeeping Unit Choice', *Journal of Marketing Research*, vol. 49, no. 4, pp. 502-13.

Chopra, S & Meindl, P 2007, *Supply Chain Management: Strategy, Planning and Operation*, 3<sup>rd</sup> edn, Upper Saddle River, N.J.: Pearson/Prentice Hall

Christopher, M & Peck, H 2003, *Marketing Logistics*, Butterworth-Heinemann.

Chye, HS 2008, *Blueprints for the Regions Unveiled*, Urban Redevelopment Authority, Singapore, viewed 13 December 2012, <<http://www.ura.gov.sg/skyline/skyline08/skyline08-03/text/09.htm>>.

Clark, K 2004, 'It's in the Data: HEB Fights Out-of-Stocks', *Chain Store Age*, vol. 80, no. 6, pp. 47-8.

Corsten, D & Gruen, T 2003, 'Desperately Seeking Shelf Availability: An Examination of the Extent, the Causes, and the Efforts to Address Retail Out-Of-Stocks', *International Journal of Retail & Distribution Management*, vol. 31, no. 12, pp. 605-17

Davis, K 1994, 'The Implications of Foreign Investment in the Retail Sector: The example of Singapore', *The Developing Economies*, vol. XXXII-3

DeHoratius, N & Raman, A 2003, 'Building on foundations of sand?', *International Commerce Review : ECR Journal*, vol. 3, no. 1, pp. 62-8.

DeHoratius, N & Raman, A 2007, 'Store manager incentive design and retail performance: an exploratory investigation.' *Manufacturing & Service Operations Management*, vol. 9, no. 4, pp. 518-34.

DeHoratius, N & Raman, A 2008, 'Inventory Record Inaccuracy: An Empirical Analysis', *Management Science*, vol. 54, no. 4, pp. 627-41.

Department of Statistics Singapore 2008, 'Singapore Resident Population 2003-2007', Department of Statistics Singapore.

Department of Statistics Singapore 2013, Population Trends 2013, Department of Statistics Singapore.

Dudley, R 2013, *Wal-Mart struggles to restock shelves as sales slump*, viewed 3 January 2013 <<http://www.bloomberg.com/news/2013-02-27/wal-mart-s-slowness-stock-shelves-worsens-as-sales-stay-s.html>>

ECR Asia Pacific, 2011, *On Shelf Availability Alignment Project – 2011 ASIA PAC Survey Results*, viewed 13 December 2012,  
<<http://ecr-all.org/upload/blogfiles/835/ECR%20OSA%20Survey%20Results%202011.pdf>>

EESI Group 2011, *OSA Breakout Session 2011 - On Shelf Availability Reloaded...It Matters More*, viewed 13 December 2012,  
<<http://www.ecr-all.org/content/files/8275/OSA%20Breakout%20Session%202011.pdf>>

Eisenhardt, K M & Graebner, M E 2007, 'Theory building from cases: Opportunities and Challenges', *Academy of Management Journal*, vol. 50, no. 1, pp. 25-32.

Eisenhardt, K M 1989, 'Building Theories from Case Study Research', *Academy of Management Review*, vol. 14, no. 4, pp. 532-50

Emberson, C, Storey, J, Godsell, J & Harrison, A 2006, 'Managing the supply chain using in-store supplier employed merchandisers', *International Journal of Retail & Distribution Management*, vol. 34, no. 6, pp. 467-81.

Emmelhainz, LW, Emmelhainz, MA & Stock, JR 1991, 'Logistics Implications of Retail Stockouts', *Journal of Business Logistics*, vol. 12, no. 2, pp. 129-42

Emmelhainz, MA, Stock, JR & Emmelhainz, LW 1991, 'Guest Commentary: Consumer Responses to Retail Stock-outs', *Journal of Retailing*, vol. 67, no.2, Summer, p. 138-47.

Eroglu, C, Williams, BD & Waller, MA 2013, 'The Backroom Effect in Retail Operations', *Production & Operations Management*, vol. 22, no. 4, pp. 915-23.

Ettouzani, Y, Yates, N & Mena, C 2012, 'Examining retail on-shelf availability: promotional impact and a call for research', *International Journal of Physical Distribution & Logistics Management*, vol. 42, no. 3, pp. 213-43.

Euromonitor International (2009) - Country Sector Briefing, 2009, Supermarkets – Singapore  
Euromonitor International, London

ECR Europe 2003, *ECR - Optimal Shelf Availability - Increasing shopper satisfaction at the moment of truth*, ECR Europe and Roland Berger Strategy Consultants

Fernandes, R, Gouveia, JB & Pinho, C 2010, 'Overstock - A Real Option Approach', *Journal of Operations and Supply Chain Management*, vol. 3, no. 1, pp. 98-107.

Fernie, J & Corcoran, L 2011, 'Responses to out-of-stocks and on-shelf availability in UK fashion retailing', *The International Review of Retail, Distribution and Consumer Research*, vol. 21, no. 4, pp. 309-22.

Fernie, J & Grant, DB 2008, 'On-shelf availability: the case of a UK grocery retailer', *International Journal of Logistics Management*, vol. 19, pp. 293-308

Fernie, J & McKinnon, AC 2003, 'The grocery supply chain in the UK: improving efficiency in the logistics network', *International Review of Retail, Distribution & Consumer Research*, vol. 13, p. 161.

Fisher, M L, Raman, A & McClelland, AS 2000, 'Rocket Science Retailing Is Almost Here: Are You Ready?', *Harvard Business Review*, vol. 78, pp. 115-24.

Fisher, M, Krishnan, J & Netessine, S 2006, *Retail Store Execution: An Empirical Study*, Operations and Information Management Department, The Wharton School, University of Pennsylvania

Fisher, M 2009, 'Rocket Science Retailing: The 2006 Philip McCord Morse Lecture', *Operations Research*, vol. 57, no. 3, pp. 527-40.

Fitzsimons, G J 2000, 'Consumer Response to Stockouts', *Journal of Consumer Research*, vol. 27, no. 2, pp. 249-66

Food Export Association of the Midwest, USA, 2013, *Singapore Country Profile*, Food Export Association of the Midwest USA.

Fox, E J, Montgomery, A L & Lodish, L M 2004, 'Consumer Shopping and Spending across Retail Formats', *Journal of Business*, vol. 77, no. 2, pt 2, pp. S25-S60.

Future Ready Singapore 2013, Facts and Rankings, Economic Development Board (Singapore), viewed 25 March 2013, <<http://www.edb.gov.sg/content/edb/en/why-singapore/about-singapore/facts-and-rankings/rankings.html>>.

Gertner, R & Rosenfield, A 1999, 'How real options lead to better decisions', *Financial Times*, p. 6, viewed 25 October 1999.

Ghuri, P & Grønhaug, K 2005, *Research Methods in Business Studies - A Practical Guide*, 3<sup>rd</sup> edn, Prentice Hall Financial Times, Pearson Education Limited

Gimenez, C 2005, 'Case Studies and Surveys in Supply Chain Management Research — Two Complementary Methodologies', in H Kotzab, S Seuring, M Müller & G Reiner (eds), *Research Methodologies in Supply Chain Management* In Collaboration with Magnus Westhaus Physcia-Verlag HD, pp. 316-29.

Goldman, A, Ramaswami, S & Krider, RE 2002, 'Barriers to the advancement of modern food retail formats: theory and measurement', *Journal of Retailing*, vol. 78, no. 4, p. 281.

Goswami, P & Mishra, MS 2009, 'Would Indian consumers move from kirana stores to organized retailers when shopping for groceries?', *Asia Pacific Journal of Marketing and Logistics*, vol. 21, no. 1, pp. 127-43.

Grant, D 2013, *Current thoughts on on-shelf availability (OSA) and out-of-stocks (OOS) as they affect Retail Logistics*, Seminar Handout, Brunel Business School, University of Hull, viewed 13 February 2013, <[http://www.brunel.ac.uk/bbs/research/research-centres/oasis/news-and-events/news/ne\\_189540](http://www.brunel.ac.uk/bbs/research/research-centres/oasis/news-and-events/news/ne_189540)>

Grant, D B & Fernie, J 2008, 'Research Note: Exploring out-of-stock and on-shelf availability in non-grocery, high street retailing', *International Journal of Retail & Distribution Management*, vol. 36, no. 8, pp. 661-72

Grant, D B, Lambert, DM, Stock, JR & Ellram, LM 2006, *Fundamentals of Logistics Management*, European edn, New York; London: McGraw-Hill.

Gruen, T, Corsten, D & Bharadwaj, S 2002, *Retail Out-of-Stocks: A Worldwide Examination of Extent, Causes and Consumer Responses*, Grocery Manufacturers of America.

Gruen, T & Corsten, D 2002, 'Rising to the challenge of out-of-stocks', *ECR Journal*, vol. 2, no. 2, pp. 45 - 58.

Gruen, T W & Corsten, D 2007, *A Comprehensive Guide To Retail Out-Of-Stock Reduction In the Fast Moving Consumer Goods Industry*, Grocery Manufacturers of America (GMA), Food Marketing Institute (FMI), National Association of Chain Drug Stores (NACDS), The Procter & Gamble Company (P&G), The University of Colorado

Hammersley, M 2012, *What is Qualitative Research?*, ebook, Bloomsbury Publishing, viewed 13 January 2013, <<http://RMIT.ebib.com.au/patron/FullRecord.aspx?p=1080413>>.

Hariga, MA, Al-Ahmari, A & Mohamed, A-RA 2007, 'A joint optimisation model for inventory replenishment, product assortment, shelf space and display area allocation decisions', *European Journal of Operational Research*, vol. 181, no. 1, pp. 239-51.

Hausrucking, G 2006, *Approaches to measuring on-shelf availability at the point of sale*, Roland Berger Strategy Consultants and ECR Europe

Hausrucking, G & Hasse, F 2003, 'Rooting out-of-stocks', *ECR Journal*, vol. 3, no. 1, pp. 69 - 71.

Hayes, R H & Clark, K B 1986, 'Why some factories are more productive than others', *Harvard Business Review*, vol. 64, no. 5, pp. 66-73.

Howell, SD & Proudlove, NC 2007, 'A statistical investigation of inventory shrinkage in a large retail chain', *The International Review of Retail, Distribution and Consumer Research*, vol. 17, no. 2, pp. 101-20.

Institute of Grocery Distribution 2007, 'Availability 2007', *ECR UK Availability 2007*

Joffe, H 2011, 'Thematic Analysis', in *Qualitative Research Methods in Mental Health and Psychotherapy*, John Wiley & Sons, Ltd, pp. 209-23.

Kang, Y & Gershwin, SB 2005, 'Information inaccuracy in inventory systems: stock loss and stockout', *IIE Transactions*, vol. 37, no. 9, pp. 843-59.

Karabati, S, Tan, B & Ozturk, OC 2009, 'A method for estimating stock-out-based substitution rates by using point-of-sale data', *IIE Transactions*, vol. 41, no. 5, pp. 408-20.

Karolefski, J 2004, 'When the Customer Can't Find it...everybody loses', *Food Logistics*, no. 68, pp. 14-9.

Keh, H T & Park, S Y 1997, 'To Market, to Market: the Changing Face of Grocery Retailing', *Long Range Planning*, vol. 30, no. 6, pp. 836-46.

Ketzenberg, M, Metters, R & Vargas, V 2000, 'Inventory policy for dense retail outlets', *Journal of Operations Management*, vol. 18, no. 3, pp. 303-16.

Kham, p 2013, 'Shop n Save supermarket outlets to be converted to Giant stores' *Straits Times*, viewed 02 April 2013, <http://www.straitstimes.com/breaking-news/singapore/story/shop-n-save-outlets-rebranded-giant-stores-20130401>

Kotzab, H & Teller, C 2005, 'Development and empirical test of a grocery retail instore logistics model', *British Food Journal*, vol. 107, no. 8, pp. 594-605

Kucuk, SU 2004, 'Reducing the Out-of-Stock Costs in a Developing Retailing Sector', *Journal of International Consumer Marketing*, vol. 16, no. 3, pp. 75-104

- Kucuk, SU 2008, 'Can distribution explain double jeopardy patterns?', *International Journal of Retail & Distribution Management*, vol. 36, pp. 409-25
- Laine, J 2010, 'Key management elements to increase store performance', *Retail - Daily Management of Store Operations*, viewed 9 February 2011, <[http://www.bearingpoint.com/SID-73B0FE76-876461FA/en-fi/download/Retail\\_Store\\_Mgmt\\_WP\\_100322\\_B.pdf](http://www.bearingpoint.com/SID-73B0FE76-876461FA/en-fi/download/Retail_Store_Mgmt_WP_100322_B.pdf)>
- Larson, PD & DeMarais, RA 1999, 'Psychic stock: an independent variable category of inventory', *International Journal of Physical Distribution & Logistics Management*, vol. 29, no. 7/8, pp. 495-507.
- Lowson, RH 2001, 'Customized operational strategies for retailers in fast-moving consumer industries', *The International Review of Retail, Distribution and Consumer Research*, vol. 11, no. 2, pp. 201-24.
- Mangan, J & Christopher, M 2005, 'Management Development and Supply Chain Manager of the Future ', *The International Journal of Logistics Management*, vol. 16, no. 2, pp. 178-91.
- McCarthy, MT & Golicic, LS 2005, 'A Proposal for Case Study Methodology in Supply Chain Integration Research', in H Kotzab, M Müller, G Reiner & S Seuring (eds), *Research Methodologies in Supply Chain Management* in collaboration with Magnus Westhaus, Physcia-Verlag HD pp. 252 - 65.
- McKinnon, AC, Mendes, D & Nababteh, M 2007, 'In-store logistics: an analysis of on-shelf availability and stockout responses for three product groups', *International Journal of Logistics: Research and Applications*, vol. 10, no. 3, pp. 251-68
- Messinger, PR & Narasimhan, C 1997, 'A model of retail formats based on consumers' economizing on shopping time', *Marketing Science*, vol. 16, no. 1, p. 1.
- Miller, L 1997, 'The many faces of shrink', *Progressive Grocer*, vol. 76, no. 2, p. 82.
- Miranda, MJ & Jegasothy, K 2008, 'Malaysian grocery shoppers' behavioural response to stock-outs', *Asia Pacific Journal of Marketing and Logistics*, vol. 20, no. 4, pp. 396-412.
- Morgan, C & Dewhurst, A 2007, 'Using SPC to measure a national supermarket chain's suppliers' performance', *International Journal of Operations & Production Management*, vol. 27, no. 8, pp. 874-900.
- Morris, T & Wood, S 1991, 'Testing the Survey Method: Continuity and Change in British Industrial Relations', *Work, Employment & Society*, vol. 5, no. 2, pp. 259-82
- Motes, WH & Castleberry, SB 1985, 'A longitudinal Field Test of Stockout Effects on Multi-Brand Inventories', *Academy of Marketing Science, Journal*, vol. 13, no. 4, pp. 54-68.
- Neuman, L 2003, *Research Methods: Qualitative and Quantitative Approaches*, 5<sup>th</sup> edn, Pearson Education Inc., New York.
- FairPrice 2010, FairPrice Supermarkets, viewed 30 June 2010
- Othman, H & Chan, F 2007, 'Why is Singapore a little red dot?', *National Library Board Singapore*, viewed 10 December 2010, <<http://blogs.nlb.gov.sg/ask/children/240>>



Pal, JW & Byrom, JW 2003, 'The five Ss of retail operations: a model and tool for improvement', *International Journal of Retail & Distribution Management*, vol. 31, no. 10, pp. 518-28.

Papakiriakopoulos, D 2010, 'Automatic Detection of Out-Of-Shelf Products in the Retail Sector Supply Chain', PhD Thesis, Athens University of Economics and Business.

Papakiriakopoulos, D 2012, 'Predict on-shelf product availability in grocery retailing with classification methods', *Expert Systems with Applications*, vol. 39, no. 4, pp. 4473-82.

Papakiriakopoulos, D, Pramataris, K & Doukidis, G 2009, 'A decision support system for detecting products missing from the shelf based on heuristic rules', *Decision Support Systems*, vol. 46, no. 3, pp. 685-94.

Philp, K 1995, *Theft and Fraud in Supermarkets*, Australian Institute of Criminology.

Pramataris, K & Miliotis, P 2008, 'The impact of collaborative store ordering on shelf availability', *Supply Chain Management*, vol. 13, pp. 49-61

Raman, A, DeHoratius, N & Ton, Z 2001a, 'The Achilles' Heel of Supply Chain Management', *Harvard Business Review*, vol. 79, no. 5, pp. 25-8.

Raman, A, DeHoratius, N & Ton, Z 2001b, 'Execution: The Missing Link in Retail Operations', *California Management Review*, vol. 43, pp. 136-52.

Rani, L & Velayudhan, SK 2008, 'Understanding consumer's attitude towards retail store in stockout situations', *Asia Pacific Journal of Marketing and Logistics*, vol. 20, no. 3, pp. 259-75.

Reiner, G, Teller, C & Kotzab, H 2013, 'Analyzing the Efficient Execution of In-Store Logistics Processes in Grocery Retailing-The Case of Dairy Products', *Production & Operations Management*, vol. 22, no. 4, pp. 924-39.

Rikvin 2012, 'Singapore's Infrastructure Ranked Best in the World', in *Press Releases, Singapore Business News*, viewed 31 December 2013, <<http://www.rikvin.com/press-releases/singapores-infrastructure-ranked-best-in-the-world/>>

Robson, C 1997, *Real World Research - A Resource for Social Scientists and Practitioner-Researchers*, 2<sup>nd</sup> edn, Blackwell Publishers Ltd.

Robson, C 2002, *Real World Research: a resource for social scientists and practitioner-researchers*, 2<sup>nd</sup> edn, Oxford, UK; Malden, Mass.: Blackwell Publishers

Russell, DM & Hoag, AM 2004, 'People and Information Technology in the Supply Chain - Social and organizational influences on adoption', *International Journal of Physical Distribution & Logistics Management*, vol. 34, no. 2, pp. 102-22.

Quelch, JA & Jocz, KE 2012, 'Managing physical place', in *All Business is local - why place matters more ever in a global virtual world*, New York : Portfolio/Penguin New York, pp. 55-93.

Saunders, M, Lewis, P & Thornhill, A 2003, *Research Methods for Business Students*, 3<sup>rd</sup> edn, Prentice Hall Financial Times, Pearson Education Limited

Schary, P B & Christopher, M 1979, 'The Anatomy of a Stock-Out', *Journal of Retailing*, vol. 55, no. 2, Summer, pp. 59-70.

Silverman, D 2001, *Doing Qualitative Research - A Practical Handbook*, Sage Publications Ltd.

Sinha, P K & Uniyal, D P 2005, 'Using observational research for behavioural segmentation of shoppers', *Journal of Retailing & Consumer Services*, vol. 12, no. 1, pp. 35-48.

Skinner, W 1974, 'The focused factory', *Harvard Business Review*, vol. 52, no. 3, pp. 113-21.

Sloot, L M, Verhoef, P C & Franses, P H 2005, 'The impact of brand equity and the hedonic level of products on consumer stock-out reactions', *Journal of Retailing*, vol. 81, no. 1, pp. 15-34.

Staff Reporter, Singapore 2012, 'The impact of Carrefour's exit on Singapore's retailer market', *Singapore Business Review*, viewed 13/01/2012, <<http://sbr.com.sg/food-beverage/news/impact-carrefours-exit-singapores-retailer-market>>.

Stake, RE 2003, 'Case Studies', in NK Denzin & YS Lincoln (Edn), *Strategies of Qualitative Research Inquiry*, 2<sup>nd</sup> edn, Sage Publications, Inc., pp. 134-64.

Stanton, Emms & Sia 2011, *Singapore Retail Foods Annual 2011*, Global Agricultural Information Network

Strauss, A & Corbin, JM 1998, *Basics of qualitative research: techniques and procedures for developing grounded theory*, 2<sup>nd</sup> edn, Thousand Oaks: Sage Publications.

Supermarket Security and Loss Prevention report 2006, 'Grocers making a dent in shrink rate', *Progressive Grocer*, vol.85, no.15, pp8-12

Svensson, G 2002, 'Efficient consumer response--its origin and evolution in the history of marketing', *Management Decision*, vol. 40, no. 5/6, p. 508.

Taylor, JC & Fawcett, SE 2001, 'Retail On-Shelf Performance of Advertised Items: An Assessment of Supply Chain Effectiveness At The Point Of Purchase', *Journal of Business Logistics*, vol. 22, no. 1, pp. 73-89.

Teller, C, Kotzab, H & Grant, DB 2005, 'The relevance of shopper logistics for consumers of store-based retail formats', *Journal of Retailing and Consumer Services*, vol. 19, no. 1, pp. 59-66

Tonglet, M & Bamfield, J 1997, 'Controlling shop crime in Britain: costs and trends', *International Journal of Retail & Distribution Management*, vol. 25, no. 9, pp. 293-300.

Ton, Z & Huckman, R S 2008, 'Managing the Impact of Employee Turnover on Performance: The Role of Process Conformance', *Organization Science*, vol. 19, no. 1, pp. 56-68.

Ton, Z & Raman, A 2010, 'The Effect of Product Variety and Inventory Levels on Retail Store Sales: A Longitudinal Study', *Production & Operations Management*, vol. 19, no. 5, pp. 546-60.

Trautrim, A, Grant, DB, Fernie, J & Harrison, T 2009, 'Optimizing On-Shelf Availability for Customer Service and Profit', *Journal of Business Logistics*, vol. 30, no. 2, pp. 231-47.

Trautrim, A 2011, 'Management of In-Store Replenishment Systems: An exploratory study of European retailers', PhD thesis, The University of Hull

Trautrim, A, Grant, D & Schnedlitz, P 2011, 'In-store Logistics Process in Austrian Retail Companies', *European Retail Research*, vol. 25, no. 1, pp. 63-84.

Trautrim, A, Grant, DB & Chee, W 2012, 'The Interaction of Human Resources and Managerial Systems as they Affect In-Store Replenishment Operations', *Supply Chain Forum: International Journal*, vol. 13, no. 2, pp. 54-64.

Tsay, AA 2001, 'Managing retail channel overstock: Markdown money and return policies', *Journal of Retailing*, vol. 77, no. 4, p. 457.

Turcsik, R & Summerour, J 2001, 'Monitoring shrink', *Progressive Grocer*, vol. 80, no. 10, p. 7.

Global Agricultural Information Network 2012, *GAIN Report - Singapore Retail Food Sector Report*, USDA Foreign Agricultural Service

Uusitalo, O 2001, 'Consumer perceptions of grocery retail formats and brands', *International Journal of Retail & Distribution Management*, vol. 29, no. 5, p. 214.

van Woensel, T, Van Donselaar, K, Broekmeulen, R & Fransoo, J 2007, 'Consumer responses to shelf out-of-stocks of perishable products', *International Journal of Physical Distribution & Logistics Management*, vol. 37, no. 9, pp. 704-18.

van Zelst, S, van Donselaar, K, van Woensel, T, Broekmeulen, R & Fransoo, J 2009, 'Logistics drivers for shelf stacking in grocery retail stores: Potential for efficiency improvement', *International Journal of Production Economics*, vol. 121, no. 2, pp. 620-32.

Veal, A J 2005, *Business Research Methods - A Managerial Approach*, 2<sup>nd</sup> Edn, Pearson Adison Wesley - Pearson Education Australia.

Verbeke, W, Farris, P & Thurik, R 1998, 'Consumer response to the preferred brand out-of-stock situation', *European Journal of Marketing*, vol. 32, no. 11-12, pp. 1008-28.

Verhoef, P C & Sloot, L M 2006, 'Out-of-Stock: Reactions, Antecedents, Management Solutions, and a Future Perspective', in M Krafft & MK Mantrala (eds), *Retailing in the 21st Century*, Springer Berlin Heidelberg, pp. 239-53.

Voss, C, Tsikriktsis, N & Frohlich, M 2002, 'Case Research in operations management', *International Journal of Operations & Production Management*, vol. 22, no. 2, pp. 195-219.

Waller, M A, Tangari, A H & Williams, B D 2008, 'Case pack quantity's effect on retail market share - An examination of the backroom logistics effect and the store-level fill rate effect', *International Journal of Physical Distribution & Logistics Management*, vol. 38, no. 6, pp. 436-51.

Walter, C K & Grabner, J R 1975, 'Stockout Cost Models: Empirical Tests in a Retail Situation', *Journal of Marketing*, vol. 39, no. 3, pp. 56-60

Walters, D 1977, 'The Cost of a Stock-out', *Managerial Finance*, vol. 3, no. 2, pp. 72-84.

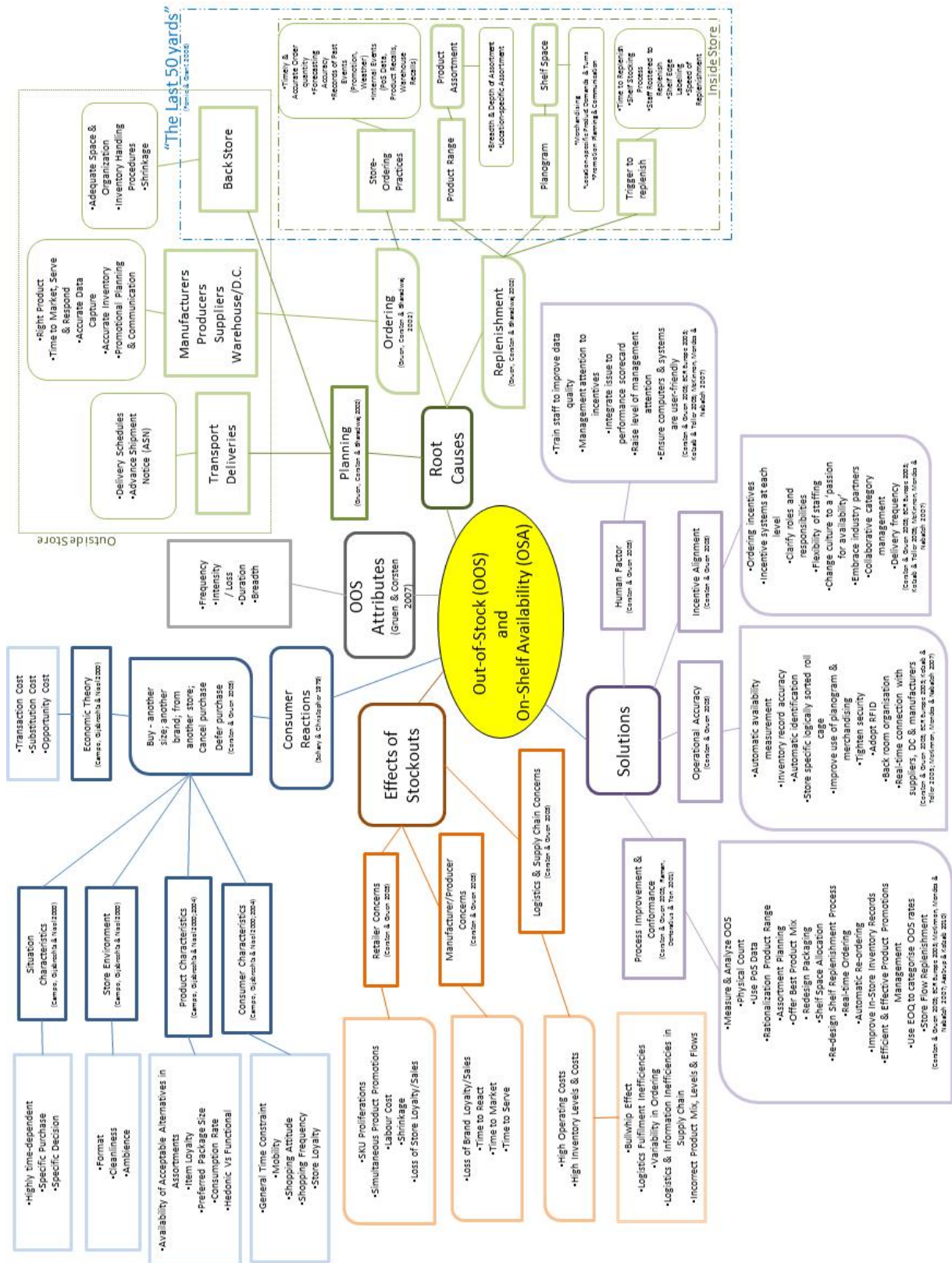
Whiteoak, P 2004, 'Rethinking efficient replenishment in the grocery sector', in *Logistics and Retail Management: Insights into Current Practice and Trends*, Fernie J and Sparks (eds), Kogan Page Limited, pp. 138-63.

- Yang, M-H & Chen, W-C 1999, 'A study on shelf space allocation and management', *International Journal of Production Economics*, vol. 60-61, pp. 309-17.
- Yaniv, G 2009, 'Shoplifting, monitoring and price determination', *The Journal of Socio-Economics*, vol. 38, no. 4, pp. 608-10.
- Yin, R 2003, *Case Study Research - Design and Methods*, 3<sup>rd</sup> Edn, Sage Publications.
- Yin, R 2009, *Case Study Research - Design and Methods*, 4<sup>th</sup> Edn, Sage Publications.
- Yücel, E, Karaesmen, F, Salman, FS & Türkay, M 2009, 'Optimizing product assortment under customer-driven demand substitution', *European Journal of Operational Research*, vol. 199, no. 3, pp. 759-68.
- Zinn, W & Liu, PC 2001, 'Consumer Response to Retail Stockouts', *Journal of Business Logistics*, vol. 22, no. 1, pp. 49-71.
- Zinn, W & Charnes, JM 2005, 'A Comparison of The Economic Order Quantity And Quick Response Inventory Replenishment Methods', *Journal of Business Logistics*, vol. 26, no. 2, pp. 119-41.
- Zinn, W & Liu, PC 2008, 'A Comparison of Actual and Intended Consumer Behaviour in Response to Retail Stockouts', *Journal of Business Logistics*, vol. 29, pp. 141-59.

### **Image**

Sone 2009 'Durians in Hanoi, Vietnam' blog, 12 September, Dedicated to Durians, viewed 12/01/2013 <<http://stinkyspikes.wordpress.com/category/durian-stalls/page/3/>>

# Appendix A: Key Insights from Literature on OOS and OSA



## Appendix B: Interview Protocol

Interviewees Profile	Managing Director	Store Manager
Date of interview		
Position in the store		
Location of store		
Group ( <i>indicates age &amp; size of store in SKUs – A = 16-30K SKUs, B = 6-20 SKUs, C = 3-12K SKUs</i> )		
<b>Interview Questions</b>		
<b>About inventory management</b>		
1. How do you collect and manage information on your inventory/stock? <ul style="list-style-type: none"> <li>• Manual processes- can you describe the process</li> <li>• Automatic processes - can you describe the process</li> <li>• Semi-automatic - can you describe the process</li> </ul>		
2. How do you perform inventory checks? <ul style="list-style-type: none"> <li>• Physical/Visual walkabout the store</li> <li>• Via inventory recording system</li> <li>• Physical and inventory recording system</li> </ul>		
3. How often do you conduct inventory checks? <ul style="list-style-type: none"> <li>• Daily</li> <li>• Weekly</li> <li>• Fortnightly</li> <li>• Monthly</li> </ul>		
4. When is the inventory checks conducted? <ul style="list-style-type: none"> <li>• Before store opens</li> <li>• After closing hours</li> <li>• During operational hours</li> </ul>		
5. Who conducts the inventory checks? 5.1 Is this a designated task for this staff i.e. solely in charge of inventory checks? 5.2 Who does s/he reports to – store manager or finance or procurement? 5.3 Who is in charge of inventory management? <ul style="list-style-type: none"> <li>• Store manager</li> <li>• Someone from HQ</li> </ul> 5.4 Who does this position report to? <ul style="list-style-type: none"> <li>• Finance</li> <li>• Procurement</li> </ul>		
6. Do you have established key performance indicators (KPIs) related to inventory management? 6.1 What are the KPIs to be achieved in inventory management? 6.2 Store-specific KPIs? 6.3 HQ prescribed KPIs? 6.4 Combined from HQ and store?		
7. Do you categorize your inventory? 7.1 How many categories are there? 7.2 What are the categories? 7.3 What criteria do you base or formulate your categories?		
8. Do you have a separate inventory management system for on shelf space and back store? 8.1 If yes, do you have different ordering procedures for both respectively? 8.2 If no, do you categorize inventory for shelf space separately from inventory for back store?		

About out of stock events in the stores		
<p>1. Do you have out of stock events occurring in your store?</p> <p>1.1 Do you measure how often an out of stock even occur?</p> <p>1.2 How do you measure the occurrences of this event?</p> <p>1.3 How do you record the information?</p> <ul style="list-style-type: none"> <li>• Manual</li> <li>• Excel</li> <li>• Access</li> <li>• In-house management system</li> <li>• Vendor management system he information?</li> </ul>		
<p>2. Do you use a Planogram?</p> <p>2.1 If yes, who establishes the Planogram?</p> <ul style="list-style-type: none"> <li>• Store managers</li> <li>• HQ</li> <li>• Both</li> </ul> <p>2.2 Do you measure the level of compliance to the Planogram?</p> <p>2.2.1 If yes, is the level of compliance acceptable to HQ?</p> <p>2.2.2 If no, why is the Planogram not fully adhered?</p>		
<p>3. Do suppliers get involved in the planning of the Planogram?</p> <p>If YES:</p> <p>3.1 What is the extent of their influence in planning of the Planogram?</p> <p>3.2 How are they involved in the planning of Planogram?</p>		
About the stores' ordering processes/policies		
<p>1. Where does the store receive its inventory?</p>		
<p>2. Where does the store place its orders?</p> <ul style="list-style-type: none"> <li>• Warehouse/DC</li> <li>• Direct to suppliers, manufacturers, producers and trading companies</li> <li>• Both</li> </ul>		
<p>3. How does store places its orders?</p>		
<p>4. What is the frequency of order placement?</p>		
About stores' relationship with warehouse/DC		
<p>1. Does the store adopt any operational strategy to manage its relationships with its distribution center?</p> <ul style="list-style-type: none"> <li>• Category Management</li> <li>• Vendor Management</li> <li>• Efficient Consumer Response</li> <li>• Consumer Response Management</li> <li>• Collaborative Planning Forecasting &amp; Replenishment</li> <li>• Others (Please specify)</li> </ul> <p>If yes,</p> <p>1.1 Which operational strategy is adopted?</p> <p>1.2 Is this adopted with all suppliers or do you have different strategy for different suppliers?</p>		
<p>2. How do you place orders with the DC?</p> <ul style="list-style-type: none"> <li>• Telephone</li> <li>• Fax</li> <li>• Email</li> <li>• Integrated vendor systems</li> </ul>		
<p>3. How often do you place orders with DC?</p>		
<p>4. What is the order processing time for each other i.e. when do you normally receive the orders from the DC?</p>		
<p>5. Do you get the DC to perform any value-adding processing services for the store? If yes:</p> <p>5.1 What VAS performed by the DC for your store?</p> <p>5.2 How do these VAS affect order processing time and affect inventory receiving time?</p>		

About stores' relationships with suppliers		
1. How does store communicate/place orders with its suppliers?		
2. Are stores' systems integrated with the suppliers? If yes, 2.1 Type of information visible to suppliers		
3. Do you have face-to-face meetings with your suppliers? If yes, how often do you meet with your suppliers?		



## Appendix C: Derivation of Extent of OOS Occurrences at Stores

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### Given:

- 1) Total number of stores in SS Supermarket Chain in Singapore = 23
- 2) Number of stores with total SKU & loss sale figures (in S\$) given = 19
- 3) Total value (in S\$) of SS Supermarket SKUs, which will be denoted as *Total \$ Value of Chain SKU*.

### Derivation:

Let *Total SKUs of 19 stores* =  $T_{SKU,19}$

Thus,

$$\text{Average SKU for Store} = \frac{T_{SKU,19}}{19}$$

$$\text{Total SKU for Chain} = \left( \frac{T_{SKU,19}}{19} \times 23 \right)$$

$$\text{\$ Value per SKU (Mean SKU value)} = \frac{\text{Total \$ Value of Chain SKUs}}{\left( \frac{T_{SKU,19}}{19} \times 23 \right)}$$

$$\therefore \text{Loss sales as \% of SKU} = \frac{\text{Loss sales value at store}}{\text{\$ value of SKU at store}}$$

where:

$$\text{\$ value of SKU at store} = (\text{Mean SKU value}) \times \text{SKU at Store}$$