OPTIMISING INFORMATION SHARING WITHIN THE MASSMART SUPPLY CHAIN NETWORK

by

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DECLARATION

I, **Kashmira Naidoo**, declare that

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To Vivek, I consider myself blessed and fortunate to have had your constant encouragement and motivation during my most challenging times.

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ABSTRACT

The promotion-driven retail chain within the Massmart group resembles variability upstream and downstream of the supply chain. This variability may be associated with mis-alignment of supply chain activities and the in-house electronic systems of communication. Despite the implementation of a logistics network and regional distribution centres, the movement of stock from manufacturers to retail stores remains a challenge in managing out-of-stock situations at various stores. The supply chain partners across extended enterprises epitomise limited demand information sharing within the retail promotion-driven model. The foundation upon which information is currently shared emanates from long, silo-oriented forecasting periods (eight weeks), oversimplified point-of-sale data and a poorly synchronised supply chain strategy.

The study aims to optimise supply chain integrated information sharing through collaborative, forecast-based performance outcomes and electronically-shared information tools across extended enterprises. Research objectives in this study aim: firstly, to examine the extent to which optimised information sharing is enhanced by integrated supply chain activities across the extended enterprise; secondly, to establish the magnitude of supply chain value-added performance outcomes in the collaborative planning, forecasting and replenishment model across functions and across enterprises; and finally, to establish the role of electronically-enabled information sharing tools in an integrated and effective supply chain structure.

This study uses questionnaires to collect data from the returned sample size of 143 respondents out of an initial distribution of 165 questionnaires. This quantitative approach uses descriptive statistics and frequency distributions to analyse individual variables. Pearson correlation was chosen for bivariate analysis while multiple regression analysis further considered the relationship between information sharing and the independent variables using multivariate analysis.

The findings of this study suggest that optimised information sharing across the extended enterprise is dependent on the accessibility and performance of information systems and technological tools. This result indicates that the information systems adopted should facilitate the extended supply chain collaboration and mitigate supply chain network variability from the promotion-driven model. These managerial implications indicate that supply chain efficiency and integration is the responsibility of each individual supply chain partner involved in a retail supply chain network.

Key words: **Collaboration, Planning, Forecasting and Replenishment, Information sharing, pull-push systems and category management.**

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LIST OF ABBREVIATIONS

B2B: Business-to-business

CM: Category management

CMI: Co- managed inventory

CPFR: Collaborative planning, forecasting and replenishment

CSCMP: Council of supply chain management professionals

ECR: Efficient consumer response

EDI: Electronic data interchange

EDLP: Every-day low prices

EPOS: Electronic point-of-sale

ERP: Electronic resource planning

FMCG: Fast moving consumer goods

IT: Information technology

JDA: James Donald Armstrong

LID: Large item depot

MDD: Massdiscounters

POS: Point-of-sale

QR: Quick response

RDC: Regional distribution centre

SAP: System Applications Products

SC: Supply chain

SPSS: Statistical package for the social sciences

SRC: Supplier retailer collaboration

SRM: Supplier relationship management

TCO: Total cost of ownership

VMI: Vendor managed inventory

CHAPTER ONE

INTRODUCTION TO THE STUDY

1.1 Introduction

Optimising implies that a company seeks to render its supply chain and business processes as efficient, flexible and responsive as possible in order to achieve a competitive advantage. A successful supply chain demands that trading partners optimise the movement of information, material and money (Plennert, 2014: 14-25). The sub-elements comprising the title of the dissertation may be identified as the Massmart business format, supply chain networks, optimising and information sharing. According to various online sources (Merriam-webster, 2014) optimisation may be defined as "an act, process, or methodology of making something, a design, system, or decision as fully perfect, functional, or effective as possible". Information sharing involves the exchange of information between two or more parties. Massmart is a large retail and wholesale organisation, operating various business formats within South Africa and various African countries (Massmart, 2013a). For the purpose of the study, optimising information sharing within the Massmart supply chain network implies that information sharing between trading partners is the key to the successful movement of money, information and materials (Mahdavi, Mohebbi and Cho, 2010:26). Furthermore, the availability and effective use of pertinent information results in competitive profit-drivers within and across widely dispersed supply chains. The manner in which information is shared across the Massmart supply chain is investigated in subsequent chapters of this dissertation. It concludes with statistical findings on the current process and identifies areas where improvement is required.

Improved collaboration between functional and extended enterprises to share information within the supply chain network requires integrated planning of functional activities (purchasing, manufacturing, transportation, warehousing and inventory management), spatial activities (across geographically dispersed vendors or markets) and inter-temporal activities (strategic, tactical and operational planning horizons). Electronically-enhanced collaborative, planning, forecasting and replenishment (CPFR) performance should facilitate the sharing of confidential information about costs, structures and capacity as well as collaborative management business processes (Shapiro, 2007:5-7). While literature is available on initiatives involving CPFR strategy of organisations; "it is not clear how the benefits of these initiatives should be quantified and how one can identify the drivers of the magnitude of these benefits" (Szymczak, 2013:166-171).

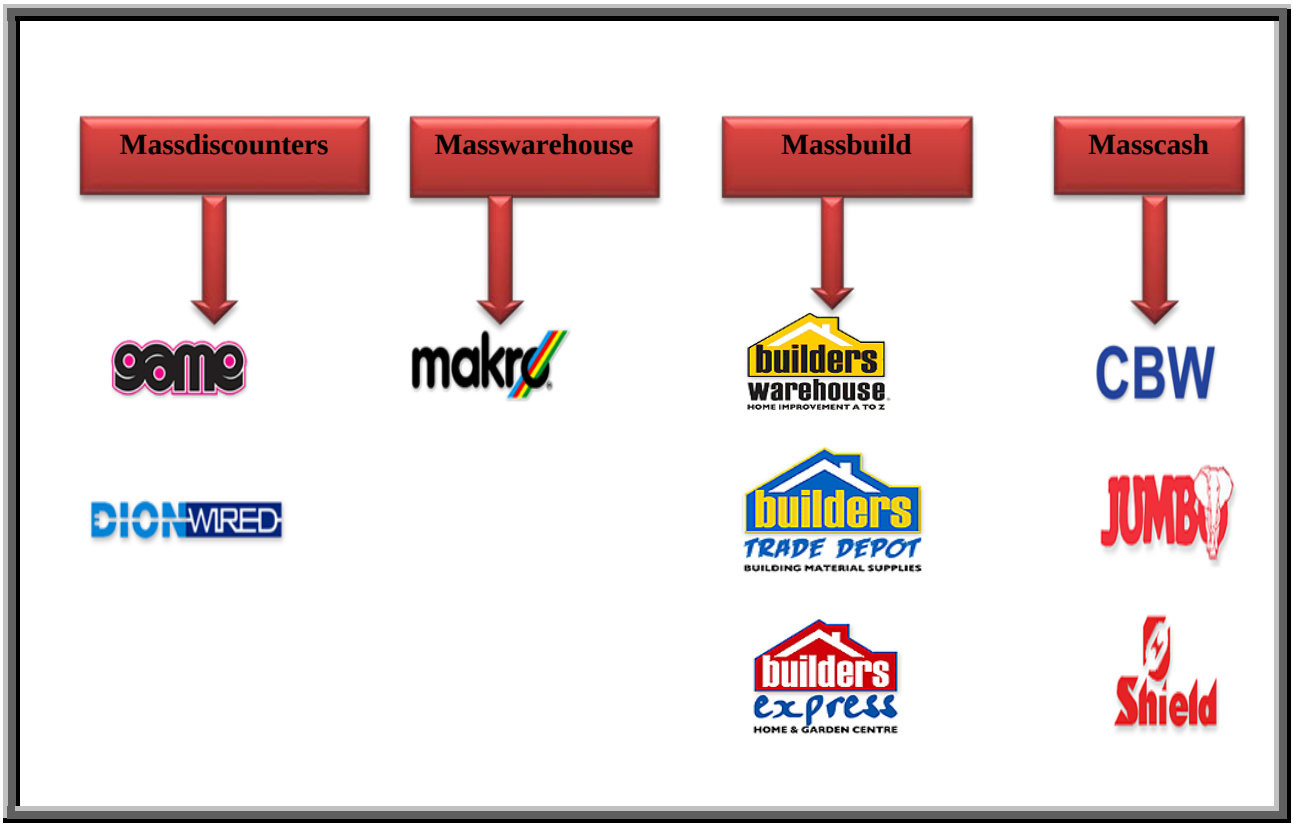
The research study focuses on Massdiscounters; a chain within the Massmart group, which is a retail promotion-driven business experiencing variability upstream and downstream of the supply chain. Evidence of variability includes customer complaints, store out-of-stocks during promotions and inefficient ordering and distribution processes. “The organisation’s trading profit has reduced during 2012 and 2013 and this is attributed to reduced consumer confidence” (Massmart, 2014b). A logistics network comprising regional distribution centres is used to move stock from manufacturers to stores. While information sharing is used to some extent; this research study seeks to understand and explain the cause of the out-of-stocks at stores within the context of retail promotion-driven business model.

The dissertation comprises six chapters with the first chapter focusing on an introduction to the study that provides insight to the research framework. Chapter two reviews literature published on information sharing and the key constructs of the study. The research methodology chapter follows the literature review and indicate the research methods applied. Chapter four is the data analysis and interpretation. The discussion of results follows the data analysis and interpretation which allows for links to be made between the data and the research objectives. The final chapter of the dissertation explain the recommendations and conclusions identified from the literature and research findings.

1.2 Background of the Organisation

According to Monckza, Handfield, Giunipero and Patterson (2008), the emerging field of supply chain alliances has received considerable attention in various publications, yet there are many unanswered questions regarding the dynamics of such relationships. Das and Teng (2002:445) note that the supply chain is an intrinsically collaborative form of an “alliance constellation”, where multiple partner organisations compete against a single organisation or group of organisations. A number of fundamental issues drive this research study, including how alliances are developed, their key success factors and the specific benefits to be realised.
Figure 1.2.1 illustrates that the Massmart business consists of four business formats, namely Massdiscounters, Masswarehouse, Massbuild and Masscash.

Figure 1.2.1: Massmart business format

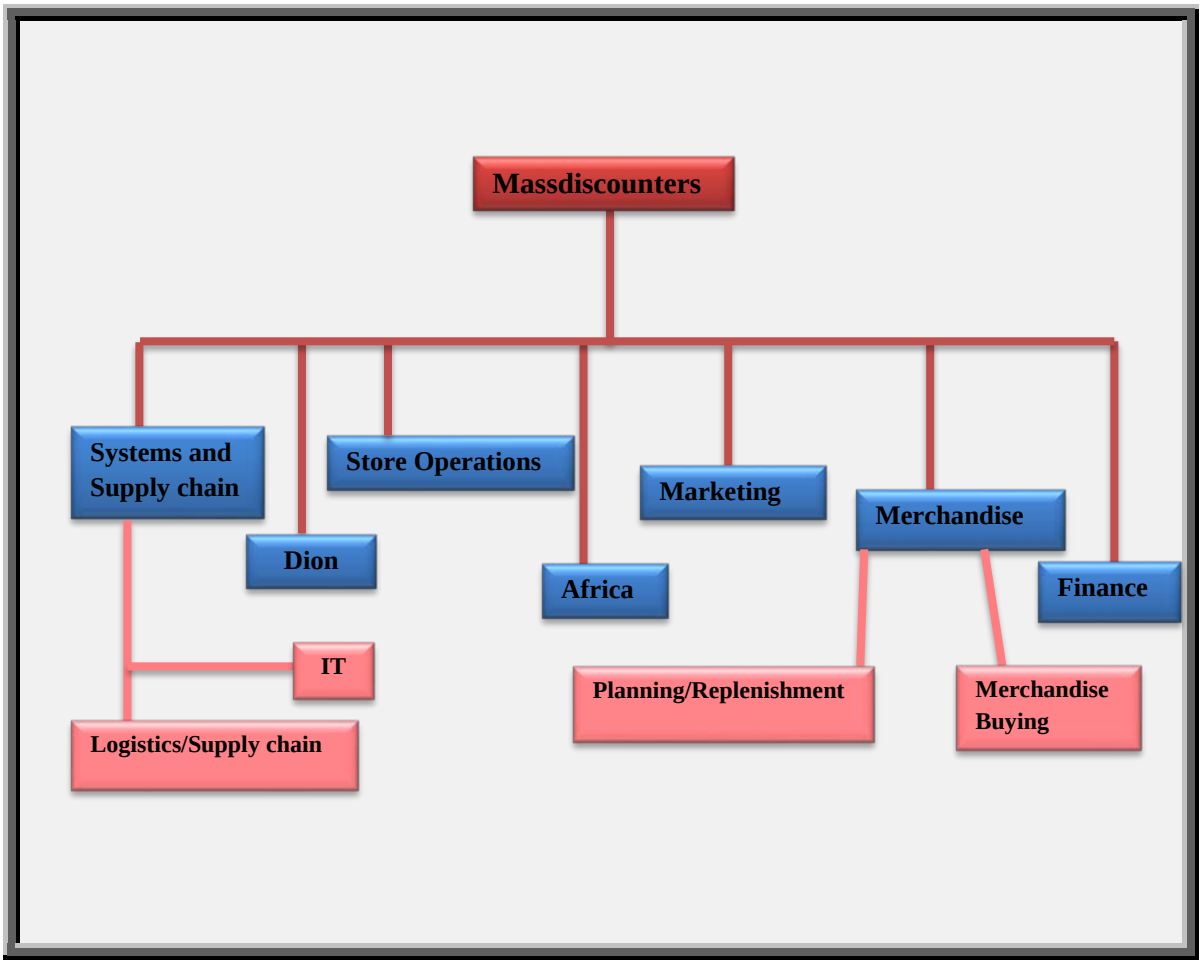


Source: Massmart. (2013a). *Business overview.* [Online] Available at: http://www.massmart.co.za/our-business/overview/ [Accessed 24 August 2013].

Figure 1.2.1 indicated that the Massdiscounters chain consists of two retail formats, one trading as Game and the other as Dion Wired. The research is based on Game Stores and its supply chain trading partners. “Game is a promotionally driven discount retailer of predominantly general merchandise and non-perishable groceries for home, business and leisure use” (Game, 2013:1). However this model is now evolving to a grocery-type retail business model. Eight-week forecasts are created by the planning and replenishment team using point-of-sale data, and are provided to suppliers. The organisation employs a push-pull distribution strategy. The company’s logistics network comprises of regional distribution centres; however stock reaches stores too late or not at all. Supply chain alliances, across divisions as well as extended enterprises, are not a new concept for this particular business.

The organisation's internal structure consists of the following, among other, divisions:

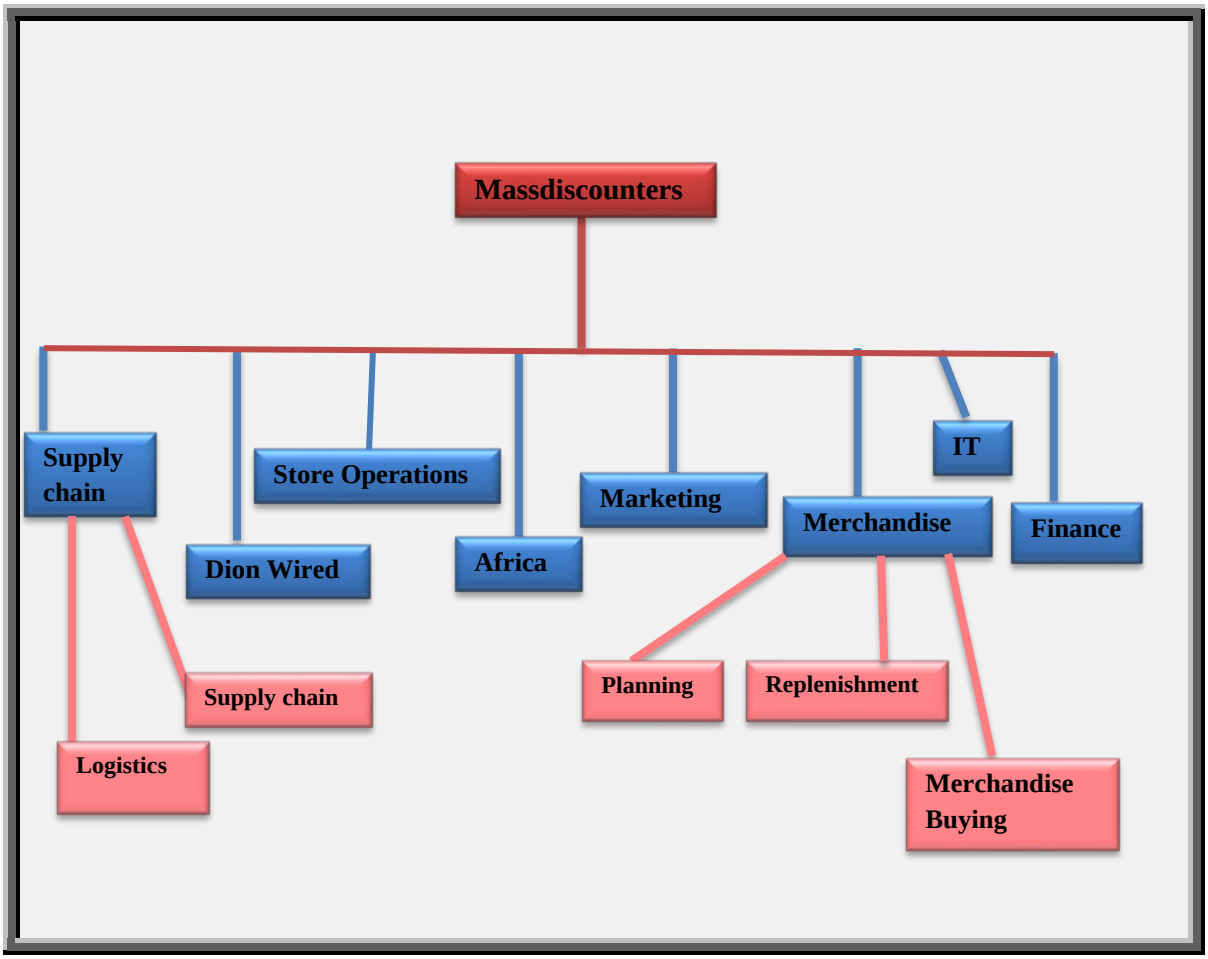
Figure 1.2.2: Massdiscounters divisional structure in 2012



Source: Designed through the interpretation of the researcher

Figure 1.2.2 depicts the divisional structure of the organisation in 2012. The business divisions are Systems and Supply Chain; Dion Wired; Store Operations; Africa; Marketing; Merchandise and Finance. The Merchandise division consisted of the buyers and planners who work in conjunction with one another. The buyers sourced products *via* various channels while the planning team created orders based on point-of-sale (POS) information. The replenishment team was tasked with analysing sales information and creating forecasting tools for accurate demand planning. However, the structure implied that a demand planner would carry out the functions of a forecasting and replenishment specialist. The planning team created orders based on actual demand, driven by POS information. However, suppliers had limited or no information about the order quantities and requirements they can expect in the future. In 2012, the Merchandise division was responsible for demand and supply planning as well as product sourcing. The Systems and Supply Chain division operated separately from the Merchandise division and comprised the Logistics, Supply Chain and Information Systems departments.

Figure 1.2.3: Massdiscounters divisional structure in 2014



Source: Designed by researcher

Figure 1.2.3 depicts the divisional structure of the organisation in 2014. The business divisions are Supply Chain; Dion Wired; Store Operations; Africa; Marketing; Merchandise; IT and Finance. Noticeable changes are that the Merchandise division separated the planning and replenishment functions as a need was identified for specialisation in these areas. Furthermore Supply Chain comprises the Logistics and Supply Chain departments and IT has become a separate business division managed by a new director (Massmart, 2014b). However, the Merchandise and Supply Chain divisions continue to behave as separate divisions with different goals and objectives. The assumption investigated in this study is that the nature of the business structure is not conducive to optimal information sharing across the supply chain.

The logistics division consists of three regional distribution centres (RDCs) within South Africa, seven large item depots (LIDs) and a national team which aims to enhance visibility and resolve supply chain inefficiencies. The supply channel flows from a manufacturer via retailer distribution centre to retail store (Massmart, 2014b). Suppliers deliver their products to RDCs for final delivery to stores. The RDC is managed by the retail chain and third-party logistics service providers are contracted to deliver products to all Game stores (Rushton, Croucher and

Baker, 2014:52-54). The retail business is highly promotion driven. The Marketing division creates advertising campaigns and drives promotional initiatives. Products are advertised in weekly community newspapers. The price and product information contained in these advertisements is driven by the Buyer. Finally, the Store Operations division consists of 122 Game stores within Africa as well as other corporate divisions which manage the stores operations (Game, 2013). Stores receive stock from RDCs as well as from direct-store delivery suppliers. Stores are expected to successfully execute promotional campaigns. This requires a tremendous level of support from the above-mentioned functions within the organisation. According to Seifert (2003:30) "collaborative planning, forecasting and replenishment (CPFR) is an initiative among all participants in the supply chain intended to improve the relationship among them through jointly managed planning processes and shared information". This study analyses the actual forecasting methods used in order to determine whether or not they are aligned with the organisation's strategy as well as its supply chain trading partners.

1.3 Problem Statement

Effective supply chain partnerships across extended enterprises require efficiently visible information sharing within the retail promotion-driven business model. The dynamics of information sharing emanate from long, silo-oriented forecasting periods (eight weeks), oversimplified point of sale (POS) data and a poorly synchronised pull/push supply chain distribution strategy. This foreground scenario of the Massdiscounters retail business, have an influence on large volumes of inventory stored at distribution centres and stores exhibiting poor in-stock numbers. The theoretical premise of the study is based on the social exchange theory to emphasize the magnitude of supply chain collaboration, information sharing and inter-organisational relationships. The study aims to optimise supply chain integrated information sharing through collaborative, forecast-based performance outcomes and electronically-shared information tools across extended enterprises.

1.4 Objectives of the study

The objectives of this research study aim:

- To examine the extent to which optimised information sharing can be enhanced by integrated supply chain activities across the extended enterprise;
- To establish the magnitude of supply chain value-added performance outcomes in the Collaborative Planning, Forecasting and Replenishment (CPFR) model across functions and across enterprises;
- To assess the role of electronically-enabled information sharing tools in an integrated and effective supply chain structure.

1.5 Research Questions

This study aims to answer the following questions:

- To what extent can information sharing be enhanced by integrated supply chain activities amongst the Massmart Group's supply chain partners?
- How are supply chain value-added activities associated with the CPFR model across the functional areas and extended enterprises?
- What is the role of electronically-enabled information sharing tools in an integrated and effective supply chain structure?

1.6 Motivation for the study

The research study focuses on Massdiscounters, one chain within the Massmart group. Massdiscounters comprises Game and Dion Wired and is a highly promotion-driven retail business. The organisation has experienced reduced consumer confidence, reflected in reduced trading profit during 2013 (Massmart, 2014b). One of the biggest challenges is that weekly promotions increase variability across the supply chain. Supply chain teams lack the detail necessary to respond to rapidly changing customer requirements. Internationally, collaborative planning, forecasting and replenishment (CPFR) is deemed a critical success factor in the consumer goods economy. Alongside the effective use of CPFR principles, strategic alliances and information sharing within and across organisations offer enormous potential savings on the one hand, and growth through avoidance of out-of-stocks on the other (Davis, 2013:61). The research study analyses the supply chain challenges and opportunities of information sharing for effective business performance as well as the methodology required to successfully utilise the principles of CPFR. This is further explained by the social exchange theory in the context of supply chain.

1.7 Theoretical framework of the study

The social exchange theory (SET) claims that individuals or groups attempt to interact with others in order to generate a reward. In relation to supply chain collaboration, "social exchange theory implies that power is regarded as the most important sociological aspect of an inter-organisational relationship when one firm (or business area) needs to influence another's decisions" (Cao, Zhang, 2013:21). Value-chain management recognises that demand and supply are equally important elements of the supply chain. In today's organisations, sales forecasting may be the responsibility of one department or multiple departments, which share information via systems or manual methods. According to Dudek (2009:20-23) collaborative planning, forecasting and replenishment (CPFR) is a process for developing integrated supply chain relationships between retailers and manufacturers, and comprises of three phases, namely,

planning, forecasting and replenishment. The first task is defining a relationship in terms of goals, defining the scope, and assigning checkpoints, escalation procedures and roles and responsibilities. Social exchange theory creates a premise that indicates joint business planning in terms of new product listings, new store openings and closures, changes in inventory policy and promotional activity (the retailer's task is category management and the manufacturer's task is market planning). "This critical information is sometimes given little importance and drives the supply chain with incorrect or untimely information" (Seifert, 2003:2). The implication is that supply chain integration is hindered by ineffective information sharing structures across supply chains.

1.8 Literature Review

Supply chain collaboration offers organisations the opportunity to establish a competitive advantage (Simatupang and Sridharan, 2004). Many supply chain partners, both inter- and intra-organisational, make decisions with limited information at their disposal. Zhang (2008) observes that supply chain members are often separate and independent economic entities. Cheng (2011:374) states that "information sharing has increasingly become an important issue for supply chain because it impacts supply chain costs and achievement of competitive advantage". Information sharing is deemed an effective coordination mechanism which integrates activities. This improves profitability and growth opportunities for business. (Ghosh, 2012:6). Optimising information sharing may be interpreted as sharing accurate and real-time data via an easily accessible electronic database. Ali and Frew (2013:94) argue that "as focus shifts from improving manufacturing processes to activity co-ordination in supply chains through information management; information sharing has become a critical factor in the supply chain" sphere. Hence a key issue in supply chain management is to develop mechanisms that can align objectives and coordinate activities so as to optimise system performance. The literature review conducts an in-depth investigation into the relationship between four variables namely collaborative planning, forecasting and replenishment; supplier relationship management; supply chain strategies and category management. These variables have been identified as key drivers of supply chain collaboration, information sharing and alignment.

1.8.1 Collaborative Planning, Forecasting and Replenishment

According to Wisner and Stanley (2008:164), "collaborative planning forecasting and replenishment (CPFR) is a business practice that combines the intelligence of multiple trading partners in the planning and fulfilment of customer demand. CPFR links sales and marketing best practices such as category management, to supply chain planning and execution processes to increase availability, while reducing inventory, transportation and logistics costs". Visible

information is the key ingredient in realising the benefits of an efficient value-chain, and CPFR enables supply chain trading partners to collaborate. Seifert (2003:5) explains that three scenarios may pose a threat to retail supply chain strategies. Firstly, production is not consistent with demand and thereby places immense pressure on supplier warehouses and retailers' regional distribution centres (RDCs). Secondly, buyers within the retail organisation agree to large volume purchases in order to obtain discounts. Thirdly, these decisions are taken in isolation. Hence the savings generated are lost through higher overall costs within the supply chain. This results in variability in demand, large levels of inventory throughout the supply chain and low service levels on core lines (Seifert, 2003:5-6).

Sales forecasting has a direct impact on the inventory that an organisation carries and motivates improvements in a retail distribution centre's forecasts and the incorporation of a retailer's inventory position into this forecast (Williams, 2008). According to Mittendorf, Shin and Yoon (2012), sales forecast data shared by a retailer enables a manufacturer to reduce inventory costs by lowering stock- holding and streamlining logistics processes. It is suggested that forecasts should be primarily based on data gathered from the POS in order to synchronise supply chain plans with consumer demand. The main benefit of using POS data is that they represent independent demand – none of the supply chain partners have control over them. "The downside of using POS data is that there may be a large number of points of sale, the sales of one POS may be small and not all POS systems are able to collect, process, and transmit consumer data upstream" (Kaipia and Lakervi, 2004:1-3). Inventory can be eliminated from the supply chain by timely and accurate information about demand. If POS data were available from the retail level on a real-time basis, this would help to mitigate the bullwhip effect associated with supply chain inventories and could significantly reduce cost (Coyle, Langley, Gibsom, Novack and Bardi, 2009: 20). Dolgui and Proth (2010:119) define the bullwhip effect as the "phenomenon of demand variability amplification along a supply chain, from the retailers to distributors, manufacturer and manufacturers suppliers, and so on". One of the obstacles to achieving the common goal of serving the consumer is the fact that general merchandise and fast moving consumer goods (FMCG) suppliers find it difficult to predict a retailer's orders (Williams, 2008:4-5). As a result order fulfilment targets are not consistently achieved by suppliers. This research study investigates the correlation between suppliers' levels of order fulfilment and stores' "in-stock" levels.

1.8.2 Supplier relationship management

Ross (2011:258) defines supplier relationship management (SRM) as "the nurturing of continuously evolving value-enriching relationships between supply chain buyers and sellers that requires a firm commitment on the part of all trading parties to a mutually agreed upon set

of goals and is manifested in the collaborative sharing and timely cost-effective networking of sourcing and procurement competencies to facilitate the entire material replenishment life cycle from concept to delivery". A pre-requisite for a more agile supplier base is a high level of information sharing. Information on downstream demand must be easily accessible; data on real demand needs to be captured as far down the chain as possible and shared with upstream suppliers (Rudzki and Trent, 2011:149-150). Apart from the systems resources required to make this possible, there must be willingness amongst the partners to put aside any previous mistrust. Information must be able to flow freely in both directions in the chain (Christopher, 2000). The study analyses the manner in which the organisation relates to suppliers. This is the potential key to the level of information sharing, or lack thereof, in Game's supply chain.

1.8.3 Supply chain strategies (push *versus* pull)

The supply chain strategy utilised by a retail business is sometimes complex. However the lack of a clearly defined supply chain strategy may be disastrous. The study focuses on two popular distribution strategies. A "push-based" supply chain strategy refers to a situation where production and distribution decisions are based on long-term forecasts and has been used historically. The disadvantage of this strategy is that forecasts are usually inaccurate, especially when the forecast horizon is lengthy. In a "pull-based" supply chain strategy, production and distribution are demand-driven and coordinated with true customer demand rather than a forecast. Hence it is possible for an organisation to hold no inventory and only produce to order. The disadvantage of this strategy is that supplier and manufacturer lead times do not allow for reactions to changes in true demand. Furthermore, economies of scale are unlikely in this scenario (Harrison, Lee and Neale, 2005:16-18).

1.8.4 Category management

Retail demand and supply chain planning requires the cost-efficient matching of customer demand with retail store operations. Hubner (2011:5-7) states that while customers are demanding better service and prices, retailers are increasing their product range and assortment. Hence the complexity of managing the retail operation's product range and assortment relative to true customer demand has increased significantly. The research study aims to demonstrate that an organisation driven by a low-price strategy is usually unable to significantly increase its product range or assortment. The researcher seeks to ascertain whether poor category management has a contradictory effect on the POS. According to Gunasekaran and Ngai (2003) the following problems are often identified when developing an IT-integrated supply chain:

- Lack of integration between IT and the business model;
- No proper strategic planning, resulting in poor IT infrastructure;

- Insufficient application of systems in a virtual enterprise;
- Inappropriate level of implementation knowledge of IT in SCM

The technology and communication systems available to organisations today enable the collection and storage of vast amounts of data; however, not all organisations are taking advantage of this abundant data to develop information systems that improve decision making (Coyle *et al.*, 2009). The researcher will propose that information sharing is enabled by an effective IT supply chain structure.

1.9 Research Design

The research study was conducted by means of an empirical study using primary data from surveys and a case-related study. The research project was generated based on the following principal constructs:- the CPFR and actual forecasting methods used by Game, a clear definition of supply chain strategy; and that collaboration through intelligent e-business networks will provide the competitive edge for Game and trading partners.

1.10 Research Methodology

The research study employed a non-probability sampling method. This approach is utilised when "the elements in the population do not have any probabilities attached to their being chosen as sample subjects" (Sekaran, 2003:276). A survey was carried out through the use of a self-administered questionnaire. Punch (2003:1-10) explains that quantitative research is essentially about investigating and understanding how and why variables are related to each other. Both primary and secondary data were used to fulfil the objectives of the study. Secondary data was accessed *via* books, journal articles or the internet. The questionnaires contained both open-ended and closed-ended questions.

1.10.1 Sample size and population

Various business divisions were targeted for the purposes of the research, namely, logistics, supply chain, merchandise, information technology (IT) and store operations. Key trading partners were also requested to participate in the study. The sample comprised of directors, executives and managers within the organisation and the fifty largest suppliers of Massdiscounters.

1.10.2 Reliability and Validity

According to Jackson (2008:67), reliability is defined as "an indication of the consistency or stability of a measuring instrument". Validity tests how well the instrument that is developed

measures the particular concept it is supposed to measure. The researcher used Cronbach's alpha, a reliability coefficient that indicates how well the items in a set are positively correlated to one another (Sekaran, 2003).

1.10.3 Data Analysis

The correlation and cross-tabulation relationships were investigated among the variables involved in the study. According to Field (2000:71-85), a correlation is a measure of the linear relationship between variables. The two types of correlation relationships are referred to as bivariate or partial. The SPSS (Statistical Package for the Social Sciences) software was used for data analysis. The collected data were entered through the SPSS data entry station and SPSS 11.0 analysed the data collected.

1.11 Ethical considerations

Permission to conduct the study was obtained from all gatekeepers, including Massdiscounters' various business divisions, as well as suppliers and individual stores. Permission was obtained by means of a letter of consent which was attached to each survey instrument. Furthermore, the University of KwaZulu-Natal requires that all personal data collected remain confidential and gathered data be submitted for storage in the university archives. A gatekeeper's letter was provided by the Massdiscounters directors or executives who authorise access to information.

1.12 Limitations and delimitations of the study

The delimitations of the study are the ability to access information at all business divisions as the Massdiscounters corporate division is based in the Durban region, Kwazulu Natal province. The researcher is currently employed within the supply chain division of this organisation and has formed valuable relationships with a number of internal and external trading partners. The limitations of the sample size were that the researcher had limited exposure to the Massbuild, Makro and Masscash chains of the Massmart group. Furthermore, the trading partners involved in the study might not have access to extensive data and other detailed information and records which may be helpful to this investigation. The researcher attempted to avoid formulating personal opinions and exercised boardroom judgement while conducting the study.

1.13 Conclusion

As global markets become increasingly efficient, competition no longer takes place between individual businesses, but between entire value chains. The theoretical framework and motivation of the study indicate that supply chain trading partners are no longer able to work in

silos, but rather need to operate as teams with shared objectives and goals. The study seeks to assess the performance and requirements of a collaborative supply chain. It further aims to demonstrate that collaboration through intelligent e-business networks will provide the competitive edge that enables all the participants in a value chain to prevail and grow (Horvath, 1996). Davis (2013:61- 68) argues that supply chains that are driven by incorrect information, lack of visibility, poor relationship management and lack of collaboration will face barriers to supply chain integration.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter reviews the literature pertaining to information sharing within and across a retail supply chain. The review of existing literature seeks to understand the key determining factors and challenges for information sharing. The business process along a modern supply chain is explored followed by an in-depth discussion of the key variables of the study and their influence on optimal supply chain information sharing. The discussion will thereafter probe the inter-dependency of the key constructs with information sharing and technology. This research study investigates ways in which the Massmart group can share information with its trading partners as effectively as possible. Furthermore, the researcher seeks to determine whether shared information and transparency in business partnerships are indeed necessary for an effective supply chain. Such shared information should ultimately result in benefits such as high-in-stocks, greater stock turn, improved relationships with suppliers and customers; leading to increased sales, and large returns on investments in the supply chain network. In order to determine how integrated networks enhance competitiveness, the Massdiscounters business model is investigated with a focus on optimised information sharing and extended enterprise relationships. According to Freedictionary (2013:1) optimising refers “to making as perfect or effective as possible” or “to increase the efficiency of by rewriting instructions”.

Cheng (2011:374) states that “information sharing has increasingly become an important issue for supply chain because it impacts supply chain costs and achievement of competitive advantage”. Information sharing is deemed an effective coordination mechanism which integrates activities. This improves profitability and growth opportunities for business. (Ghosh, 2012:6). The authors further describe optimised information sharing as the most useful tool for organisations that recognise the value of knowledge management.

According to Liu (2006: 3-10), dramatic progress in the information technology field has resulted in a transformation of traditional supply chains. In the modern “event-driven” economy, supply chains must have the ability to exceed consumers’ demand by reacting positively to any inter-organisational or external (market or economic) changes. In an integrated supply chain network with strict delivery times and low expected variances, unexpected events or exceptions occur frequently due to lack of cohesion between planning and actual execution in a dynamic environment. Orders that are delivered late, or retail stores’ complete order volume not being fulfilled have far-reaching consequences, such as the “bullwhip effect”.

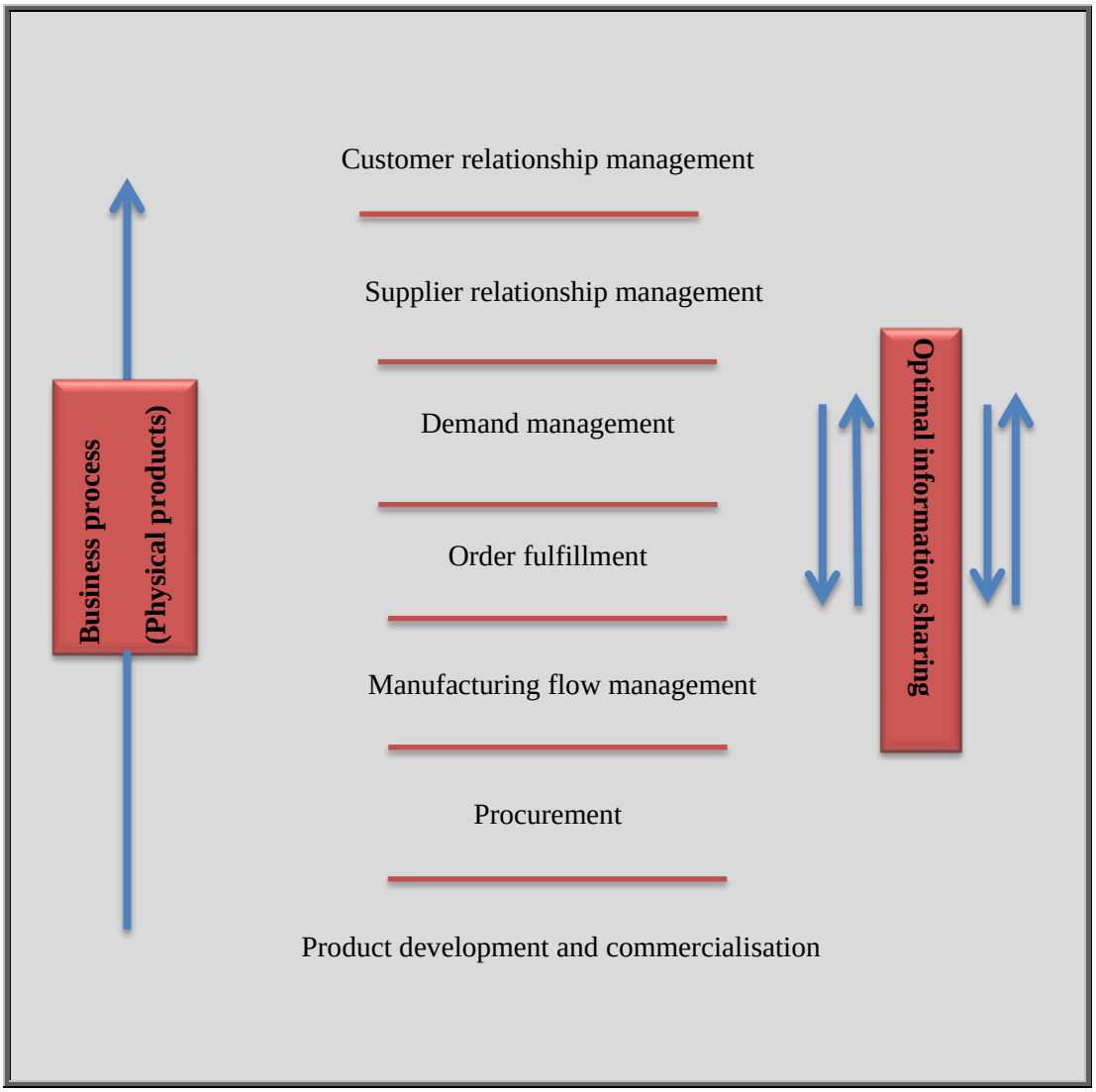
In the opinion of Warburton (2004:1), the bullwhip effect refers to a scenario "where a retailer's orders to their suppliers tend to have a larger variance than the consumer demand that triggered the orders. This demand distortion propagates upstream with amplification occurring at each echelon". In other words, the order details and volumes requested by the retailer may lack accuracy and alignment with true customer demand. The result is out-of-stocks at stores, too much stock within the supply chain network or disjointed supply chain activities.

Skaksen (2013:2-3) identified five major causes of the bullwhip effect: interpreting orders (the demand); order batching; promotions (which artificially stimulate demand); shortages (gaming, which also leads to artificial demand) and inflated orders. Sharman, Rao and Raghu (2011:111) indicate that "information sharing reduces the total variance amplification and stage variance amplification" often encountered by supply chains. Information sharing reduces the effect of inventory shortages at upper echelons such as retailer store locations. (Sharman *et al*., 2011:111). The level of effective information sharing adopted by supply chain trading partners therefore reduces the bullwhip effect.

2.2 Business Processes along the Modern Supply Chain

Contemporary business models seek to implement prompt and accurate information sharing tools. Business processes are thus becoming more complex as process flows are integrated across trading partners (Liu, 2006: 1-8). The process mechanisms in a supply chain must be synchronised in order to establish an intra- and inter-organisational aligned supply chain network. According to Szymczak (2013:16-18) a supply chain is "the network of organisations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services in the eyes of the ultimate consumer".

Figure 2.2.1: Business process elements along a typical supply chain



Source: Autry, C.W., Goldsby, T.J., Bell, J., Moon., M. A., Munson., Watson, M., Lewis, S., Cacioppi, P. and Jayaraman, J. (2013: 17-34). *The definitive guide to modern supply chain management*. New Jersey: FT Press.

Figure 2.2.1 illustrates typical supply chain business processes and requirements for optimal information sharing. Autry, Goldsby, Bell, Moon, Munson, Watson, Lewis, Cacioppi and Jayaraman (2013:17-34) theorised that optimal information sharing requires collaboration between functions such as customer relationship management; supplier relationship management; demand management; order fulfilment; manufacturing flow management; procurement and product development; and commercialisation. Autry *et al*., (2013: 23-27) argues that information sharing calls for effective information systems. For the purposes of this research study on Massdiscounters, supplier relationship management; collaborative forecasting, planning and replenishment (which considers order fulfilment, manufacturing flow

management and demand management); supply chain distribution strategies and category management were selected to answer the research questions. The literature reviewed in this chapter focuses on these elements, relative to information sharing and systems.

2.3 Collaborative Planning Forecasting and Replenishment (CPFR)

Supply chain integration comprises of two key processes: the alignment of objectives and incentives, and the integration of processes up and down the supply chain (Waters, 2010:195-197). Acton (2013:319-320) advocates that, in order to determine the transparency of information between trading partners, information technology should be harnessed to assist supply chain members to establish partnerships for better supply chain performance. Supply chain partnerships have a tendency to mitigate the deficiencies associated with decentralised control by reducing the "bullwhip effect" through working with supply chain members prior to implementing supply chain collaboration with trading partners.

Ireland and Crum (2005:159) caution that "internal business collaboration is far more difficult than external collaboration". This refers to organisations with different divisions that do not properly collaborate and lack an effective method or system for sharing information. Massdiscounters divisions, such as planning, buying, marketing and logistics historically operated within a silo mentality. The social exchange theory is indicated as the theoretical framework for the study and implies that power is regarded as the most important sociological aspect of an inter-organisational relationship when one firm (or business area) needs to influence another's decisions (Cao, Zhang, 2013:21). While collaborative teams are usually formed (within and across organisations) to improve supply chain performance, the challenge lies in the lack of visibility of improvements made in this space. Hence internal visibility must be effective before an organisation seeks to colloborate with external trading partners.

2.3.1 What is Collaborative Planning, Forecasting and Replenishment (CPFR)?

Collaborative Planning, Forecasting and Replenishment (CPFR) "is a business practice that combines the intelligence of multiple trading partners in the planning and fulfillment of customer demand" (Mendes, 2011: 59). CPFR links sales and marketing best practices, such as category management, to supply chain planning and execution processes in order to increase product availability while reducing inventory, transportation and logistics costs (Mendes, 2011: 59).

Buyukozkan and Vardaloglu (2012: 10438) maintain that "CPFR is a scheme that integrates internal and external trading partners' information systems". According to Yao, Kohli, Sherer and Cederlund (2012:2) CPFR systems "are information systems that enable partnering firms to

integrate their inventory planning, forecasting and replenishment processes by sharing information, developing joint forecasts and jointly creating replenishment plans. The complexity arises as these organisations must integrate incompatible business processes between CPFR partners". These observations are relevant to the current study. The elements that dominate the definition of CPFR are business partner integration and sharing information, supply chain efficiencies and the outcome of product availability at retail stores while costs remain minimal.

2.3.2 Objective of CPFR

The objective of the CPFR business model "is to align demand and production in a sense that outlining distribution capacity capability and requirements as a part of the planning process can easily result in a significant transportation and inventory-holding cost reduction" (Camarinha-Matos, Paraskakis and Afsarmanesh, 2009:71). According to Dudek (2009:20-23) CPFR is a process for developing integrated supply chain relationships between retailers and manufacturers, and comprises of three phases, namely, planning, forecasting and replenishment. The first task is defining a relationship in terms of goals, defining the scope, and assigning checkpoints, escalation procedures and roles and responsibilities. The second collaborative task is "joint business planning" in terms of new product listings, new store openings and closures, changes in inventory policy and promotional activity (the retailer's task is category management and the manufacturer's task is market planning). The planning stage involves preparation to evaluate a company's internal requirements and capabilities, trading partner segmentation, and an implementation strategy. The forecasting phase involves steps such as sales and order forecasts, and exception handling, which is an ongoing, iterative process. The third phase handles order execution and delivery. In all three phases, the trading partners work together to achieve the common goals defined in the initial phase (Mendes, 2011: 59-61).

Various tools are available to integrate supply chain activities. Continuous replenishment systems employ a number of different concepts such as vendor managed inventory (VMI) that uses daily sales data for reordering processes extracted from point-of-sale (POS). Co-managed inventory (CMI) systems refer to "a scenario in which retailers would share information regarding promotional activities of all suppliers in a category with participating suppliers" (Walters and Hanrahan, 2000:330). According to Buyukozkan and Vardaloglu (2012:10438-10455), the success factors of CPFR are "information sharing and system integration", "people management and development", "relationship building and trust management" and "other factors" such as the forecast process and system and data security. The literature shows that, for retailers, integrated systems are critical for collaboration across the supply chain.

2.3.3 Discussion of CPFR elements

2.3.3.1 Collaborative Planning

Planning refers to the "definition of cooperation's mission statement including goals, tasks and resources and development of a joint business plan" (Dudek, 2009: 20-23). Collaborative operations planning is a non-hierarchical, cooperative approach to the coordination of operations planning tasks across the supply chain. Collaborative planning requires substantial investment in information systems and change management across companies. In a supply chain integration project, the expected benefits of collaborative planning should be compared with the cost of initial implementation and the ongoing operation of the process. Implementation is only recommended when the expected benefits of developing and implementing a collaborative planning process exceed the associated costs (Dudek, 2009:20-23).

Seifert (2003:1) observes that CPFR has expanded in Africa, where retailers are successfully adapting these practices to their business processes and their own market conditions and creating best practices. The supply chain process refers to the series of companies in a supply chain, each of which orders from its immediate upstream member. Inbound orders from a downstream member serve as valuable information input to upstream production and inventory decisions. The information transferred in the form of "orders" tends to be distorted and can misguide upstream members in their inventory and production decisions. In particular, the variance of orders may be larger than that of sales, and the distortion tends to increase as one moves upstream - a phenomenon termed the "bullwhip effect" (Dornfield and Linke, 2012:580-600). The authors further argue that the bullwhip effect increases in magnitude due to a lack of information sharing across the supply chain. Furthermore, the complexity increases when each business division is responsible for individual replenishment decisions. The causes of bullwhip effect include "demand signal processing, rationing game, order batching, and price variations" (Skaksen, 2013:2-3).

2.3.3.2 Forecasting

According to Tayur and Ganeshan (2012:73), "a remarkable CPFR success story is Walmart whose replenishment practices are hailed as the centre -piece of its competitive strategy". "In March 2012, American multi-national retail corporation Walmart completed its acquisition of a 51% stake in South African retailer Massmart for 2.4 billion dollars, one of the largest merger and acquisition transactions seen in Africa, heralding the arrival of the world's largest retailer to the continent" (Hathaway, 2013:1). With this acquisition, it is expected that many of these practices will be adopted for use in the South African market. Wang, Heng and Chau

(2007:173) state that Walmart has established a successful collaborative relationship with both customers and suppliers. As a result, the company has gained superior bargaining power, lower inventory levels and operational costs and greater economies of scale within the distribution network.

Quick response (QR) is a strategy used by retailers to share POS, inventory levels and forecast data with suppliers, as well as information on promotional events. The visibility of current demand and inventory levels enables suppliers to better forecast and schedule their production-inventory activities, and improve customer service. Indeed, information sharing can reduce demand uncertainty to such an extent that suppliers can build inventory well in advance of receiving a promotional order (Fahrenwaid, Wise and Glynn, 2001). QR, vendor managed inventory (VMI) and CPFR have one thing in common; the requirement that retailers transfer demand information to their suppliers, and sometimes even to suppliers' suppliers. However, sharing information also poses significant challenges.

2.3.3.3 Replenishment

According to Packowski (2013:141), replenishment activity "determines in which quantity and at what time products are ordered from other supply chain stages". He identifies two types of replenishment. Sabri and Shaikh (2010:20) list these as push replenishment (production triggered by a forecast-based plan) and pull replenishment (triggered only by real consumption). The different types of replenishment depend on the type of industry and level of predictability of demand. The following section outlines the steps in the CPFR processes and the shared data objects produced and consumed during each step.

2.3.4. Process steps within CPFR

Collaborative planning, forecasting and replenishment activity requires a sequence of processes to be carried out effectively. Table 2.3.4.1 describes the activities that require information sharing and transparency amongst trading partners.

Table 2.3.4.1: CPRF processes, shared data and consumed data

Process Step		Data Consumed	Data Produced
1	Develop collaboration arrangement	Point of sale (POS), historical shipments	Exception criteria
2	Create joint business plan	Trading partners' corporate plans and strategies	Joint business plan, item management profile
3	Create sales forecast	Joint business plan, POS data, exception criteria, events	Sales forecast identified, exception items
4	Create order forecast	POS data, inventory, sales forecast, events, historical demand and shipments, product availability data, item management profile	Order forecast, identified exception items
5	Generate order	Order forecast, item management profile	Order

Source: Liu, E. and Kumar, A. (2003). Leveraging information sharing to increase supply chain configurability. *Twenty-Fourth International Conference on Information Systems.* Available at: http://test.scripts.psu.edu/users/a/x/axk41/icis03_reprint.pdf [Accessed: 20 June 2013].

The first process step of Table 2.3.4.1 indicates that the development of a collaboration arrangement between trading partners requires that they share POS data (which is typically generated by retailers' systems) and historical shipment information. Process step two suggests that creating joint business plans result in transparent corporate business plans and strategies. Sales and order forecasts therefore require that POS data, historical shipments and demand data, as well as product availability data be shared. Liu and Kumar (2003:531) suggest that a true CPFR process requires transparency and availability of information sourced by the retailer, manufacturer, distributor and supplier. Buyukozkan and Vardaloglu (2012:10438) support this argument by stating that the CPFR model is a tool which integrates trading partners' "internal and external information systems to assist developing a collaborative supply chain structure in the retail sector". Hence optimising information sharing across the retailer's supply chain is a requirement for effective CPFR.

The literature on CPFR shows that product availability, supply chain cost reductions, supply chain processes and ordering efficiencies are driven by an integrated business process. This relies heavily on information sharing and visibility between the trading partners. Effective information sharing and visibility depends on excellent information sharing systems. This research study examines the extent to which optimised information sharing enhances integrated supply chain activities across the extended enterprise for Massdiscounters. Furthermore, the

study will establish the magnitude of supply chain value-added performance outcomes in the CPFR model across Massdiscounters and its supply chain trading partners.

2.3.5 CPFR and inventory

According to Qi, Shen and Dou (2013:1325) CPFR "is a collaborative management technology of supply chain inventory". It has been championed by Walmart and aims to eventually reduce inventory quantities for the retailer while increasing stock turns for the supplier. The Council of Supply Chain Management Professionals (CSCMP), Waller and Esper (2014:2) explain that inventory is an asset to any organisation because "inventory represents property that is likely to be converted to revenue, as the ultimate aim is that inventory will facilitate sales for an organisation". The authors add that inventory is an asset; while maintaining that poor inventory management leads to increased costs and retailers having to store too much of the wrong type of inventory. In other words, inventory levels must be optimal – as effective as possible – thereby ensuring that stores stock the right product to suit customers' requirements.

Christopher (2013:50-288) explains that CPFR leads to a reduction in capital investment due to more accurate inventory planning. Furthermore, the cost of goods is reduced, as obsolete products are no longer a challenge. Sales are likely to increase as customers are more satisfied with the products available at the stores. The problem statement indicated that the retail business in question is storing large volumes of stock and that company reports refer to a business drive to reduce capital spend and stock levels (Massmart Annual Report, 2013). According to Scottsdale (2013), Massdiscounters completed implementation of JDAs' demand and fulfilment system in 2013. The objective is to drive a lean supply chain. Massdiscounters "uses JDAs' demand and fulfillment solution to improve and leverage supply chain production planning and execution processes, ensure more accurate statistical forecasting, reduce overstocks and inventory, gain central inventory visibility and rely on a centralised solution to drive a leaner overall supply chain process" (Scottsdale, 2013). The literature indicates that CPFR is an effective tool to manage stock levels within a supply chain. This study aims to determine whether or not JDA has assisted this retail business to optimise CPFR and manage inventory.

2.4 Supplier relationship management

Lambert (2008:53-54) states that "supplier relationship management (SRM) is the supply chain management process that provides the structure for how relationships with suppliers are developed and maintained". These processes should enable the identification of potential suppliers in a network as part of the organisation's mission statement to improve processes,

eliminate demand order variability and remove non-value adding activities. The preceding section indicated that relationship building and trust management is a key factor in successful CPFR in the retail industry. Becoming more cost-efficient and enhancing relations with key suppliers can provide market expertise and develop innovative new products despite competitive pressures. According to Lamb, Hair and Mcdaniel (2009:415), "the SRM process is somewhat related to the manufacturing flow management process and comprises of several components that entail the customer relationship management process". If flexibility is critical to manufacturing flow management; the level of flexibility should be highly dependent on supplier relationships. "The supplier relations process requires the identification and selection of suppliers; creating supplier scorecards; regular supplier reviews; supplier factory visits; and identifying ways that suppliers could provide improved service levels at a lower cost" (Lamb *et al*., 2009:415).

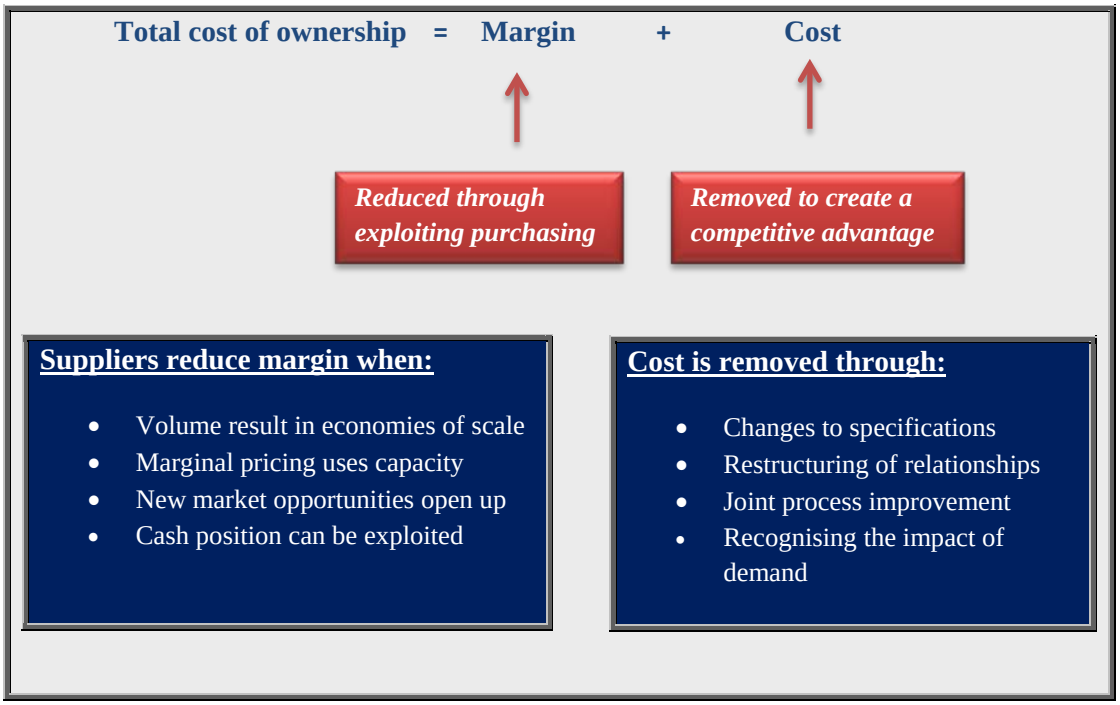
Predefined supply chain relations processes may justify investment in a supply network. Furthermore, "suppliers in the supply network must contribute to the retailer's competitiveness by providing expertise in various aspects such as product improvement, new product development, process improvement and quality management programmes" (Buttle, 2009-185). By the same token, Rayner (2012:144-146) highlights that "best practice is all about building successful, long-term relationships across the retail supply chain through the sharing of key information between all the actors in a supply chain – often referred to as supplier collaboration". This adds value when the supplier and retailer are working toward a common goal.

Although suppliers have great deal of market expertise, sharing sales data is critical. However many are cautious about sharing sensitive information. It is assumed that this collaborative relationship can develop once actual cost and sales data are shared. "Supplier/Retailer Collaboration (SRC) occurs when both retailers and suppliers share proprietary internal or external data, and/or share policies and processes used in decision making with the clear objective of sharing the benefits" (Walters and Hanrahan, 2007:327). The study aims to understand the level of trust and collaborative effort between Massdiscounters and its suppliers.

2.4.1 Strategic Sourcing

Strategic sourcing requires a high degree of understanding between supply chain partners of one another's goals, organisational objectives and practices (Li, 2007:88). While strategic sourcing can involve a number of tactics, they fall into one of two broad categories: exploiting buying power or creating competitive advantage.

Figure 2.4.1.2 Impact on total cost of ownership



Source: Volition, (2013). *Supplier Relationship Management – Putting the Relationship in!*[Online] Available at**:** http://www.volition.co.za/index.php/our-stories/81-supplier-relationship-management-sourcing-relationships.html [Accessed 4 July 2013].

One strategic sourcing measure is Total Cost of Ownership, also known as TCO. TCO is defined by Monczka *et al*., (2008:408) as "the present value of all costs associated with a product, service, or capital equipment that are incurred over its expected life". Figure 2.4.1.2 illustrates the implications of TCO for margin and cost. It is essential that organisations formalise TCO activities in order to increase margins and reduce the cost base within the supply chain. Collaborative sourcing is about putting the relationship back into supplier relationship management and creating a competitive advantage through applying solid supply chain management skills. The figure shows that TCO equates to increasing margin and reducing cost. Suppliers are key partners who may reduce margin for a retailer as a result of economies of scale, new market opportunities and product development. The figure demonstrates that, cost is reduced by means of joint collaboration initiatives and demand planning. Eventually this will create new ways of relating, leading to stronger and healthier business relationships. To distinguish this approach, the term "collaborative sourcing" is adopted to describe a partnership approach that creates long term competitive advantage for all stakeholders. It comprises relationship restructuring, joint process improvement, demand management and product specification improvement.

Practical focus areas can be defined for collaborative sourcing, such as integrated operations planning, demand impact visibility, inbound logistics design, gain share pricing models and life

cycle design. According to the literature, a supply chain's TCO will determine the affordability of its products. In order for Massdiscounters to be competitive, transparency, knowledge sharing and collaboration must exist within the supply chain. Organisations must adopt a transparent approach to critical factors such as quality, lead times and service levels. A recent South African survey with a target population of procurement professionals, found that 68, 9% of the respondents cited the biggest advantage of good supplier relationship management as mutual gain throughout the supply chain (Smartprocurement, 2010). This research study investigates the level of commitment to collaboration within the retailer's supply chain. The study will provide insight into the supplier relationship management practiced within Massdiscounters.

2.4.2. Supplier relationships and inventory management

O'Connell (2012:108-109) observes that, "collaboration on technology between a company and its suppliers should be aligned, with jointly prepared technology strategy and roadmaps". The author argues that suppliers and the retailer must operate at the same level of technological innovation in order to collaborate. This leads to a reduction in inventory levels upstream the supply chain as suppliers' expertise in managing production and distribution costs is tapped. Brown, Bessant and Lamming (2013:361-365) discuss the challenge of inventory management. Organisations should consider the use of either periodic review of ordering or continuous review. The choice between ordering small quantities of stock more frequently and benefitting from bulk discounts is a challenge for most retailers. Again, supplier partnerships are the key to effective decision-making when ordering and managing stock levels because the economic ordering quantity approach is not always suitable (Brown *et al*., 2013:380-384).

The literature confirms that poor supplier relationship management has far-reaching consequences for a retailer. The benefits of well-managed relationships include sound inventory management, accurate forecasting and planning, reduced capital investment and efficiencies of scale, among others. The study investigates the supplier relationship management techniques employed by Massdiscounters. Furthermore the use of optimal sharing of information and plans is a feature of the literature in this field. The study therefore explores the technological maturity of the retailer relative to its supply chain partners.

2.5 Supply chain strategies (push vs pull)

According to the CSCMP (2014), "supply chain management, encompasses the planning and management of all activities involved in sourcing and procurement, conversion and all logistics management activities". It also includes "coordination and collaboration with channel partners

which can be suppliers, intermediaries, third parties" (Sinha, 2009:14). Based on this definition, competitive organisations should focus on:

- Distribution network design and supply channels (number and location of suppliers, production facilities, distribution centres, warehouses and customers)
- Distribution strategy (a centralised vs decentralised business model, cross docking, direct shipment, push or pull strategy, the use of third party logistics service providers)
- Information and visibility (integrate systems and processes throughout the supply chain to share valuable information including demand signals, forecasts, inventory and transportation)
- Inventory management principles

Supply chain strategy and design creates a foundation to manage supplier relations. As noted earlier, this facilitates collaborative partnerships and information sharing. Simchi-Levi, Kaminsky and Simchi-Levi (2009:1) argue that "intensified competition in global markets, the demand for products with short life cycles, challenging customer requirements, rapidly changing development in communication and transportation technologies; have forced businesses to invest in their supply chain networks". In order to remain relevant it is imperative that businesses enhance customer service levels and decrease their cost base.

Efficient Consumer Response (ECR) is directed toward a pull system using information on actual demand that is captured at the POS. The ECR model can be characterised as an efficient reaction to customers' needs. "The basis of supply chain integration can therefore be characterised by cooperation, collaboration, information sharing, trust, partnerships, shared technology and a fundamental shift away from managing individual functional processes to managing integrated chains of processes" (Power, 2005:253). According to Reynolds and Cuthbertson (2004:54) "retail sales can be maximised if there is available stock across the entire product range, production can be increased if consumer sales are maximised and inventory can be reduced if production and deliveries are aligned to the level of retail sales". The contemporary supply chain focuses on consumption, rather than production. The measurement of retails sales varies between stores, for example, between fast moving consumer goods (FMCG) store versus general merchandise stores. Furthermore, since the type of product differs, different supply chain strategies may be required within a single retail business model. The consumer pull supply chain calls for full visibility of consumer sales to all participants in the chain (Reynolds and Cuthbertson, 2004:54-55).

Capturing electronic point-of-sale (EPOS) data is not sufficient for retailers to develop a consumer pull supply chain. This type of supply chain embraces the functions of inventory control, depot management, marketing, category management, buying and finance. British retailers, Sainsburys and Marks and Spencer invested between 1, 5% and 2% of their annual turnover on information systems during the early 1990s. Such investment must be justified by increased efficiencies and greater competitiveness (Marks and Spencer, 2012:1-10). This is achieved by means of lower operating costs, reduced inventories, and increased sales as a result of fewer out-of-stock situations in its branches. Information sharing policies affect manufacturing, inventory and transportation, as well as several other decisions. They also influence the requirements for information exchange infrastructure, including the use of electronic data interchange (EDI) or the internet. Other information technology options include the implementation of ERP and manufacturing execution systems. The choice of distribution channels includes internet-based distribution, third party logistics, direct sales, quick response, continuous replenishment, and vendor managed inventory (Sinha, 2009:70).

"In 1998, Mars changed its distribution strategy to a "push pull" strategy in which inventory at their regional distribution centre was managed based on long-term forecasts; while delivery to retailers was based on realised demand" (Sople, 2012: 321-323). The appropriate supply chain strategy depends on the industry, the organisation and individual products. If there is high uncertainty about customer demand, the supply chain should be managed based on a pull strategy. Similarly, the higher the delivery cost, relative to the unit price, the more important it becomes to employ a push strategy to manage parts of the supply chain (Sople, 2012:321-323).

Irrespective of the supply chain strategy selected, the literature notes that the strategy must be clearly defined and communicated both internally and across the supply chain. Product flow must be aligned with information flow between the various players. "The level of alignment is dependent on the technology and collaboration effort employed by the organisation" (Chiles and Dau, 2005:46).

2.5.1 Supply Chain strategies and Inventory Management

According to Bevilacqua, Ciarapica and Giacchetta (2012:171-173), the manner in which an organisation moves materials and information has a direct impact on customer service levels. The selected supply chain strategy must be shared with supply chain trading partners. This will enable the retailer to reduce inventory levels, minimise obsolete products in the network and react to changing customer requirements and requests. Massdiscounters services 143 stores, utilises a central distribution strategy and operates a promotion-driven business (Game, 2013:1). The literature confirms that whether a push or pull approach is maintained depends on the

achievement of economies of scale, centralised distribution and the ability to react to changing customer requirements. This study seeks to determine whether or not the supply chain strategies employed by Massdiscounters are appropriate, given the promotional nature of the business.

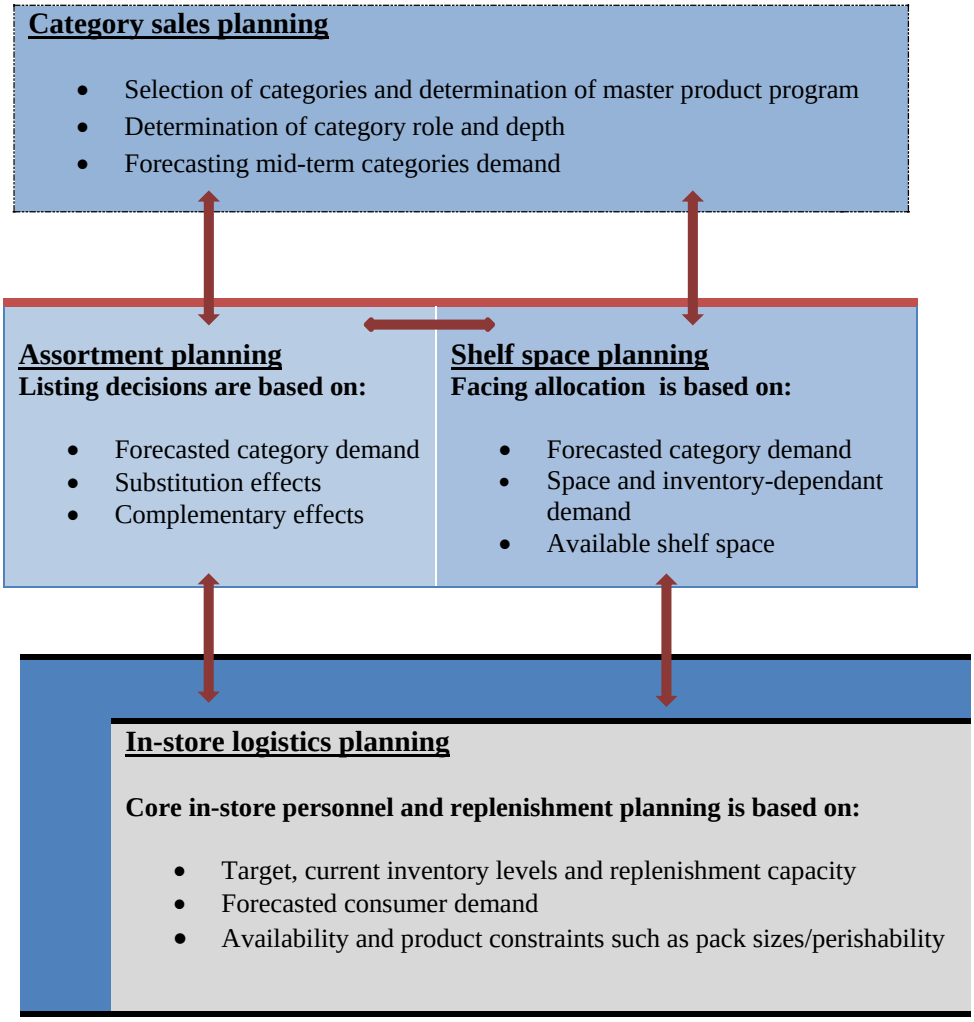
2.6 Category management

Products compete for shelf space in retail stores. “Category management (CM) has therefore become a critical marketing and operational decision faced by retailers of today”. (Hubner and Kuhn, 2012:199-209). CM “involves managing product categories as business units and customising them on a store-by-store basis to satisfy customer demands. CM has become crucial as space management in the retail sector becomes more complex” (Nielsen, 2012:190-250). Once the supplier-retailer relationship is developed; its focus on product categories results in cost reduction, and strategic alliances using the suppliers’ market expertise. Both parties benefit from ensuring that customers are serviced according to their true requirements.

A suitable merchandise assortment at retail stores may result from market segmentation, and customer and target market profiling (Leinwand and Mainardi, 2013:67-69). O’ Brien (2009:2) states that category management is “the practice of segmenting the main areas of organisational spend on bought in goods and services into discrete groups of product and services according to the function of those goods and services and most importantly, to mirror how individual marketplaces are organised. Using this segmentation, organisations work cross functionally on individual categories, examining the entire category spend, how the organisation uses these products and services, the marketplaces and individual suppliers”. The literature suggests that the retailer who is successful in category management execution is one who prioritises collaboration activities. The key to this philosophy is supplier integration, through information sharing.

Figure 2.6.1 describes the interdependencies of category planning.

Figure 2.6.1: Interdependencies in master category planning



Source: Hubner, A.H. and Kuhn, H. (2012) Retail category management: State of the art review of quantitative research and software applications in assortment and shelf space management. *Omega*, 40 (49), 199-209.

According to Pradhan (2010:71) "assortment planning relates to the products, lines, sizes and colour variations that are offered to a customer". This implies that the retailer is aware of what the customer wants to buy, and the basis for this decision is forecasted category demand. The figure shows the distinct relationship between category sales planning, assortment planning, shelf space planning and in-store logistics planning. Forecasting and replenishment therefore enable retailers to successfully manage product categories at store level. If information is not transparent within an organisation and across departments, the corporate demand planning team will not be aware of customer demand forecasts, changes in forecasted demand or planned customer events. This implies that a less effective demand plan will be communicated to the supply organisation.

The bullwhip effect is magnified as manufacturing concerns use inaccurate information to communicate schedules to their suppliers, causing waste in the supply chain. The manufacturer suffers excessive inventory of some products and insufficient inventory levels of others. Figure 2.6.1 indicates that demand planning; space, replenishment planning, forecasting and logistics planning or supply chain strategy are determinants of effective category management. The literature observes that information sharing systems and technology are required to accurately manage store and product categories.

2.7 Information Sharing

"Information sharing refers to the extent to which critical and proprietary information is communicated to ones' supply chain partner" (Li and Lin, 2006). Sharing relevant information with suppliers and trading partners across supply chains ensures that manufacturers and partners are able to maximise accuracy of ordering, capacity planning and material planning. Supply chain dynamics are thus optimised (Cheng, 2011: 374). Ghosh (2012:1-152) advocates that "researchers emphasize that sharing of information is an effective coordination mechanism that can integrate the chain activities and improve overall chain profitability". Literature confirms that the quality and accuracy of information shared across the supply chain is the determinant of effective information sharing. Communication involving inaccurate data or slow transmission results in poor business decisions and financial results. Thus the literature indicates that technology is a key driver for effective or optimised information sharing.

2.7.1 Information Sharing and technology

According to Sodero, Rabinovich and Sinha (2013:331) "the proliferation of internet-based IT has laid a foundation for firms to electronically share rich information with partners in their supply chain". Sharing of information may result in efficient business operations through knowledge creation and activity coordination. (Sodero *et al.*, 2013:331-332) "e-SCM relies heavily on socio-technical interactions to permit the integration of silo-orientated and fragmented supply chain process with low cost and rich content"(Lin, 2014:80).

Use of electronic supply chain management is considered a core competency, however Lin (2014:80-85) has identified challenges to adoption. Firstly, implementing an electronic supply chain system is associated with large costs and lack of clearly defined business benefits. As a result organisations are hesitant to adopt this technology. Secondly, successful adoption of new technology in organisations requires a great deal of resource and employee involvement. Employees adapt to change in various different methods and many adapt at a slower pace than others. Another identified challenge is that electronic supply chain management demands

collaboration with external trading partners such as suppliers, carriers, customers and manufacturers (Lin, 2014:80-81). Wu, Chuang and Hsu (2014:130) argue that "IT infrastructure is necessary for a physical connection between supply chain members to make information sharing feasible" within organisations and across trading partners.

2.7.2 Risks associated with information sharing

More than a decade ago, Walmart announced that it would no longer share its sales data with outside companies such as Information Resources Incorporated and ACNielsen; which paid Walmart for the information and sold it to other retailers (Hays, 2004). The supply chain literature on information sharing typically assumes that information is shared truthfully by all parties (ignoring the role of incentives) and emphasises operational effectiveness, such as inventory control, alleviation of the bull-whip effect, or minimising supply-demand mismatch costs (Anand and Goyal, 2010:5-6).

For Massdiscounters, supply chain development through Regional Distribution Centres (RDCs) is a key strategic initiative to improve overall business efficiencies, reduce costs and improve in-stock levels for customers. A Strategic Supply Chain Integration department has been established to facilitate RDC implementation. This department acts as the custodian of supply chain-related processes and systems by ensuring alignment and optimisation across merchandise, logistics and store operations, with the customer at the centre. Suppliers are being integrated into the RDC network, and many are beginning to appreciate the benefits of using this network (Massmart Annual Report, 2013). "Massdiscounters' reported total sales of R14.8 billion in 2012, an increase of 11%. Comparable sales growth was 4.4% and sales deflation of 3.3% was recorded. By containing comparable expense growth at 6.3%, the company was able to deliver trading profit before tax, excluding foreign exchange movements, of R813 million, a growth of 4.0% on the previous year" (Massmart Annual Report, 2013). This study seeks to determine whether or not this retailer participates in information sharing and collaboration. Understanding of the need to protect information shared by trading partners must also be explored.

2.8 Implementing supply chain collaboration in practice

During Walmart's initial implementation of supply chain collaboration, the retailer struggled to get Procter and Gamble to consider the store-level point of sale demand forecast in its demand plans. The suppliers' attention and focus was on Walmart distribution centre orders. It regarded these centres as the customer, rather than the consumers of its products. Industry experts estimate that Procter and Gamble's sales to Walmart increased from 350 million dollars in 1998

to four billion dollars in 1999 while tripling inventory turns in Walmart stores, as a result of the companies' collaboration (Ireland and Crum, 2005:19-27). Walmart has 10,800 retail units in 27 countries (Walmart, 2013). According to Zentes, Morschett and Schramm-Klein (2011:375) Walmart is one of the largest business groups in the world in terms of turnover and profits. The organisation generates a turnover of 405 billion dollars and a profit of 14.3 billion dollars. Walmart's range focuses on customers' needs and offers significant discounts on product prices in order to expand volumes and increase overall profits. Cost reductions as well as fast reactions to customer wishes with regard to product ranges ensure success. Efficient supply chain management is thus important for Walmart.

2.9 Conclusion

"Industry leaders such as Dell, Cisco and Walmart, are driving the use of supply chain collaboration enabled by technology to transform their supply chains, delivering differentiated capability, value and competitive advantage in the process" (Ireland and Crum, 2005: vii). Effective information sharing requires accuracy and information technology tools. Lack of quality information and rapid and smooth flow of information results in poor decision-making, increased costs, larger stock volumes within the supply chain and overall poor performance. The literature indicates that collaborative planning, forecasting and replenishment and supplier relationship management are key success factors to achievement of joint business partnering with supply chain trading partners.

Figure 2.9.1: Calculating the benefits of Supply Chain Collaboration

Retailers' benefits according to AMR research study
· **Improved products in stock: 2 to 8 percent**
· **Reduced inventory: 10 to 40 percent**
· **Increased sales: 5 to 20 percent**
· **Reduced logistics costs: 3 to 4 percent**
Suppliers' benefits according to AMR research study
· **Reduced inventory: 10 to 40 percent**
· **Increased replenishment cycles: 12 to 30 percent**
· **Increased sales: 2 to 10 percent**
· **Improved customer service: 5 to 10 percent**

Source: Ireland, R.K. and Crum, C. (2005). *Supply chain collaboration- How to implement CPFR and other best collaborative practices.* 1st Edition. Florida: J Ross Publishing Inc.

Figure 2.9.1 illustrates the benefits that retailers and suppliers can expect to reap from supply chain collaboration. Retailers' benefits include improved in-stock, reduced inventory, increased sales and reduced logistics costs. Suppliers' benefits include reduced inventory, increased replenishment cycles, increased sales and improved customer service. "System complexity, trust amongst supply chain partners, system security, good information systems structures and willingness to partner" are all prerequisites for successful CPFR implementation in the retail sector (Buyukozkan and Vardaloglu, 2012: 10438- 10455). SAP ERP systems for new product enhancement and best practices for optimising business processes are successful in implementing SAP supplier relationship management.

According to Varley (2006:54) "ECR (efficient consumer response) relies too heavily on theory with the costs of efficiencies far outweighing the resulting benefits". The new philosophy supports a more analytical approach to product management. The full-scale adoption of category management requires considerable reorganisation within the retailer and has encountered a number of inhibiting factors such as skills shortages (for example, enabling IT management); the difficulties associated with identifying suppliers, allies or partners with whom information should be shared; reluctance to change inappropriate organisational structures; and a lack of clear strategic plans for product ranges. Another concern with category management is the lack of variety offered to customers. A further drawback is the threat to small suppliers; there is a risk that larger suppliers will be able to abuse their power by improving their market share at the cost of other suppliers in a category.

The literature demonstrates that information sharing, visibility and integration are inter-related strategies that should be used effectively to ensure a retail supply chains' success. Relationships should be built and information exchanged; furthermore organisations should adopt clearly defined and well-communicated supply chain strategies. Objectives must be shared with trading partners across the extended enterprise. This requires information systems that are aligned across the trading partners. Clear objectives and processes should also be aligned for mutual benefit. The literature affirms that retailers' promotional activities increase the magnitude of the bullwhip effect and create difficulties in managing the supply chain and due to inaccurate forecasting. A lack of system tools implies that an organisation is unable to effectively share information across internal business divisions, as well as with its trading partners across the supply chain.

CHAPTER THREE
RESEARCH METHODOLOGY AND DATA COLLECTION

3.1 Introduction

This chapter identifies and describes the research design utilised for this research study. According to Kumar (2014:23), "research involves systematic, controlled, rigorous exploration and description of what is not known and establishment of associations and causations that permit the accurate prediction of outcomes under a given set of conditions". The chapter outlines the sampling technique and data collection method employed by the researcher. The questionnaire design is described and the methods used to analyse data are outlined in detail. The methods of assessing reliability of the scale employed are also highlighted.

3.2 Type of design

A research design adopted for this research is exploratory in nature. Cooper and Schindler (2010:143) describe exploratory studies as "loose structures with the objective of discovering future research tasks." The immediate purpose of exploration is usually to develop hypotheses or questions for further research. Given the lack of theory and empirical studies in this field, the exploratory design is an appropriate research method. The first phase of the study provides an extensive literature review which is instrumental in designing the data collection guide. The second phase of the study involves data collection from managers within the retail and manufacturing sector who are well-placed to understand supply chain and business concepts.

3.3 Research approach of the study

The study is quantitative in nature. The quantitative aspect serves to answer questions about the relationships among the variables studied, and derives meaning from the data analysed through the use of statistics, diagrams and tables (Cooper and Schindler, 2010:146). The nature of this study is also discussed in relation to the time horizon as either being longitudinal or cross-sectional. This study is cross-sectional in nature as data is gathered from various managers within the Durban region, eThekweni municipality, Kwazulu Natal province, South Africa; at a single point in time.

3.4 Target population

Castillo (2009) defines the target population as "the entire group of individuals or objects to which researchers are interested in generalising the conclusions. The target population usually has varying characteristics and it is also known as the theoretical population." The target population for this study are specific individuals in the Massdiscounters retail business and the

fifty largest volume suppliers of the organisation; who are in a position to provide pertinent information for the purpose of the study. The target population are based within the Durban region, eThekwini municipality, Kwazulu Natal province.

3.5 Sampling design

The sampling design is defined as the process of selecting the number of units for a study in a way that represents the larger population from which they are selected (Sekaran and Bougie, 2010:266). The research study adopted a non-probability sampling approach. This approach is utilised when "the elements in the population do not have any probabilities attached to their being chosen as sample subjects" (Sekaran, 2003:276). Although this method of sampling does not confidently enable generalisation across the population, since the nature of this study is exploratory; non-probability sampling is a preferred method to provide insight on the research objectives given that research is conducted in the Durban region.

3.6. Type of sample and sample size

According to Sekaran and Bougie (2010:276) the non-probability sampling design attaches no probability to the elements being chosen in the population. Thus the sample cannot confidently infer generalisation to the population. The specific approach employed was purposive sampling in the form of judgment sampling. Sampling was confined to specific individuals in the Massdiscounters retail business and large volume suppliers; who are in a position to provide pertinent information for the purpose of the study. This sampling method has been chosen to obtain as much information possible from managers and suppliers on optimising information sharing with the retailer and their trading partners. The respondents represent a combination of lower, middle and top level management as well as non-managerial personnel such as supervisors.

Table 3.6.1: Population size for the study by job profile

Job profile	Sample size
Corporate buyers	38
Supply/demand planners	30
Store managers	23
Logistics senior managers	5
Executives	6
Directors	4
Supply chain managers	6
Merchandise managers	4
IT managers	13
Store operations	13
Non managerial/Supervisory level	100
Suppliers	50
Total population size	**292**

Source: Compiled by researcher from respondents job profiles

Table 3.6.1 indicates that directors, executives and managers within the corporate office, stores, regional distribution centres and supplier stakeholders comprise the population size of 292. The basis for selection of employees within the retail organisation; is that these individuals are well-placed to answer the questions correctly. This is attributed to their job roles being situated within the divisions which play a key role in the supply chain. Suppliers chosen to participate in the study were selected on the basis of being the largest fifty suppliers who supply goods to the retail distribution centres, in terms of rand value receipts. Table 3.6.2 indicates the corresponding sample size to different population sizes. This study makes reference to these population sizes when determining the target sample size of 165 potential participants from the estimated population size of 292. (smallest distance away from actual N= 290)

Table 3.6.2: Sample size corresponding to different population sizes

Population size (N)	Sample size (n)	Population size (N)	Sample size (n)
10	10	150	108
15	14	160	113
20	19	170	118
25	24	180	123
30	28	190	127
35	32	200	132
40	36	210	136
45	40	220	140
50	44	230	144
55	48	240	148
60	52	250	152
65	56	260	155
70	59	270	159
75	63	280	162
80	66	290	165
85	70	300	169
90	73	320	175
95	76	340	181
100	80	360	186
110	86	380	191
120	92	400	196
130	97	420	201
140	103	440	205

Source: Sahu, P.K. (2013) *Research methodology: A guide for researchers in agricultural science, social science and other related fields.*1st Edition. India: Springer.

Sahu (2013:47) depicts the acceptable sample size corresponding to various population sizes. The research intended to collect 165 completed questionnaires which is the acceptable sample size from the corresponding population size of 292. However the actual number of completed questionnaires received from the target population equates to 143 respondents. The return rate on completed questionnaires is thus 87% based on 143 divided into 165, which forms the basis of an acceptable data set.

3.7 Data collection method

The researcher utilised the survey method of data collection, carried out by means of a self-administered questionnaire. Data was collected by administering questionnaires to employees from Massdiscounters corporate office, stores and regional distribution centres, and key

suppliers. Respondents had been requested to return hard copies or email responses of the completed questionnaire. According to De Vaus (2002), questionnaires are highly structured and provide a straightforward method of obtaining information. Punch (2003) explains that quantitative research is essentially about investigating and understanding how and why variables are related to each other. Kumar (2014:63) notes that one may choose to study either a concept or variable, or both. Concepts can be described as images or perceptions about a topic, while variables are measurable elements within a study. Both primary and secondary data were used to achieve the study's objectives. Secondary data was accessed via textbooks, journals, articles and the internet.

3.8 Questionnaire design

According to Bernard (2000:25-67), a covering letter should form part of the questionnaire. This describes the nature of the study and guarantees confidentiality. The questionnaire for this study included a covering letter. The questionnaire contained closed-ended questions. Jackson (2008:5-10) explains the difference between open-ended questions and closed-ended questions. Open- ended questions request participants to formulate their own responses. Closed-ended questions are those that request that participants choose responses from a limited number of given alternatives.

The questionnaire comprised three sections. Section A posed questions pertaining to the respondents' personal details and frequency of information sharing within the organisation and across the organsiations supply chain. Section B contained dichotomous questions with options of 'Yes' or 'No' answers. Section B pertained to obtaining data on perceptions regarding information sharing, and the impact of information technology systems. Finally, Section C comprised questions based on a Likert scale ranging from 1 = strongly disagree, to 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree; as well as a scale requesting that respondents rank perceived benefits of CPFR from "not at all important" to "extremely important". The Likert scale type questions in Section C pertain to the key variables of the study namely CPFR, supplier relationship management, push versus pull supply chain strategies and category management.

The questionnaire design was strategically structured in order to enable data collection across each independent variable. Kumar (2014:66) describes variables as follows:

- Independent variable: the cause assumed to be responsible for bringing about change in a phenomenon or situation. The independent variables in this study are CPFR, supplier

relationship management; push vs pull distribution strategies and category management.

- Dependent variable: the outcome or change brought about by introduction of an independent variable. The dependent variable identified for the purposes of this research study is information sharing within the Massmart supply chain.

3.9 Description of data collection

This study is exploratory and cross-sectional using employees and suppliers of Massdiscounters as the unit of analysis. The types of statistics used are inferential statistics. According to Leech, Barrett and Morgan (2004:53), inferential statistics make inferences about population values based on the sample data collected and analysed.

3.10 Scales

A scale is a tool used to distinguish individuals on the variables of interest to the study (Sekaran, 2003). There are four types of measurement scales/types of data: nominal, ordinal, interval and ratio. The study adopted nominal and interval scales only. According to McNabb (2004:80-81) “nominal data is simply a naming or classification scale” whereas “a typical use of ordinal data is to measure people’s preferences or rankings for services or things”. In other words ordinal data can be gathered using Likert-scale type questions and interval level data can also be ranked and categorised. For example, while we may not know the exact intervals between the dress sizes of small, medium, large and extra- large; one may establish that there are equal intervals between kilometres per litre when looking at fuel economy (Waxman, 2013:60-80). Interval data is usually numeric. Black (2011:9) noted that ratio-level data have similar characteristics to interval data. However ratio data takes into account numbers to the absolute zero and the number zero cannot be manipulated. Examples of ratio data are productivity measures, weight and volume.

3.11 Research Methods

3.11.1 Univariate

Descriptive statistics involve the transformation of raw data into a form that provides information to describe a set of factors in a given situation. According to Sekaran (2003), the mean is a measure of central tendency that offers a general picture of the data without unnecessarily inundating one with each of the observations in a data set. The mean values were analysed by the researcher. Furthermore, the median, which is the central item in a group of observations when they are arranged in either ascending or descending order was established, based on each variable, and comparisons were made across the outliers. The researcher also

established the variability that exists in a set of observations. Therefore the variance was calculated.

3.11.2 Bivariate

Pearson correlation is a bivariate approach where the relationship between two variables is studied. The researcher assessed the significance level to determine whether or not there is significant correlation between two variables. For example, at the 5% level of significance, the researcher could deduce that 95 times out of 100, there is a significant correlation between the two variables and there is only a 5% chance that the relationship does not exist. The correlation between two variables ranges from -1.0 to +1.0. For the purposes of this study, it is important to understand the strength and direction of the relationship between two continuous variables. Pearson r enables such understanding. For example, the relationship between information sharing and supplier relationship management was tested.

3.11.3 Multivariate

Multiple regression

Whereas the correlation coefficient "r" indicates the strength of the relationship between two variables, it provides no indication of how much the variance in the dependent variable will be explained when several independent variables are theorised to influence it simultaneously (Sekaran, 2003). The researcher tested the influence of the independent variables (collaborative planning, forecasting and replenishment [CPFR], supplier relationship management, push vs pull distribution strategies and category management) on the dependent variable (information sharing). Multiple regression may be used to explore the relationship between one continuous dependent variable and a number of independent variables. The value of R-squared is the amount of variance explained in the dependent variable by the other independent variables (Sekaran, 2003).

According to Beri (2007), a problem that may arise with multiple regression is that some of the independent variables may have a high correlation among themselves. This is the problem of multicollinearity which could render the regression equation unrealistic or inaccurate. The presence of multicollinearity was tested by investigating the correlation (r) between the independent variables. The simplest method used to detect multicollinearity is the correlation matrix, which can be employed to detect whether or not there are large correlations between pairs of explanatory variables. Another approach is to compute the 'tolerance' associated with an independent (predictor) variable. Self and Wymer (1999) advise that when tolerance is small, it is appropriate to discard the variable with the smallest tolerance.

3.12 Assessment of data

It is important to ensure that the research instrument used to measure the variables is able to provide relevant and accurate information. The researcher established the reliability and validity of the measures.

3.12.1 Reliability and Validity

Jackson (2008:67) defines reliability as "an indication of the consistency or stability of a measuring instrument". The reliability of a measure indicates the extent to which it is without bias and therefore ensures consistent measurement across time and across the various items in the instrument. The researcher used Cronbach's alpha. This reliability coefficient indicates how well the items in a set are positively correlated to one another (Sekaran, 2003). It provides a general formula for scale reliability based on internal consistency by providing the lowest estimate of reliability that can be expected for an instrument (Lehman, O' Rourke, Hatcher and Stepanski, 2005:141). The closer Cronbach's alpha is to 1, the higher the internal consistency reliability. There are two methods of validity, which is internal and external validity. Validity tests whether the developed research instrument measures the particular concept that it was intended to measure. The types of validity measures are content validity (relevant for judgement methods), criterion related validity (relevant for correlation); and construct validity which is relevant for judgement, factor analysis, multivariate analysis and correlation analysis (Copper and Schindler, 2010:289).

3.13 Data analysis

The questionnaires were checked to ensure that the respondents had attempted to answer all questions. Thereafter, each question was coded using numerical values. Numerical values were assigned to the responses provided by the target population. SPSS (Statistical Package for the Social Sciences) software was used to aid in the analysis of data. The collected data was entered through the SPSS data entry station and SPSS 20.0 analysed it. Diagrams such as bar charts and and histograms are available methods commonly used to display quantitative data. The advantage of using diagrams is the ease at which one is able to interpret and understand the collated information.

3.14 Conclusion

The data analysis chapter served to outline and explain the research design employed within this research study. Data was collected via a self-administered questionnaire and Sahu (2013) provided an indication of the acceptable sample size corresponding to various population sizes. The nature of the study is thus quantitative and has used only nominal and interval scale data in

an attempt to explore the research objectives. The manner in which data was obtained was described. SPSS software is the tool which has allowed for analysis of data collected from respondents. Univariate data such as mean, median and variance will be depicted in the following chapter. The study also requires a detailed analysis and interpretation of the relationship between variables as well as the strength of the relationship between variables. As a result multiple regression analysis has been employed. The following chapter will analyse and interpret the data collected from the respondents; with the aim of achieving the research objectives previously mentioned.

CHAPTER FOUR
DATA ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter presents the results of this quantitative research study. One hundred and forty three respondents participated in the research study, and a questionnaire (which may be referred to in the Appendices section- Appendix B) was used as the survey instrument to collect data. The Statistical Package for Social Sciences (SPSS) was utilised to analyse data such as correlation coefficients, mean values and standard deviations. In addition to measures of central tendency, multiple regression analysis was employed to understand the relationship between information sharing, which acts as the dependant variable; and the independent variables in the study. For the purposes of this particular study, the research objectives were defined as follows:

4.1.1 To examine the extent to which optimised information sharing enhances integrated supply chain activities across the extended enterprise.

4.1.2 To establish the magnitude of supply chain value-added performance outcomes in the Collaborative Planning, Forecasting and Replenishment (CPFR) model across functions and across enterprises.

4.1.3 To understand the role of electronically-enabled information sharing tools in an integrated, yet effective supply chain structure

The study yielded interesting evidence in relation to each research objective. The questionnaires were administered to the target population of 292 (refer to table 3.6.1). The sample included corporate buyers, supply and demand planners, logistics managers, supply chain managers, store managers, the key suppliers and executives of the retail organisation.

4.2 Characteristics of the sample composition

The following section provides a description of the sample composition of the study. The gender, number of years employed and job status of the respondents who participated in the study are analysed.

Table 4.2.1: Gender

Gender	Frequency	Percent
Female	62	43.4%
Male	81	56.6%
Total	**143**	**100%**

Table 4.2.1 shows that 56.6% of the respondents are male, while 43.4% are female. The gender analysis presented above shows that there is fairly proportionate gender representation in this study.

Table 4.2.2: Number of years employed

Category of years	Frequency	Percent
Less than 1	14	10%
1-3	35	24%
4-6	32	23%
7-10	42	29%
Over 10	20	14%
Total	**143**	**100%**

Table 4.2.2 analyses the number of years the respondents have been employed within the organisation. It shows that 29% of the respondents had been employed within Massdiscounters for 7-10 years, 14% for more than 10 years; 23% of the respondents have been employed within the organisation for 4-6 years; and 24% of the respondents have been employed at Massdiscounters for 1-3 years. Only 10% of the respondents had been employed within Massdiscounters for less than a year. It can therefore be assumed that the respondents have sufficient experience to provide accurate responses to the survey instrument, and have an in-depth understanding of the concepts.

Table 4.2.3: Job Status

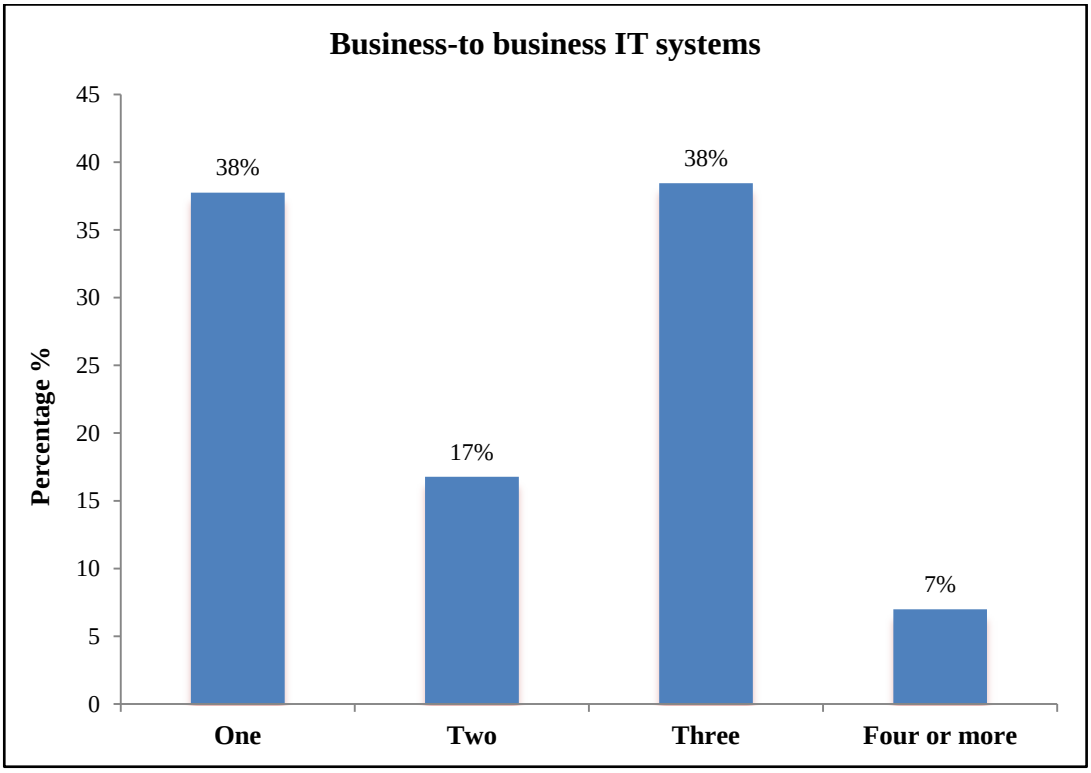
Job status categories	Frequency	Percent
Top management	18	13%
Middle management	68	47%
First-level	21	15%
Non-managerial	36	25%
Total	**143**	**100%**

Table 4.2.3 shows that 47% of the sample composition is employed at middle management level; 25% of the respondents are non-managerial employees; 15% of the respondents are at junior management level; and 13% of the sample comprises top-level/senior managers within Massdiscounters.

4.3 Analysis of Perceptions of Information Sharing

The following section presents the analysis of perceptions of the respondents in relation to various information sharing elements.

Figure 4.3.1: Business-to-business information technology systems



The survey question sought to establish the number of business-to-business (B2B) information technology systems that were implemented in the organisation during the past five years. Figure 4.3.1 shows that 38% of the respondents indicated that only one B2B information system had been implemented within Massdiscounters within the past five years, while 17% of the respondents affirm that two such systems were implemented; 38% of the respondents stated that two or more information systems had been implemented in the past five years and 7% of the respondents indicated that four or more information systems had been implemented within the organisation in the past five years.

Figure 4.3.2: Information sharing across departments

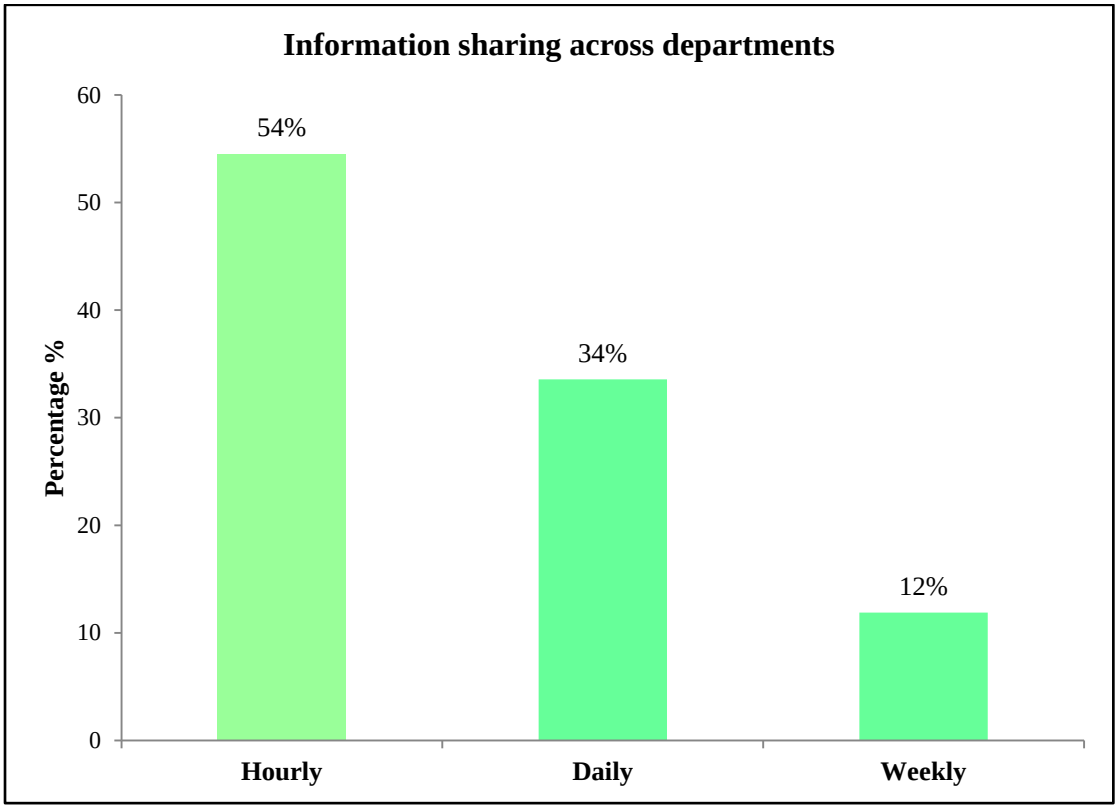


Figure 4.3.2 depicts the responses to question 5 of the survey instrument which seeks to ascertain how often information is shared across departments. The respondents were given five options:

- Hourly
- Daily
- Weekly
- Monthly OR
- Less than 12 times a year

Figure 4.3.2 shows that 54% of the respondents agreed that information is shared across departments hourly; 34% of respondents indicated that information is shared across departments

daily; while 12% of the respondents stated that information is shared across departments weekly. No respondents indicated that information is shared across departments "monthly" or "less than 12 times a year".

Figure 4.3.3: Information sharing across enterprises

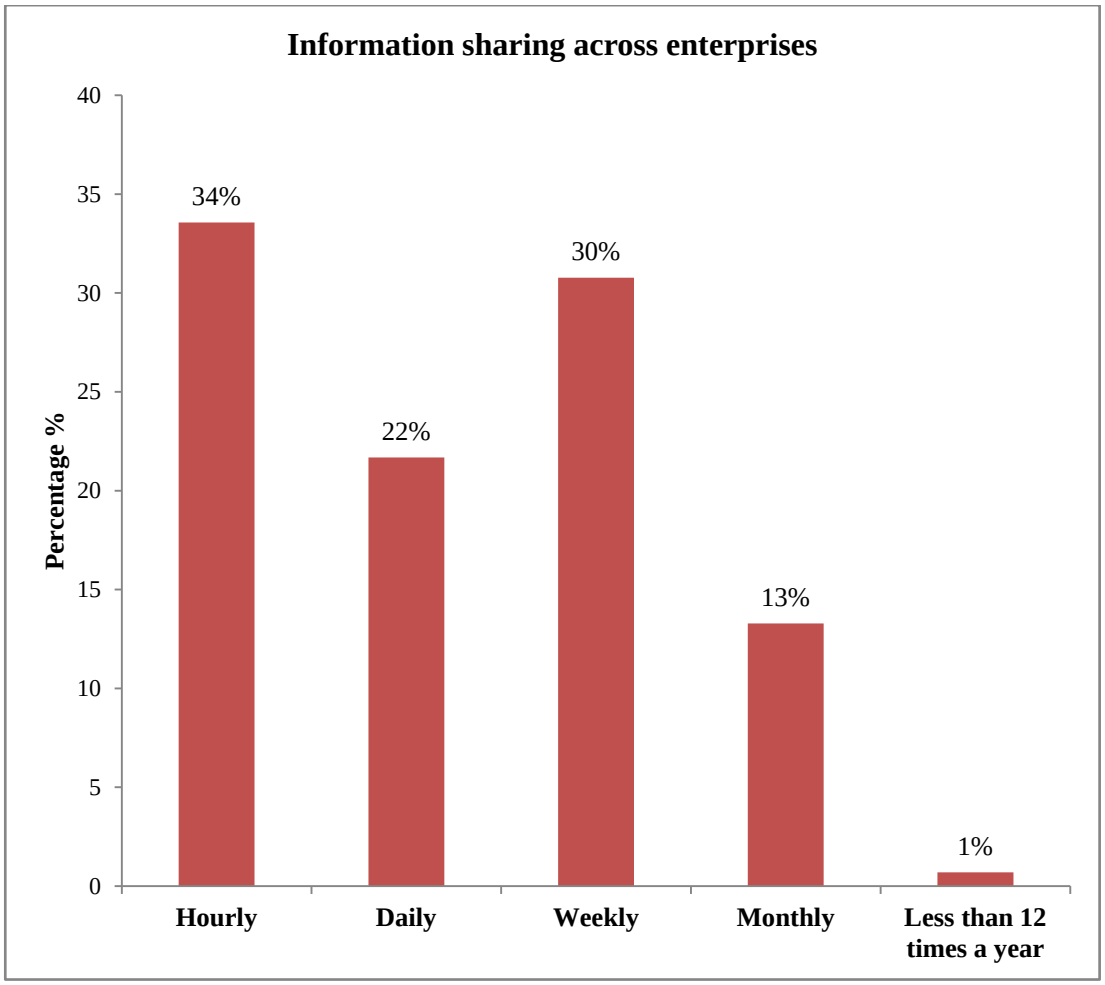
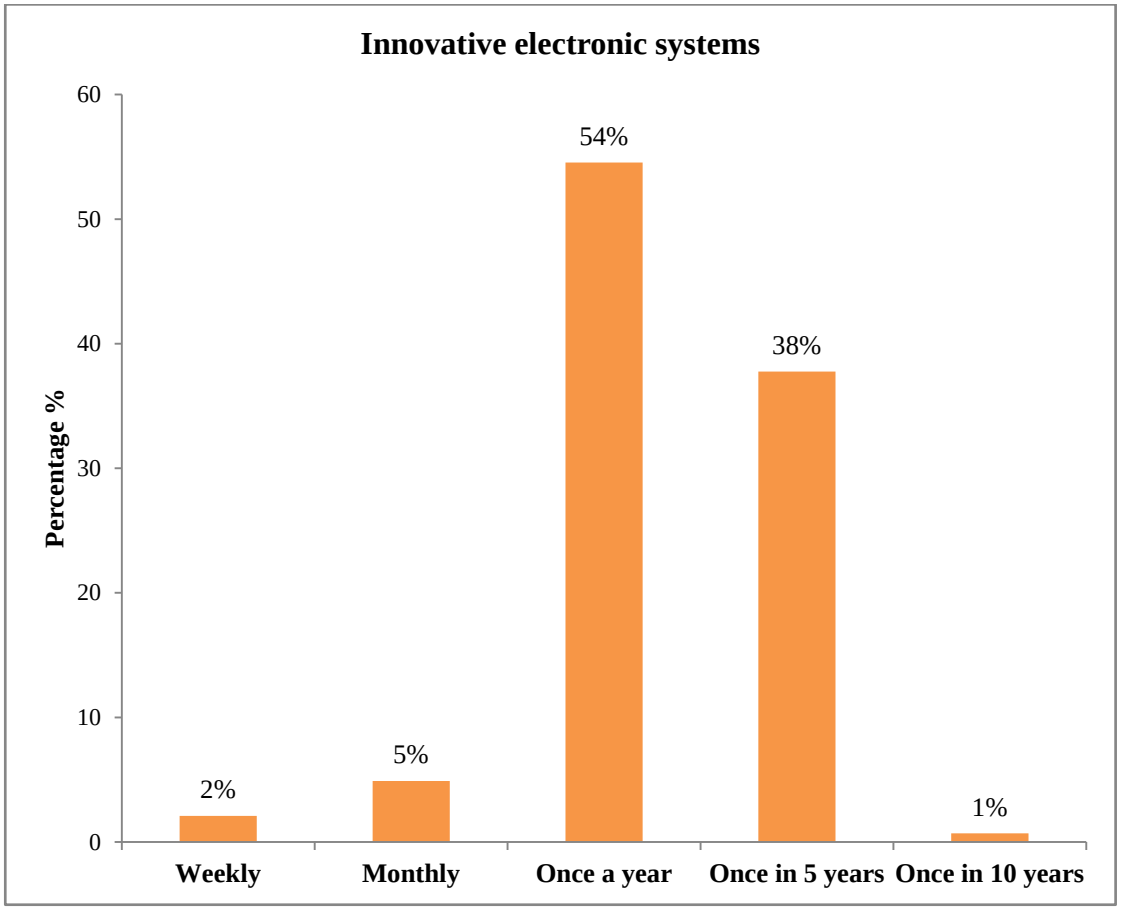


Figure 4.3.3 provides insight into the frequency of information sharing across enterprises. Thirty four percent of the respondents indicated that Massdiscounters shares information with other enterprises hourly, 22% of the respondents stated that Massdiscounters shares information with other enterprises daily and 30% of the respondents validated that information is shared across enterprises weekly. Thirteen percent of the respondents stated that Massdiscounters shares information across enterprises monthly while the remaining 1% indicated that information is shared across enterprises less than 12 times a year.

Figure 4.3.4: Innovative electronic systems

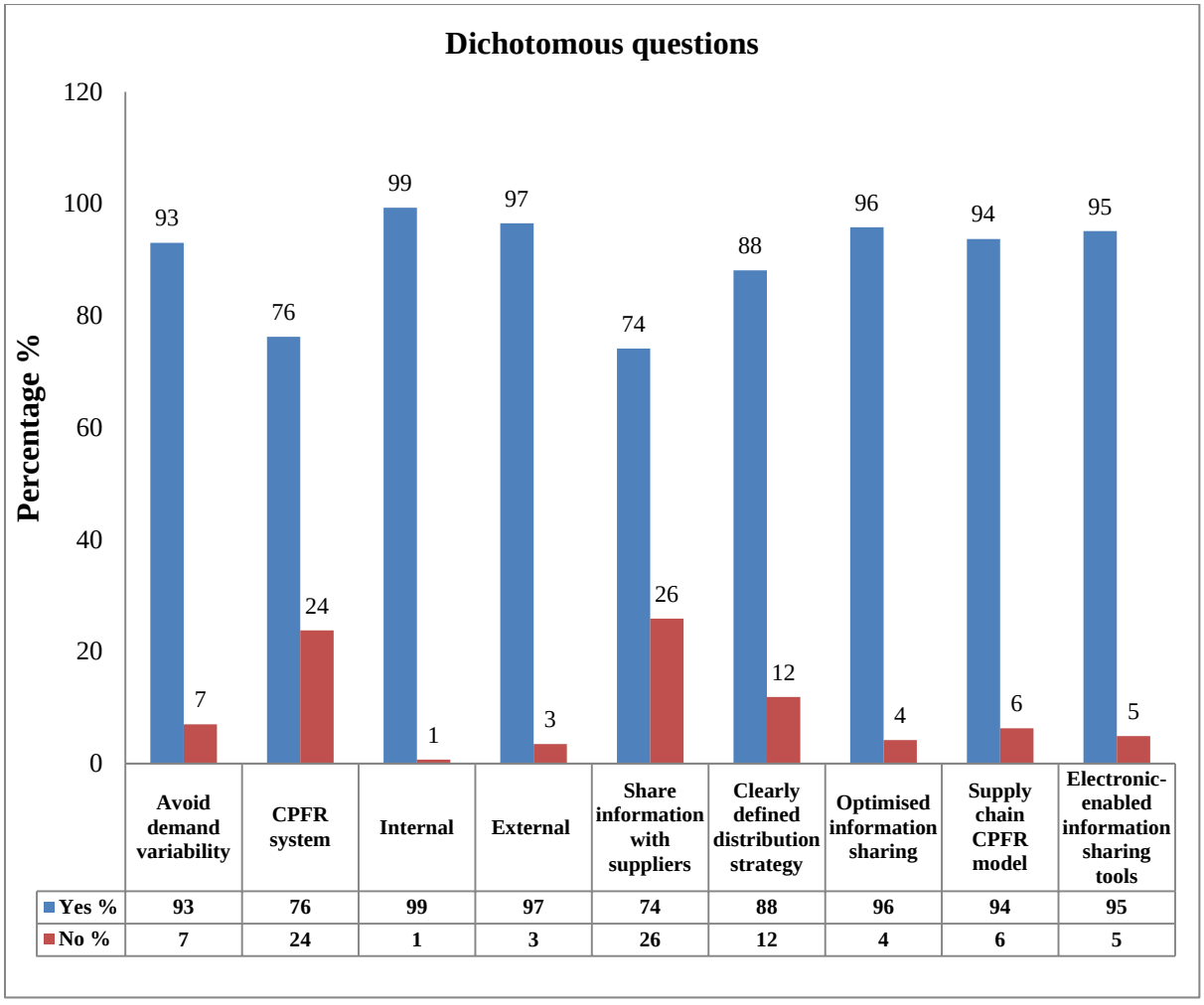


The survey instrument also sought to determine how often Massdiscounters introduces and implements innovative electronic systems. The respondents were given the option to choose either weekly, monthly, once a year, once in five years, or once in 10 years. Figure 4.3.4 shows that more than half of the respondents (54%) indicated that Massdiscounters implements innovative electronic systems once in a year; while 38% of respondents stated that innovative electronic systems are implemented once in five years. Only 1% of the respondents state that the organisation implements innovative electronic systems once in 10 years; 2% of those who participated in the study indicated that innovative electronic systems are implemented weekly. The remaining 5% of respondents affirmed that innovative electronic systems are implemented by the organisation on a monthly basis.

4.4 Dichotomous questions relating to information sharing and CPFR

Bajpai (2011:75) observes that "dichotomous questions have only two response alternatives usually presenting the two extremes of yes or no". Figure 4.4.1 presents the analysis of responses collected from respondents in relation to dichotomous variables within the research instrument. This section of the questionnaire gauged Massdiscounters employees' and suppliers' perceptions of information sharing and systems.

Figure 4.4.1: Dichotomous (Yes or No) questions relating to information sharing and CPFR



	Avoid demand variability	CPFR system	Internal	External	Share information with suppliers	Clearly defined distribution strategy	Optimised information sharing	Supply chain CPFR model	Electronic-enabled information sharing tools
Yes %	93	76	99	97	74	88	96	94	95
No %	7	24	1	3	26	12	4	6	5

Figure 4.4.1 depicts the responses to the dichotomous questions posed to the respondents. Table 4.4.2 provides a list of all dichotomous variables contained in Figure 4.4.1 and the statement represented by each of these variables.

Table 4.4.2: Dichotomous variables

Statement presented to the respondents	Variable
The organisation does share information with upstream supply chain partners in order to avoid demand variability	Avoid demand variability
The organisation does make use of CPFR systems to enhance Supply Chain partnering	CPFR systems
The organisation does believe that internal collaboration (within the various business divisions) has value- adding outcomes by reducing cost and improving efficiency	Internal
The organisation does believe that external collaboration (with and among trading partners such as suppliers, distributors and 3PLs) has value-adding outcomes to mitigate demand variability	External
The organisation does share information with and access information from suppliers prior to making any strategic decisions	Share information with suppliers
The organisation does have a clearly defined distribution strategy (centralised vs decentralised supply chain model)	Clearly defined distribution strategy
Optimised information sharing enhances integrated supply chain activities across the extended enterprises	Optimised information sharing
The magnitude of supply chain value-added performance outcomes are supported by a CPFR model across functions and enterprises	Supply chain CPFR model
Electronically-enabled information sharing tools enhance integration, co-ordination and collaboration in supply chain networks	Electronically-enabled information sharing tools

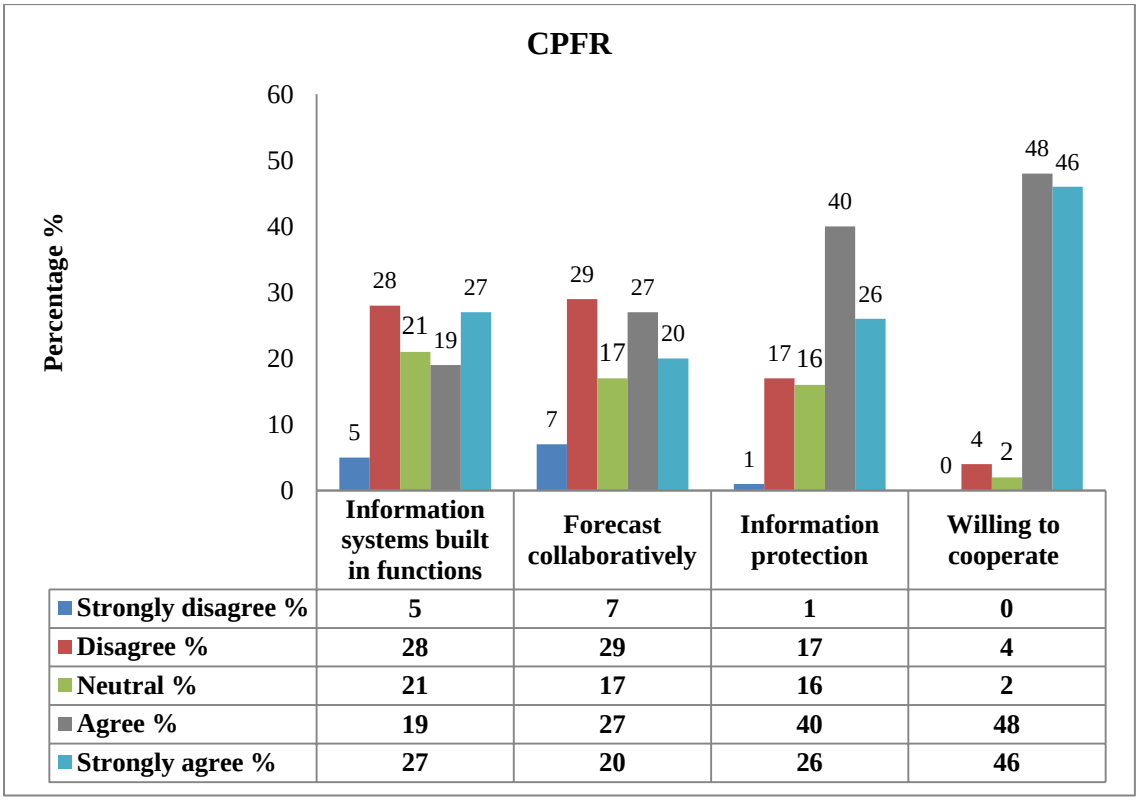
Figure 4.4.1 shows that 93% of the respondents stated that Massdiscounters shares information with upstream supply chain partners in order to avoid demand variability; while 7% of the respondents negate this. Furthermore, 76% of the respondents confirmed that the organisation uses CPFR systems to enhance supply chain partnering, while 24% of participants disagreed with this statement.

Ninety nine percent of the respondents believe that internal collaboration produces value-adding outcomes by reducing cost and improving efficiency and 74% of the respondents indicated that Massdiscounters shares information with, and accesses information from suppliers prior to making any strategic decisions. Figure 4.4.1 shows that 95% of the respondents indicated that optimised information sharing systems do enhance integrated supply chain activities across

extended enterprises and that electronically-enabled information sharing CPFR tools enhance integration and collaboration in supply chain networks.

4.5 Likert Scale analysis

Figure 4.5.1: Collaborative Planning, Forecasting and Replenishment

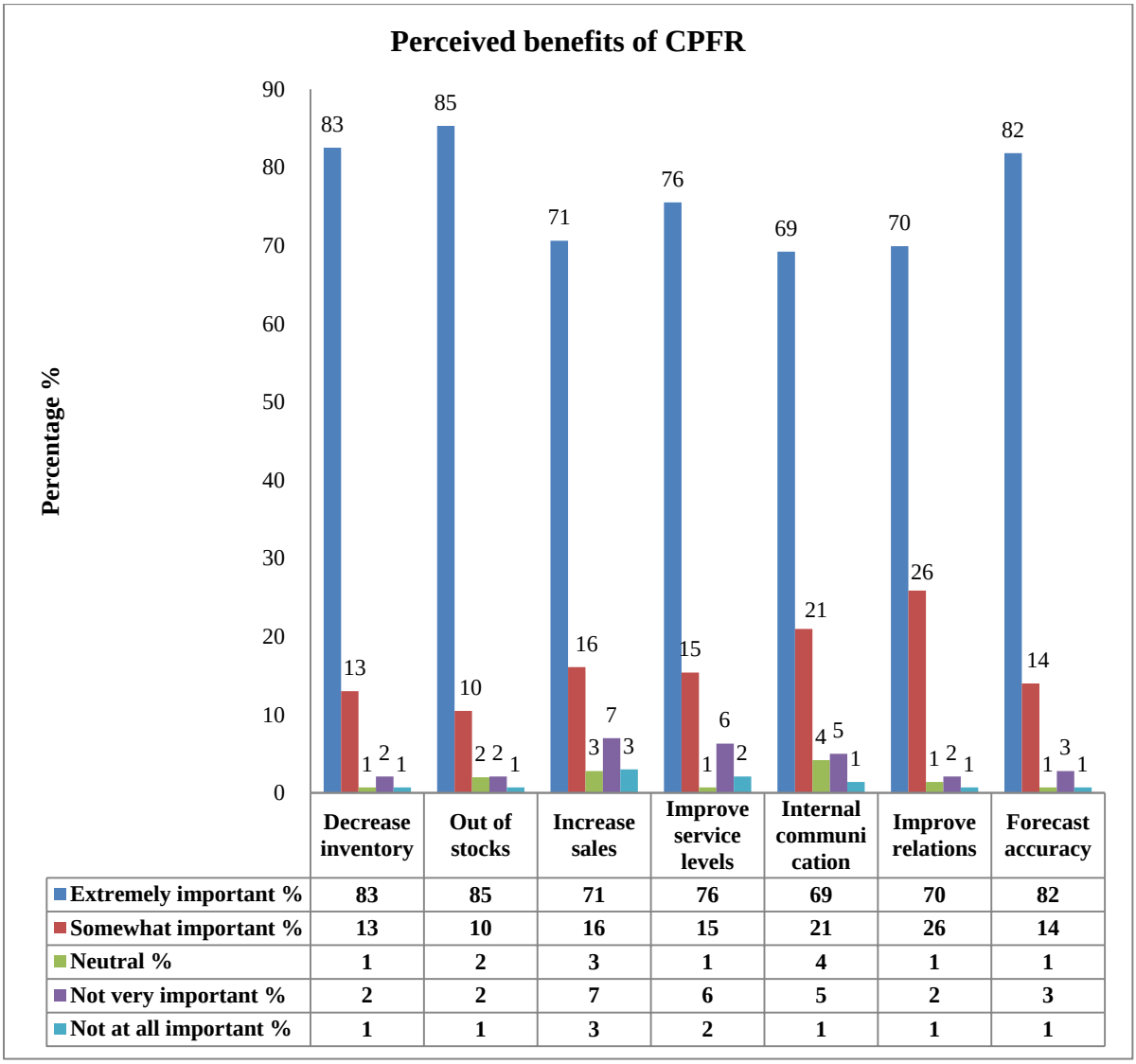


	Information systems built in functions	Forecast collaboratively	Information protection	Willing to cooperate
Strongly disagree %	5	7	1	0
Disagree %	28	29	17	4
Neutral %	21	17	16	2
Agree %	19	27	40	48
Strongly agree %	27	20	26	46

Figure 4.5.1 illustrates the responses to the first sub-section in Section C of the survey instrument where questions were based on a Likert scale. Twenty seven percent of the respondents strongly agreed that the organisation's information systems have built-in functions that facilitate collaboration with supply chain trading partners while 19% of the respondents agreed with the statement. However, 28% of the respondents disagreed that the organisation's information systems have built-in functions that facilitate collaboration with trading partners; and a significant 21% of participants remained neutral. Twenty nine percent of the respondents disagree (7% of respondents strongly disagreed) that the organisation is able to forecast and plan collaboratively with supply chain partners through integrated information systems, with 27% agreeing with this statement. Twenty percent of the respondents strongly agreed that the organisation is able to forecast and plan collaboratively with supply chain partners. The figure shows that 40% of the respondents agreed that the organisation has a high degree of understanding with supply chain partners about protecting exchanged business information (26% strongly agree); while 17% disagreed with this statement (1% strongly disagree) and 16%

of the respondents remained neutral. An overwhelming 94% of the respondents agreed that Massdiscounters shows a high degree of willingness to cooperate in business activities with its trading partners; only 4% disagreed and 2% of the respondents remained neutral.

Figure 4.5.2: Ranking Perceived Benefits of CPFR

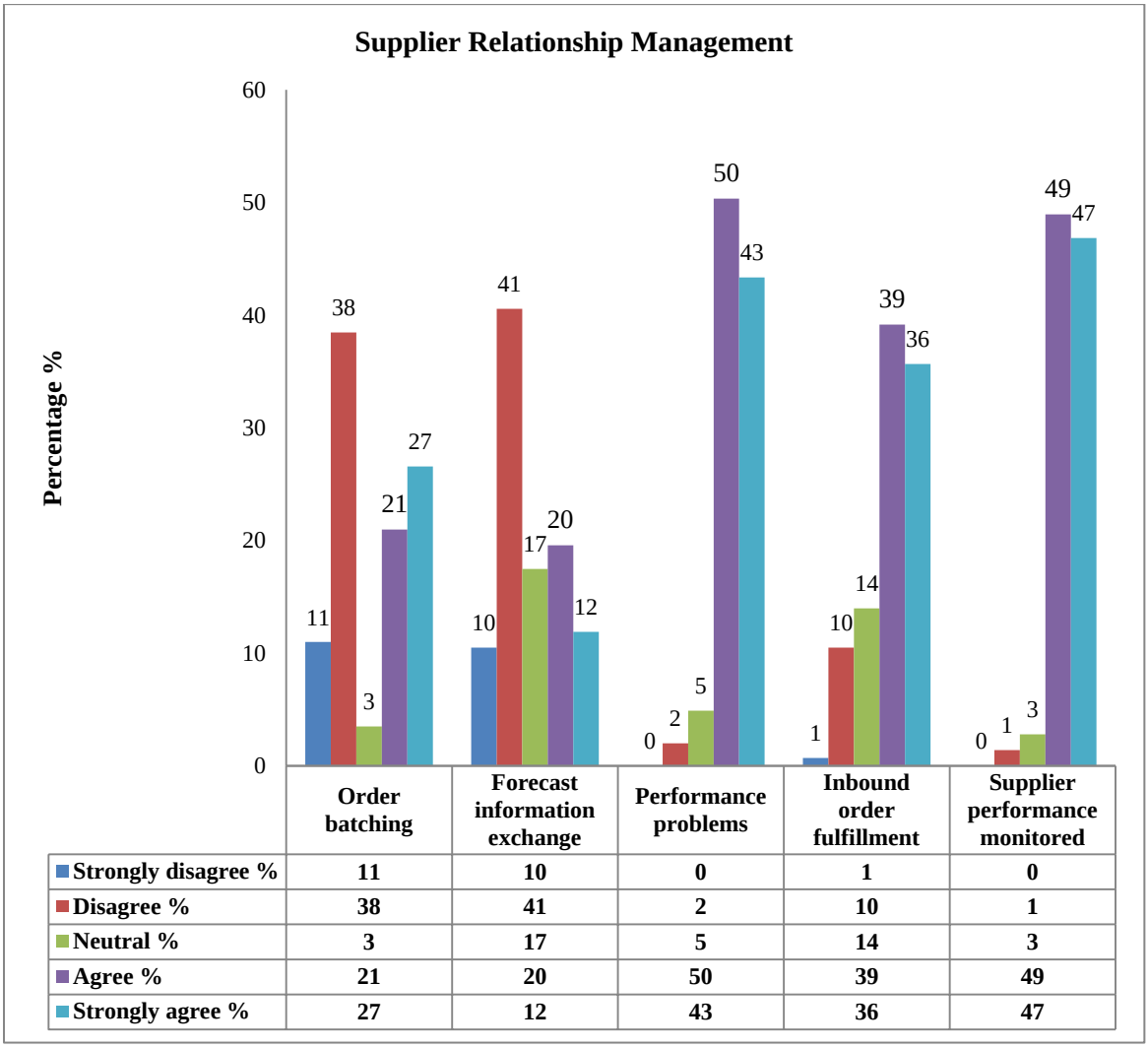


	Decrease inventory	Out of stocks	Increase sales	Improve service levels	Internal communi cation	Improve relations	Forecast accuracy
Extremely important %	83	85	71	76	69	70	82
Somewhat important %	13	10	16	15	21	26	14
Neutral %	1	2	3	1	4	1	1
Not very important %	2	2	7	6	5	2	3
Not at all important %	1	1	3	2	1	1	1

Figure 4.5.2 illustrates the respondents' perceptions of the benefits of CPFR practices. Eighty three percent of the respondents indicated that reduced inventory levels is an extremely important benefit resulting from CPFR, 13% of the respondents consider reduced stock levels as somewhat important while 1% of the respondents indicated that decrease in inventory is not at all important (as a benefit resulting from CPFR). Eighty five percent of the participants rated CPFR as extremely important in reducing out-of-stocks, 10% indicated that reduced out-of-stocks is somewhat of an important benefit of CPFR, and 1 % of the respondents stated that reduction in out-of-stocks is not an important benefit of CPFR practices. Seventy one percent of the respondents indicated that CPFR is extremely important in increasing sales. 69% of the

respondents consider internal communication to be an extremely important factor in CPFR, 70% indicated that improving relations is extremely important and 82% of the respondents stated that CPFR is extremely important in achieving forecast accuracy.

Figure 4.5.3: Supplier Relationship Management

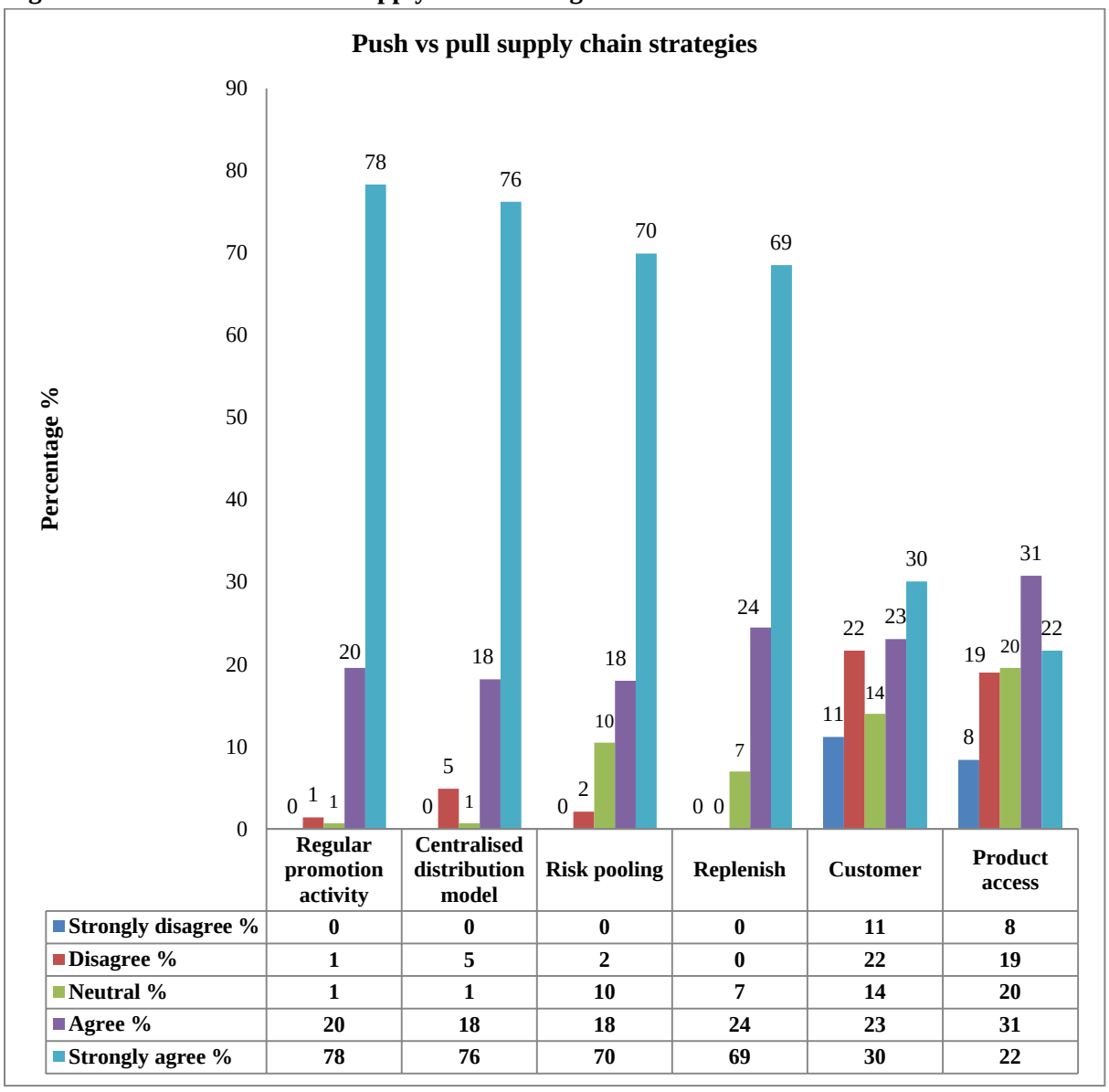


	Order batching	Forecast information exchange	Performance problems	Inbound order fulfillment	Supplier performance monitored
Strongly disagree %	11	10	0	1	0
Disagree %	38	41	2	10	1
Neutral %	3	17	5	14	3
Agree %	21	20	50	39	49
Strongly agree %	27	12	43	36	47

Figure 4.5.3 provides insight into supplier relationship management at Massdiscounters. The figure shows that 27% of the respondents strongly agreed that the organisation makes use of order batching; while 21% of the respondents agreed with this statement. Thirty eight percent of the respondents disagreed that Massdiscounters uses order batching, with 3% of participants remaining neutral and 11% of the respondents strongly disagreed. Twenty percent of the respondents agreed that there is mutual exchange of information with trading partners regarding production, forecasts and plans, 12% of respondents strongly agreed; while 17% of the respondents remained neutral. Forty one percent of respondents disagreed that there is mutual exchange of information with trading partners regarding production, forecasts and plans and a further 10% of the respondents strongly disagreed that there is mutual exchange of information

with trading partners. However, an overwhelming 93% of the respondents agreed that suppliers and retailers are committed to flexibility and solving performance problems, with 5% remaining neutral and only 2% of respondents disagreeing with this statement. The figure also shows that 36% of the respondents strongly agreed that order fulfillment for inbound deliveries at RDCs are at a satisfactory level, 39% of the respondents agreed with the statement; while 10% disagreed and 14% of all participants remained neutral. Finally, a significant 96% of the respondents indicated that suppliers' performance is monitored on an on-going basis, with only 1% disagreeing and 3% remaining neutral.

Figure 4.5.4: Push versus Pull supply chain strategies



	Regular promotion activity	Centralised distribution model	Risk pooling	Replenish	Customer	Product access
Strongly disagree %	0	0	0	0	11	8
Disagree %	1	5	2	0	22	19
Neutral %	1	1	10	7	14	20
Agree %	20	18	18	24	23	31
Strongly agree %	78	76	70	69	30	22

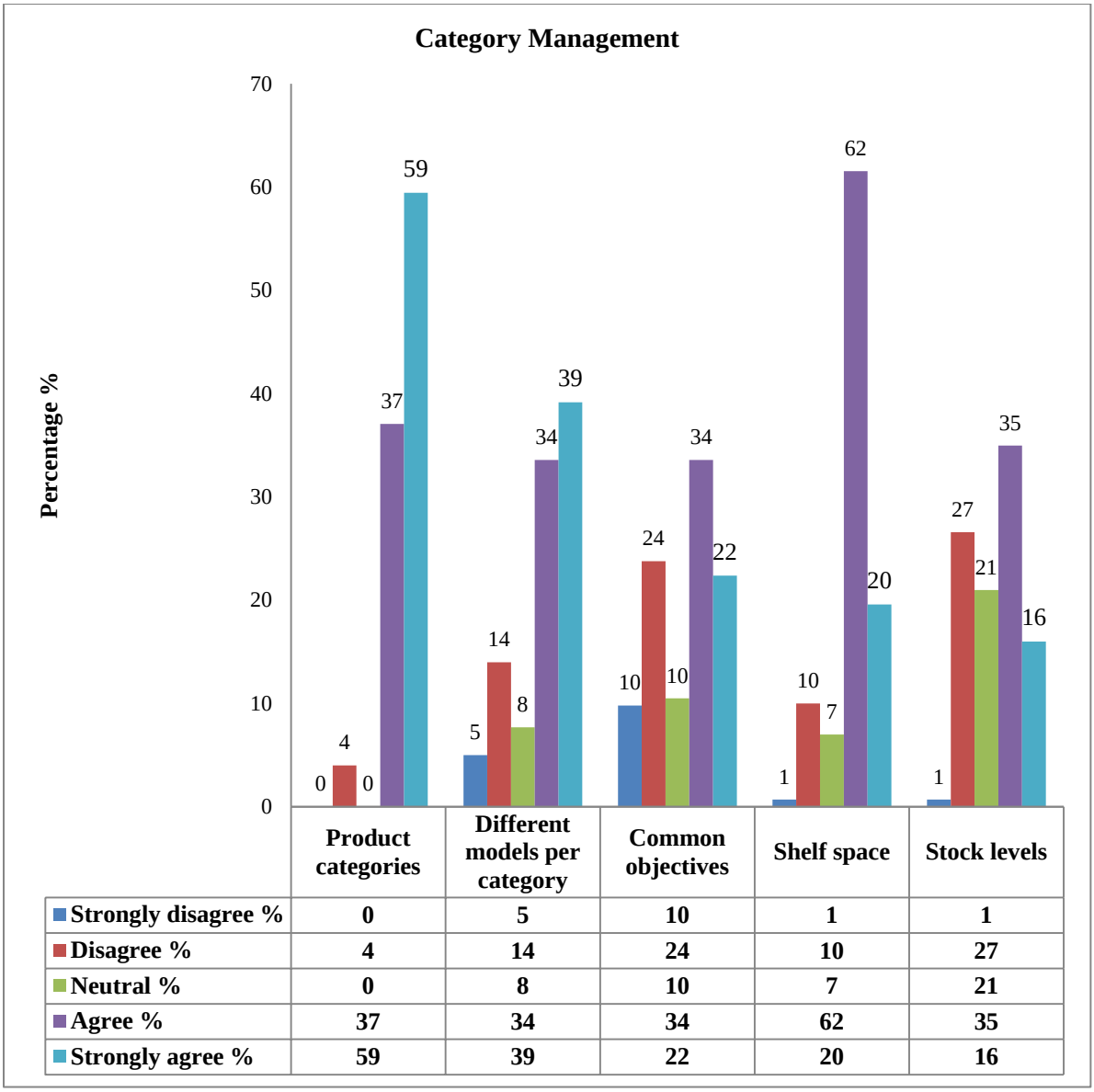
Figure 4.5.4 illustrates the supply chain distribution strategy applied by the retailer. It shows that 78% of the respondents strongly agree that the organisation encourages regular promotional

activity, 20% agreed with this statement and 1% of the respondents remained neutral. Only 1% of the respondents disagreed that the organisation encourages regular promotional activity. Seventy six percent of the respondents strongly agreed that Massdiscounters uses a centralised distribution model in its supply chain, 18% of participants agreed with the statement and 5% of the respondents disagreed that Massdiscounters uses a centralised distribution model in its supply chain.

In addition, the study sought to ascertain Massdiscounters employees' perceptions of risk pooling. Figure 4.5.4 shows that 70% of the respondents agree that risk pooling is an advantage of a centralised distribution strategy, 18% of respondents agreed and 10% remained neutral. Only 2% of the respondents disagreed that risk pooling is an advantage of centralised distribution strategy.

Furthermore, the figure shows that 69% of the respondents strongly agreed that Massdiscounters replenishes stock from RDC to store, 24 % of the respondents agreed with the statement; while none of the respondents disagreed with this statement. Thirty percent of the respondents strongly agreed that the regional distribution centres always hold the acceptable level of the right product to satisfy customers' requirements; while 23% agreed; 14% of the respondents were neutral and 33% of the participants in this study disagreed that RDCs always hold acceptable levels of the right product to satisfy customers' requirements. Twenty two percent of the respondents strongly agreed that consumers are able to easily access the product they are looking to purchase at the retail store; with 31% and 19% agreeing and disagreeing with this statement, respectively and 20% of the respondents remaining neutral.

Figure 4.5.5: Category Management



	Product categories	Different models per category	Common objectives	Shelf space	Stock levels
Strongly disagree %	0	5	10	1	1
Disagree %	4	14	24	10	27
Neutral %	0	8	10	7	21
Agree %	37	34	34	62	35
Strongly agree %	59	39	22	20	16

Figure 4.5.5 depicts the respondents' perceptions of category management. It shows that 59% of the respondents strongly agreed that product categories are clearly distinguished, 37% of the respondents agreed; while 4% of the respondents disagreed that product categories are clearly distinguished. Furthermore 39% of the respondents strongly agreed that different supply chain models are used to manage each product category, 34% agreed; while 14% of the respondents disagreed with this statement. 5% of the respondents disagree that different supply chain models are used to manage each product category. Twenty two percent of the respondents strongly agreed that the various departmental teams do work towards common supply chain goals and objectives, 34% of the respondents agreed with the statement, while 24% of the respondents disagree that the various departmental teams do work towards common supply chain goals and objectives and 10% of the respondents disagree with the statement.

The analysis of the data on Figure 4.5.5 illustrates that 62% of the respondents agreed that store shelf space is allocated to a product category based on the rate of sale of that product, while 10% of the respondents disagreed with this statement. Furthermore 16% of the respondents strongly agreed that each retail store has optimal levels of stock per product category, 35% of the respondents agree that each retail store has optimal levels of stock per product category while 27% of the respondents disagreed and 21% of the respondents chose to remain neutral.

4.6. Electronic information sharing systems used within the organisation

Table 4.6.1: Electronic information sharing systems used by the organisation to share information with supply chain trading partners

Systems	Using	Recommended
Extranet (SAP)	15	29
Electronic Data Interchange (EDI)	19	-
In-house system	58	2
Integrated Electronic Supply chain Management (e-scm)	1	-
Enterprises Resource Planning (ERP)	6	3
E-mail (E- fulfillment, E-Procurement)	89	-
Radio Frequency Identification Device (RFID)	9	13
B2C e-commerce (Customer relationship management systems)	-	16
E-Business Collaboration (Supplier relationship management systems)	-	23
Point-of-Sale (POS)	49	-
E-marketplace	-	-
Electronic Collaboration Forecasting Planning and Replenishment	4	4
Enterprise Application Integration (EAI)	-	-
SAP Advanced Planner and Optimiser (SAP APO)	-	3
Other:	JDA	Promotion Optimiser

Table 4.6.1 illustrates the results of the data collected from respondents who provided an indication of information systems that are used by the organisation to share information with supply chain trading partners. Fifteen of the respondents indicated that the organisation is using the SAP system, while 29 recommended the SAP system. One may therefore deduce that various features of SAP are currently used, but the system is not fully implemented. Forty nine

respondents indicated that the organisation does utilise a POS system. The table further shows that in-house systems are currently used to share information, although a considerable number of respondents recommended the use of ERP, RFID, B2C e-commerce, E-business collaboration, electronic collaboration forecasting planning and replenishment and SAP Advanced Planner and Optimiser.

4.7 Measures of central tendency

According to Longnecker (2010:78-81), "the two most common numerical descriptive measures are measures of central tendency and measures of variability. Among the measures of central tendency are mode (the measurement that occurs most frequently); median (the middle value when data is arranged from lowest to highest) and the mean (average value within the dataset)".

4.7.1 Descriptive statistics

Table 4.7.1.1 indicates the descriptive statistics for the independent variables of the research instrument. All variables have a corresponding minimum of "1" and a maximum of "5".

Table 4.7.1.1: Descriptive statistics

Variable	N	Mean	Std. Deviation
Regular promotional activity	143	4.7552	0.52025
Centralised distribution model	143	4.6783	0.68794
Replenishment	143	4.6014	0.65154
Risk pooling	143	4.5524	0.76617
Product categories	143	4.5245	0.68002
Supplier performance monitored	143	4.4126	0.62041
Willing to cooperate	143	4.3846	0.72114
Performance problems	143	4.3566	0.64356
Inbound order fulfilment	143	3.986	0.99283
Shelf space	143	3.8881	0.87295
Different models per category	143	3.8671	1.2347
Information protection	143	3.7343	1.08089
Stock levels	143	3.4126	1.07683
Customer requirements	143	3.3916	1.39937
Product access	143	3.3706	1.24854
Common objectives	143	3.3706	1.31983

Information systems built in functions	143	3.3566	1.28044
Forecast collaboratively	143	3.2308	1.25985
Order batching	143	3.1469	1.43869
Forecast information exchange	143	2.8392	1.22561
Valid N (listwise)	**143**		

The frequency distribution in Table 4.7.1.1 illustrates that the large majority of respondents agree that the organisation conducts regular promotional activities (m=4.7552 and standard deviation= 0.52). The second highest mean value (m=4.6783 and standard deviation= 0.687) indicates that organisations coordinate their activities by making use of the central supply chain distribution model. Stock is replenished directly from RDC to store as per the mean value of 4.6014 and the respondents agreed that risk pooling is an advantage of a centralised distribution strategy. The mean value of 4.5245 shows that product categories are clearly distinguished at Massdiscounters. The respondents indicated that supplier performance is monitored on an ongoing basis (m= 4.4126 and standard deviation= 0.62) showing that the retailer demonstrates a high degree of willingness to cooperate with their trading partners in business activities (m=4.3846 and standard deviation= 0.72). The respondents affirmed that both suppliers and the retailer are committed to flexibility and solving performance problems, as indicated by the mean value of 4.3566. The mean value of 3.986 indicates that respondents agree that inbound order fulfillment at RDCs are at a satisfactory level and that shelf space at stores is allocated to a product category based on the rate of sale of that product (m= 3.8881). The mean value of 3.8671 indicates that different supply chain models are used to manage each product category.

Furthermore, the respondents agreed that the organisation has a high degree of common understanding with supply chain partners about protecting business information that is exchanged (m= 3.7343 and standard deviation= 1.08). The mean value of 3.4126 denotes that respondents remained neutral on whether or not each retail store has optimal levels of stock per product category. This may be viewed in relation to the respondents' neutrality on whether or not RDCs always hold the acceptable amount of the right product, to satisfy customers' requirements (m= 3.3916). The respondents could not affirm that consumers are able to easily access the product they are looking to purchase at the retail store (denoted by a mean value of 3.3706). The mean of 3.3706 shows that the respondents neither agreed nor disagreed that, the various product teams work towards common supply chain goals and objectives.

There was no overwhelming evidence that the organisation's information systems have built in functions which facilitate collaboration with supply chain trading partners (m= 3.3566); and

there is no data to affirm that the organisation is able to forecast and plan collaboratively with supply chain partners through integrated information systems (m= 3.2308). The mean value for order batching is 3.14, which indicates that there is no convincing evidence that the organisation uses order batching. The variable “forecast information exchange” has a minimum value of 1 and a maximum value of 5. This implies that there were respondents who both strongly agreed and strongly disagreed that there is mutual exchange of information (with trading partners) regarding production, forecasts, plans and schedule requirements. The mean value of 2.8 indicates that there is disagreement that forecast and planning information is exchanged with trading partners. This is a critical activity in an effective supply chain; hence this variable therefore requires further detailed investigation.

4.8 Inferential Statistics

In order to achieve the objectives of this research study, it is critical to establish correlation between and among the variables. According to Urdan (2005:20-29), correlation coefficients possess two fundamental characteristics. Firstly the direction of the relationship between two variables may be positive or negative. Secondly, the strength or magnitude of the variables may range from -1.00 to +1.00. The closer the correlation coefficient is to either -1.00 or +1.00, the stronger the relationship.

4.8.1 Pearson correlation coefficient analysis

Table A.5 (refer Appendices) shows the relationship between the dependant variable and those variables categorised within the CPFR section of the questionnaire. Information systems’ built-in functions and forecast collaboratively display strength in the relationship as the correlation coefficient is 0.83. Furthermore the relationship is positive.

Table A.5 further indicates that information systems’ built-in functions and information protection depict a strong positive correlation of 0.69. One may thus infer that in order for an organisations’ information systems to have built-in functions which facilitate collaboration with trading partners, there must be sound understanding and trust in information protection. This result concurs with the findings in the literature. Information sharing and willingness to cooperate show a fairly strong positive correlation of 0.53. This is also supported by the literature, which leads the researcher to conclude that a high level of understanding of the need to protect exchanged business information is a prerequisite for trading partners’ cooperation in business activities. Order batching does not display a relationship with forecast information exchange, performance problems; inbound order fulfilment or supplier performance.

The correlation coefficient of 0.69 depicts a positive and strong relationship between performance problems and inbound order fulfilment, indicating that the trading partners must solve performance problems on both the retail and supply side in order for inbound order fulfilment to be at satisfactory level. There is a positive relationship between performance problems and supplier performance monitored as depicted by the coefficient value of 0.68. Suppliers' performance should be monitored on an on-going basis in order for suppliers and retailers to solve performance problems. This finding is also supported by the literature.

The theory suggests that centralised distribution models are extremely effective. The correlation coefficient of -0.56 between optimised information sharing and centralised distribution model is therefore interesting. Clearly, the two variables have a dependency on each other. However the research study must explain how information sharing and a centralised distribution strategy relate to supply chain collaboration and optimisation. Regular promotional activity displays a fairly strong relationship with centralised distribution model, risk pooling and replenishment. The correlation coefficient of 0.53 indicates a fairly strong relationship between customer requirements and product access. Shelf space and stock levels share a 0.58 correlation value between these two variables.

4.9. Multiple Regression

"In order to determine the extent to which the independent variable/s affects the dependent variable, multiple regression analysis is used" (Downing and Clark, 2003:67). The study analysed the influence of the independent variables (centralised distribution model, risk pooling, different models per category, replenishment, shelf space, inbound order fulfilment, and supplier performance monitored), on the dependent variable, optimised information sharing.

Correlation and multiple regression analyses were conducted to examine the relationship between information sharing and various independent variables. The multiple regression model with all seven predictors produced $R^2 = .548$, F (11, 2).

Table 4.9.1 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.523[a]	0.273	0.268	0.17211	0.273	53.056	1	141	0	
2	.605[b]	0.366	0.357	0.16133	0.093	20.479	1	140	0	
3	.649[c]	0.421	0.408	0.15476	0.055	13.122	1	139	0	
4	.676[d]	0.457	0.442	0.15036	0.036	9.269	1	138	0.003	
5	.694[e]	0.482	0.463	0.14743	0.025	6.536	1	137	0.012	
6	.714[f]	0.51	0.489	0.14386	0.028	7.874	1	136	0.006	
7	.740[g]	0.548	0.524	0.13875	0.038	11.209	1	135	0.001	1.91

a. Predictors: (Constant), centralised distribution model

b. Predictors: (Constant), centralised distribution model, risk pooling

c. Predictors: (Constant), centralised distribution model, risk pooling, different models per category

d. Predictors: (Constant),centralised distribution model, risk pooling, different models per category, replenishment

e. Predictors: (Constant),centralised distribution model, risk pooling, different models per category, replenishment, shelf space

f. Predictors: (Constant),centralised distribution model, risk pooling, different models per category, replenishment, shelf space, inbound order fulfilment

g. Predictors: (Constant), centralised distribution model, risk pooling, different models per category, replenishment, shelf space, inbound order fulfillment, supplier performance monitored

h. Dependent Variable: optimised information sharing

Table 4.9.1 illustrates the relationship between information sharing (dependent variable) and various independent variables. R is the correlation of the independent variables with the dependent variable after the inter-correlations among the independent variables have been taken into account. The R square value is defined as the explained variance. Table 4.9.1 indicates that the F value is significant at the .001 level. Under the column df the first value represents the number of independent variables; the second value is the total number of responses for all the variables in the equation (N), minus the number of independent variables (K) minus 1 (Sekaran, 2003:40-99). This means N-K-1 = x. The R column represents the value of R for the seven models, the multiple correlation coefficient. The values of 0.52; 0.60; 0.65; 0.68; 0.69; 0.71 and 0.74 indicate a good level of prediction.

In model 1, R square = 0.273. Therefore, the model is able to explain 27% of the variation in information sharing.

In model 2, R square = 0.366. Thus, the model is able to explain 36% of the variation in information sharing.

In model 3, R square = 0.421; hence, the model is able to explain 42% of the variation in information sharing.
In model 4, R square = 0.457. As a result, the model is able to explain 45% of the variation in information sharing.
In model 5, R square = 0.482, which means the model is able to explain 48% of the variation in information sharing.
In model 6, R square = 0.51, which indicates that the model is able to explain 51% of the variation in information sharing.
In model 7, R square = 0.548. Therefore, the model is able to explain 55% of the variation in information sharing.

The "R square" column represents the R- square value (frequently known as the coefficient of determination) which is the proportion of the variance in the dependent variable that can be explained by the independent variables.

Model 1 – Adjusted R^2=0.268
Model 2 – Adjusted R^2= 0.357
Model 3 – Adjusted R^2= 0.408
Model 4 – Adjusted R^2= 0.442
Model 5 – Adjusted R^2= 0.463
Model 6 – Adjusted R^2= 0.489
Model 7 – Adjusted R^2= 0.524

Model seven has the highest value of adjusted $R^{2;}$ therefore, it has a better degree of explanatory power (after controlling for the number of variables). Hence, model seven is able to explain more of the variation in information sharing than Models 1- 6. The Durbin-Watson test "is a test for correlation between successive error terms. Values may range from one to four. If it is close to zero, positive auto-correlation is likely. If it is close to four negative auto-correlation resides" (Webster, 2013:276). The above model reflects a good value of 1.91. "In a standard regression context, analysis of the distributional properties of the residual terms, e(i)=(yi – y^i) is used to evaluate how well the assumptions of the normal linear model are met" (Heeringa, West and Berglund, 2010:196).

Table 4.9.2: Anova

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.572	1	1.572	53.056	.000[b]
	Residual	4.177	141	0.03		
	Total	5.748	142			
2	Regression	2.105	2	1.052	40.433	.000[c]
	Residual	3.644	140	0.026		
	Total	5.748	142			
3	Regression	2.419	3	0.806	33.663	.000[d]
	Residual	3.329	139	0.024		
	Total	5.748	142			
4	Regression	2.628	4	0.657	29.066	.000[e]
	Residual	3.12	138	0.023		
	Total	5.748	142			
5	Regression	2.77	5	0.554	25.493	.000[f]
	Residual	2.978	137	0.022		
	Total	5.748	142			
6	Regression	2.933	6	0.489	23.622	.000[g]
	Residual	2.815	136	0.021		
	Total	5.748	142			
7	Regression	3.149	7	0.45	23.369	.000[h]
	Residual	2.599	135	0.019		
	Total	5.748	142			

a. Dependent Variable: optimised information sharing

b. Predictors: (Constant), centralised distribution model

c. Predictors: (Constant), centralised distribution model, risk pooling

d. Predictors: (Constant), centralised distribution model, risk pooling, different models per category

e. Predictors: (Constant), centralised distribution model, risk pooling, different models per category, replenishment

f. Predictors: (Constant), centralised distribution model, risk pooling, different models per category, replenishment, shelf space

g. Predictors: (Constant), centralised distribution model, risk pooling, different models per category, replenishment, shelf space, inbound order fulfillment

h. Predictors: (Constant), centralised distribution model, risk pooling, different models per category, replenishment, shelf space, inbound order fulfillment, supplier performance monitored

Based on results depicted in Table 4.9.2; all seven models have a significance value of 0 at the 95% confidence level; the deduction is that models one to seven reach statistical significance. Thus the researcher may accept the alternate hypothesis and conclude there is a relationship

between the variables of model 1, model 2 and model 3, model 4, model 5, model 6, and model 7.

Test for multicollinearity:

When analysing regressions it is critical for the researcher to conduct a test for multicollinearity. "If two or more independent variables are highly correlated, severe multicollinearity is present" (Chase Jr, 2013:67). Brooks (2008:172) states that "should multicollinearity be present, R squared will be high but the individual coefficients will have high standard errors so that the regression seems acceptable but the individual variables are insignificant. As a result significance tests may provide inappropriate conclusions which make it difficult to draw sharp inferences." Table 4.9.3 indicates that multicollinearity does not exist within the data, which is a significant result. This has been inferred as the VIF for all models is greater than 1. According to Ho (2006:249), the variance inflation factor (VIF) should not be greater than 10. Table 4.9.3 shows that all seven models have predictors with tolerance values greater than 1. Hence, the multicollinearity assumption is not violated. The eigenvalue (refer to A4 in Appendix A) represents the variability of the data along the principle components (Reddy, 2010:296).

Table 4.9.3: Collinearity

Model		Unstandardised Coefficients		Standardised Coefficients	T	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
7	(Constant)	1.235	0.115		10.74	0	1.007	1.462		
	Centralised distribution model	-0.21	0.023	-0.764	-9.147	0	-0.255	-0.164	0.48	2.083
	Risk pooling	0.088	0.024	0.335	3.638	0	0.04	0.136	0.396	2.527
	Different models per category	-0.047	0.012	-0.285	-3.876	0	-0.07	-0.023	0.618	1.619
	Replenishment	0.054	0.023	0.166	2.387	0.018	0.009	0.099	0.695	1.438
	Shelf space	0.046	0.015	0.201	3.074	0.003	0.016	0.076	0.784	1.276
	Inbound order fulfillment	-0.055	0.015	-0.271	-3.751	0	-0.084	-0.026	0.641	1.561

	Supplier performance monitored	0.08	0.024	0.248	3.348	0.001	0.033	0.128	0.612	1.634
a. Dependent Variable: optimised information sharing										

An assessment of the beta value is important when evaluating the independent variables. The beta weight indicates the relative importance of a predictor in predicting the dependent variable. The larger the value of the beta weight, the more influence this factor has on predicting the dependent variable (information sharing). Risk pooling and supplier performance monitored has the highest beta value of 0.34 and 0.25 between the seven models. Thus risk pooling and supplier performance monitored make the strongest unique contribution to explaining the dependent variable when all other variables in the model are controlled. The significance value (*p*) is 0.000 at the 95% level of confidence.

Table 4.9.4: Casewise Diagnostics

Case Number	Std. Residual	Optimised information sharing	Predicted Value	Residual
6	6.501	2	1.098	0.90204
108	6.08	2	1.1564	0.84357
a. Dependent Variable: optimised information sharing				

The original data contained a number of outliers. The data was screened with regressions in which the casewise diagnostics shown in Table 4.9.5 were used to locate outliers. In regression these outliers simply identify those cases that are 3 standard deviations away from the best fit line for the regression (Butler, 2008:24).

Table 4.9.5: Residuals statistics

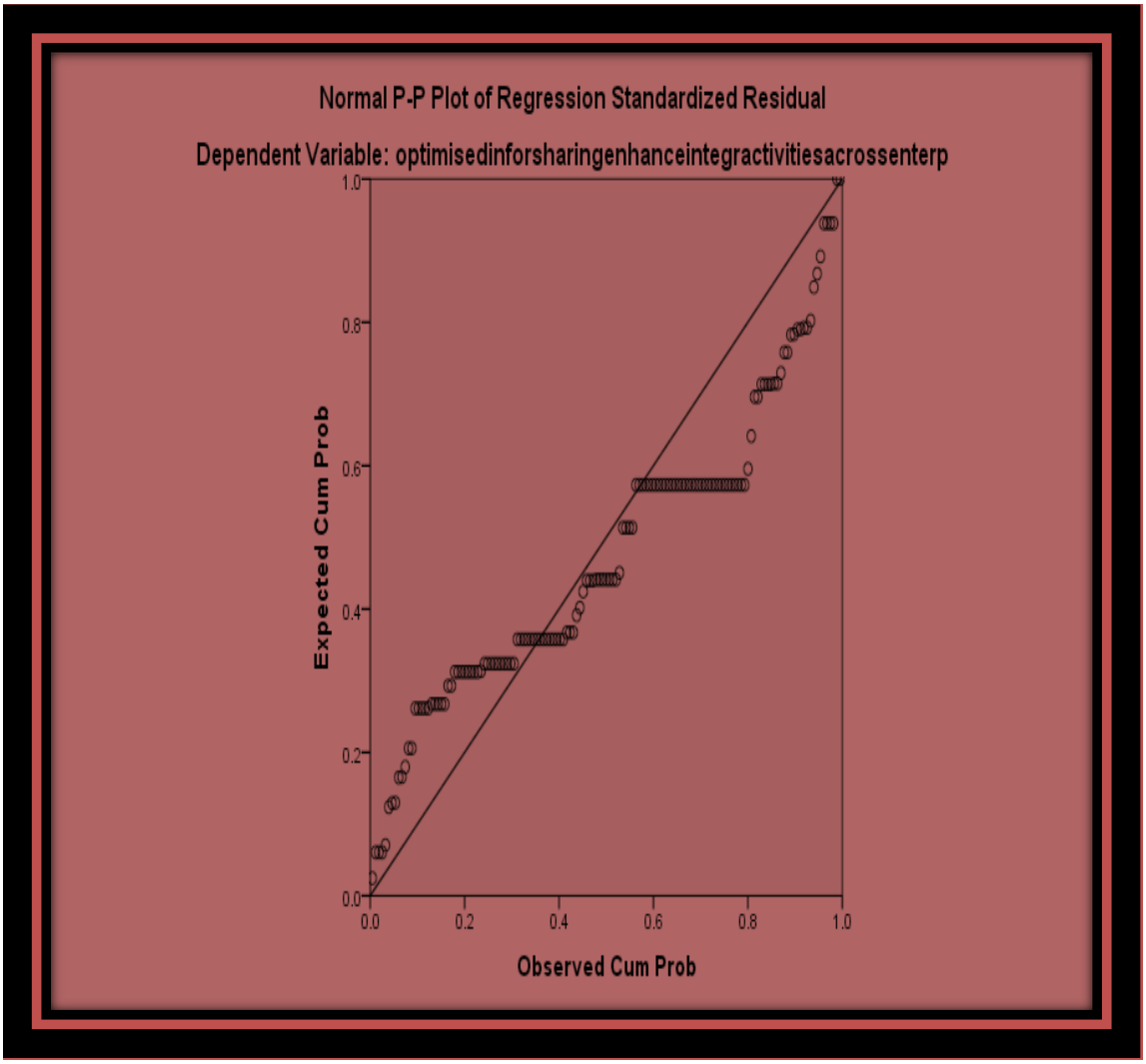
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	0.8286	1.7867	1.042	0.14892	143
Std. Predicted Value	-1.433	5.001	0	1	143

Standard Error of Predicted Value	0.019	0.072	0.03	0.012	143
Adjusted Predicted Value	0.8159	1.7375	1.041	0.1466	143
Residual	-0.27325	0.90204	0	0.13529	143
Std. Residual	-1.969	6.501	0	0.975	143
Stud. Residual	-2.041	6.832	0.003	1.021	143
Deleted Residual	-0.29349	0.99612	0.00094	0.14851	143
Stud. Deleted Residual	-2.066	8.415	0.022	1.148	143
Mahal. Distance	1.669	37.657	6.951	7.021	143
Cook's Distance	0	0.608	0.013	0.056	143
Centred Leverage Value	0.012	0.265	0.049	0.049	143
a. Dependent Variable: optimised information sharing					

Cook's distance is a measure of influence. It measures the extent to which the line would change if data points were omitted. Points with Cook's distances that are greater than one, or are larger than other points, may warrant investigation (Maindonald and Braun, 2010:149).

The researcher needs to assess the data to ensure that the assumption of common variance has not been violated. Hence, when analysing the data for outliers, normality and linearity, the researcher may analyse the Normal P-P plot of the regression standardised residual and the scatter plot.

Figure 4.9.1: Normal P-Plot of Regression Standardised Residual



In order to verify that the residuals or error items are normally distributed, a normal p-plot of regression standardised residual may be used. The normal P-P plot validates the assumption that residuals follow a normal distribution. The diagonal line represents the line of expected values and the points which coincide with this line are the expected values. In the normal P-P plot, points lie in a reasonably straight diagonal line from bottom left to top right, suggesting no deviations from normality. The researchers' criterion for normal distribution is the degree to which the plot for the actual values coincides with the single straight line in Figure 4.9.1 above. Based on Figure 4.9.1, the researcher may deduce that the plot of residuals fits the expected pattern, such that the residuals are indeed normally distributed.

4.10 Reliability and Validity

"The Cronbach's alpha is a statistical test of how well the items on a scale correlate with each other. Alpha values greater than 0.07 tend to confirm that the scale used is indeed reliable" (Olagbemi, 2011: 60). Table 4.10.1 illustrates the internal consistency reliability of the scale used by the researcher. Actual Cronbach's alpha value is 0.79, which indicates that the scale utilised in the research is indeed reliable.

Table 4.10.1: Cronbach's alpha

Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items	N of Items
.793	.834	20

In order to determine whether the research instrument measures the elements as per the intention of the study; construct validity was applied. The multivariate analysis and interpretation of results indicate that the measures used in this study are valid.

4.11 Conclusion

In conclusion, the research study's objectives were:

4.11.1 To examine the extent to which optimised information sharing is enhanced by integrated supply chain activities across the extended enterprise

4.11.2 To establish the magnitude of supply chain value-added performance outcomes in the Collaborative Planning, Forecasting and Replenishment (CPFR) model across functions and across enterprises

4.11.3 To understand the role of electronically-enabled information sharing tools in an integrated and effective supply chain structure

The chapter makes inferences based on the analysis of the data. It also examines whether the analysis has answered the research questions, in great detail. The data analysis brought many issues to the fore. Figure 4.3.1 illustrated that business-to-business information systems are not frequently implemented, implying that investment in technology is not preferred by the retailer. However, Figure 4.4.1 indicates that employees within Massdiscounters recognise and appreciate the value-add that CPFR has to offer the business in terms of performance outcomes.

Figure 4.5.4 confirms that the organisation engages in regular promotional activities, which implies that price points of items sold by the stores are constantly changing.

It is indeed interesting to note that figure 4.5.5 showed some dispersion in responses on shelf space and stock levels. Only 52% of the respondents confirmed that stock levels at stores are at an optimal level. The remainder either disagreed or chose to remain neutral. Shelf space is allocated according to rate of sale, yet stores do not carry the correct stock levels. This may be attributed to a lack of information and visibility or forecasting tools; and requires further investigation. The chapter illustrated that centralised distribution models and information sharing share a highly correlated relationship of 0.56. The centralised distribution model 7 has the greatest regression effect on the dependent variable, which is information sharing. This relationship implies that an effective distribution strategy is highly dependent on joint collaboration and business planning.

CHAPTER FIVE
DISCUSSION OF RESULTS

5.1 Introduction and motivation for the research

The problem statement for this study focuses on limited information sharing within the retail promotion-driven business model. Business divisions typically operate independently towards separate objectives. The study aimed to optimise supply chain integrated information sharing through collaborative, forecast-based performance outcomes and electronically-shared information tools across extended enterprises. The preceding chapter presented an analysis of the data collected from survey respondents. The following sections marry the data analysis with the literature on the key variables relative to information sharing and systems.

5.2 Themes from the literature review

The literature review identified various common themes. It confirmed that today's retailers participate in modern supply chains. The organisation under analysis is Massdiscounters which is a "promotionally driven discount retailer of predominantly general merchandise and non-perishable groceries for home, business and leisure use" (Game, 2013). The literature confirmed that CPFR is a crucial driver of supply chain integration, which allows for alignment and information sharing across trading partners. The success factors of CPFR were identified as information sharing and system integration. The data analysis led to the conclusion that this retailer believes in the importance of sharing information; however, it lacks system integration, both internally and with its trading partners. As a result, sharing information has become manual and complex for employees to manage and exploit.

Supplier relationships, transparency and collaborative measures require supply chain partners to understand each other's goals, objectives and key drivers. Correctly defined and executed supply chain strategy and design is imperative to achieve best supply chain performance. This suggests that Massdiscounters should realise the importance of transparency and a shared vision with its trading partners. Different business divisions are currently chasing misaligned objectives, while suppliers are given limited information due to historical perceptions of supply chain relationships. Once relationships are built and transparency is increased by means of integrated systems, all parties across the supply chain benefit from ensuring that customers are serviced in line with their true requirements. This is achieved by category management. Successful category management relies heavily on internal collaboration. Retail industry leaders such as Walmart America and manufacturers such as Procter and Gamble are reaping the benefits of integrated supply chain activities. As a result, customers are serviced according to actual demand.

5.3 Research objective one

To examine the extent to which optimised information sharing is enhanced by integrated supply chain activities across the extended enterprise

The first objective of the research study was to examine the extent to which optimised information sharing is enhanced by integrated supply chain activities across the extended enterprise. It was noted in the literature review that optimising means "making as perfect or effective as possible" or "to increase the efficiency of by rewriting instructions" (Freedictionary, 2013:1). "Integrated supply chain activities across the extended enterprise" imply that all the parties involved in a particular supply chain must integrate and participate transparently in their business activities. This statement thus aimed to establish how significant an impact (if any) efficient and effective information sharing has on all the parties involved in a particular supply chain, from raw material supplier to the retail store.

The survey instrument gathered data from respondents pertaining to frequency of information sharing across enterprises. Thirty four percent of the respondents indicated that Massdiscounters shares information with other enterprises hourly, 22% stated that it shares information with other enterprises daily, 30% of participants validated that information is shared across enterprises weekly, and the remaining 14% of the respondents stated that Massdiscounters shares information across enterprises either monthly or less than 12 times a year. The fact that 44% of the study population indicates that information is shared across enterprises weekly and less frequently is cause for concern. The resulting deduction is that Massdiscounters shares information infrequently with its external trading partners. The business environment of the 21st century dictates that real-time information and communication are critical elements of retail practice. However, the data analysis confirmed that there is an overwhelming agreement (99% of the respondents) that optimised information sharing systems enhance integrated supply chain activities across extended enterprises.

The literature strongly confirms that optimal supply chain information sharing is made possible through the use of technological innovations and enhancement across the supply chain. Therefore, it is concluded that optimised information sharing enhances integrated supply chain activities across enterprises to a significantly large degree. However, this finding does not confirm that the organisation has the tools to implement this level of collaborative effort.

It is possible that the infrequency of information sharing across enterprises may be due to the lack of available systems tools at Massdiscounters. This is confirmed by Figure 4.5.1 in the previous chapter, which illustrated that only 27% of the respondents strongly agreed that the organisations' information systems have built-in functions that facilitate collaboration with

supply chain trading partners. Nineteen percent of the respondents agreed and 28% of the respondents disagreed with this statement. A further 5% of the respondents strongly disagreed that the organisations' information systems have built-in functions that facilitate collaboration with supply chain trading partners. This suggests that Massdiscounters does not currently have the system tools and resources required to implement CPFR and information sharing. This is contradicted by Scottsdale (2013) who wrote that "Massdiscounters implemented JDAs' demand and fulfilment system in 2013". The system gives an organisation the opportunity to optimise and manage forecasting and replenishment activities across the supply chain. This system is perceived as the driver of CPFR within the organisation but is not used as a shared information and empowerment tool across divisions. Suppliers are not exposed to the system and opportunities for alignment are currently being explored by the Merchandise team.

In 2012, the retailer completed implementation of a regional distribution centre network with a sophisticated warehouse management system and modern logistics design. Three distribution centres are ideally located in KwaZulu-Natal, Johannesburg and Cape Town. In 2014, Massdiscounters reported that large volumes of inventory were currently stored in the distribution centres with slow sales movement. As a result cash flow was stored in inventory while the distribution centre acted as a warehouse which was facing capacity constraints. This suggests that, while the logistics division had moved ahead with investment in a supply chain infrastructure and distribution centres, the forecasting and inventory management system had not been implemented.

Each business area has limited access to pertinent information and this created an obstacle that has since been identified. This is reaffirmed by the multiple regression analysis where model seven has the highest value of adjusted R^2. Therefore, the variable centralised distribution model displays the largest degree of explanatory power of all other variables (after controlling for the number of variables).

The implication is that, while the company took the critical decision to invest in centralised distribution centres, there are challenges in putting the system in place. Information sharing and centralised distribution strategy exhibit the highest correlation value of all the variables, implying that an information sharing system is required to effectively operate this business model. As noted in the literature, true collaboration requires that information be shared both within the organisation and between the organisation and its external trading partners. Figure 4.3.2 leads the researcher to question whether a level of 54% hourly information sharing is suitable for this retail organisation. Some may argue that daily and weekly information sharing is unacceptable in today's competitive business environment. In summary, the results of this

research study suggest that the organisation does not have the required system tools and resources for a detailed collaborative process, although employees' perceptions of collaboration with trading partners are extremely positive. As a result, the organisation is unable to reap the maximum benefit of optimised information sharing which greatly enhances integrated supply chain activities across the extended enterprise.

The literature notes that optimised information sharing relies on integrated information sharing systems and the electronic tools utilised within the organisation. The implementation of CPFR is an element of integrating supply chain activities across extended enterprises. Walters and Hanrahan (2007: 327) note that the "supplier/retailer Collaboration (SRC) exists when both retailers and suppliers share proprietary internal or external data, and/or share policies and processes used in decision making with the clear objective of sharing the benefits". The same holds true for relationships with customers. The literature confirms that optimised and electronic information sharing strategically enhances integrated supply chain activities across the extended enterprise. However Massdiscounters lacks the system tools to capture the potential value-added.

5.4 Research objective two

To establish the magnitude of supply chain value-added performance outcomes in the Collaborative Planning, Forecasting and Replenishment (CPFR) model across functions and across enterprises

This research objective sought to establish whether or not the CPFR model has an impact on supply chain value-adding performance outcomes. The first research objective found that the organisation shares information infrequently with both its external trading partners and internally, and does not have the tools to align activities across the supply chain. There was overwhelming agreement among the respondents that electronically-enabled information sharing CPFR tools enhance integration and collaboration in supply chain networks. However, only 27% of the respondents strongly agreed that the organisation's information systems have built-in functions that facilitate collaboration with supply chain trading partners, while 19% agreed and 33% of the respondents disagreed with this statement. Furthermore, 36% of the respondents disagreed that the organisation is able to forecast and plan collaboratively with supply chain partners through integrated information systems, and 47% agreed with this statement. This suggests that, due to a lack of system capacity and resources, Massdiscounters is unable to reap the benefits of optimised information sharing, which greatly enhances integrated supply chain activities across the extended enterprise.

The literature confirms that CPFR, supply chain integration, and inventory management requires collaboration of various process activities involving suppliers.

Figure 4.5.3 indicates that 48% of the respondents agreed that the organisation utilises order batching principles which favour the supply-side of the supply chain. If goods are ordered in consolidated batches, economies of scale will benefit the manufacturer, transporter, supplier and distribution centre. However, "order batching is considered as misaligned to supply chains with end-customer demand fluctuations" (Mangan, Lalwani and Butcher, 2011:122). Table 4.7.1.1 indicates that an overwhelming number of respondents affirmed that the organisation institutes regular promotional activities while the literature has shown that regular promotional activity within any organisation requires an effective supply chain operation and strategy. The mean value for order batching is 3.14, which suggests that the organisation does not sufficiently use order batching. This implies that multiple orders exist within the supply chain and logistics network. Ordering processes currently allow for manual interventions, limited system usage, greater use of resources and a lack of consolidation in terms of stock movement.

Figure 4.5.2 provided a summary of respondents' perceptions of the benefit of CPFR practices. Eighty three percent of the respondents indicated that CPFR is extremely important in decreasing inventory levels. Reducing out-of-stocks, increasing sales, forecast accuracy and improving relations and internal communication are considered to be important benefits of CPFR by an overwhelming majority of the participants. According to Massmart (2014c), "Massmart runs an active supplier advocacy process with the objective of encouraging responsible supplier conduct in our supply chain. The advocacy process incorporates a combination of self-assessment surveys, issue-specific workshops, random data verification, site visits and sharing of comparative data". It is evident that this organisation does indeed practice and foster a culture of information sharing and collaboration with suppliers. The concern is that the methods used to achieve this are currently manual and driven by human intervention.

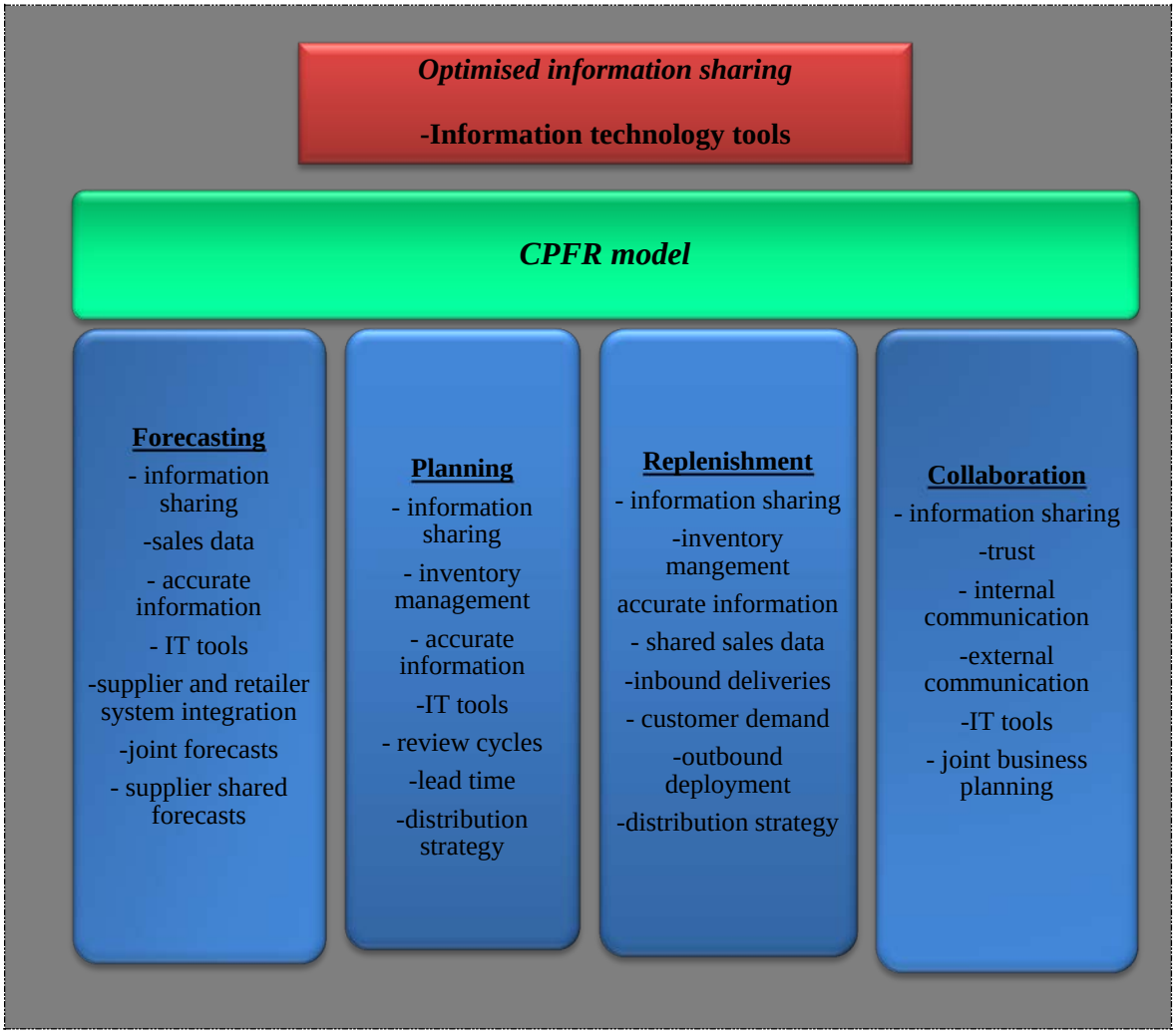
The consequence of a lack of information technology sharing systems is that this retailer is not sufficiently effective and efficient to remain abreast of its competition. Figure 4.5.4 shows that 22% of the respondents strongly agreed that consumers are easily able to access the product they are looking to purchase at the retail store; 31% of participants agreed that consumers are easily able to access the product they are looking to purchase at the retail stores; 20% of participants remained neutral and 27% of the respondents disagreed that consumers are able to easily access the product they are looking to purchase from the retail store. Given that the

sample comprises the organisation's employees, this is a clear indication that there is an issue with out-of stocks at store level.

An overwhelming 94% of the participants agreed that the organisation shows a high degree of willingness to cooperate in business activities with trading partners while only 4% of the respondents disagreed with this statement. This suggests that the organisation and its employees are extremely willing to participate in CPFR and relationship management, but the tools available are not aligned with this goal. Figure 4.5.2 illustrates that the respondents view CPFR as extremely important in driving positive results within a retail organisation. An industry example that supports this deduction is Walmart who "successfully established a collaborative relationship with both customers and suppliers. As a result Walmart gained superior levels of bargaining power, lower inventory levels, operational costs and greater economies of scale within the distribution network" (Wang, Heng and Chau (2007:173).

"In March 2012, American multi-national retail corporation Walmart completed its acquisition of a 51% stake in South African retailer Massmart for 2.4 billion dollars, one of the largest merger and acquisition transactions seen in Africa, heralding the arrival of the world's largest retailer to the continent" (Hathaway, 2013: consultancyafrica.com). It is assumed that Walmart will share this success with the Massmart group. The Walmart example clearly shows that the magnitude of supply chain value-added performance outcomes in the CPFR model across functions and enterprises has far-reaching, positive results for key success factors such as sales, inventory levels, service levels and relations with trading partners.

Figure 5.4.1: CPFR model suggested by the data and the literature



Source: Created by researcher

Figure 5.4.1 depicts the CPFR model dictated by the data collected from the respondents and the literature reviewed. The model explains that CPFR is driven by optimised information sharing which can only be achieved with the aid of information technology tools. CPFR has been divided into forecasting, planning, replenishment and collaboration. Important elements for successful forecasting are information sharing, access to sales data, accurate information about the business and stock pipeline, IT tools, supplier and retailer system integration, joint forecasting and shared supplier forecasts. Planning sub-elements are information sharing, inventory management, accurate information, IT tools, review or ordering cycles, supplier and stock movement lead time and the distribution strategy employed. The key drivers of effective replenishment are information sharing, inventory management, accurate information about the stock pipeline, shared sales data, inbound deliveries and supplier fill rates, customer demand, outbound deployment and distribution strategy employed. Finally, for the purpose of this study, collaboration has been identified when the following critical factors are firmly entrenched in

business operations: information sharing, trust, internal collaboration within the organisational business functions, external collaboration with trading partners, IT tools and systems and joint business planning with trading partners. This model highlights that information sharing is a critical requirement for all four CPFR elements. Managing and driving these critical elements is difficult.

Given the promotional driven nature of the retailer, the organisation lacks the available system resources which are absolutely necessary for effective information sharing. The literature further confirms that utilisation of CPFR business principles is crucial to retail success. Given the complexity of economies, the workforce and government influence, this is indeed the means to competitive advantage within the supply chain arena. In order for retailers to remain relevant, collaborative planning, forecasting and replenishment should be adopted both within the organisation as well as between the organisation and its trading partners. Various industry examples show that the value-added is immense. The challenge is that successful CPFR implementation requires investment in systems and people which most organisations are hesitant to make. It seems that Massdiscounters lacks system investment to match continuous improvement efforts in the logistics and planning divisions that later implemented JDAs demand and fulfilment. Employees are extremely willing to engage with trading partners but lack the systems to do so effectively and accurately.

5.5 Research objective three

To understand the role of electronically-enabled information sharing tools in an integrated and effective supply chain structure

More than half of the respondents indicated that Massdiscounters implements innovative electronic systems once in a year, while 38% stated that these systems are implemented once in five years. Only 8% of the respondents selected “weekly”, “monthly” or “once in 10 years”. As noted in the previous chapter, 95% of the respondents stated that optimised information sharing systems are enhanced by integrated supply chain activities across the extended enterprises. The literature supports this argument. It has been established that, due to lack of available system capacity and resources, Massdiscounters lacks systems to support optimised information sharing as a result of poorly integrated supply chain activities across the extended enterprise. Table 4.6.1 from the previous chapter provides a list of the systems currently used as well as those recommended by the respondents.

Table 4.6.1: Electronic information sharing systems used by the organisation

Systems:	Using	Recommended
Extranet (SAP)	15	29
Electronic Data Interchange (EDI)	19	-
In-house system	58	2
Integrated Electronic Supply chain Management (e-scm)	1	-
Enterprises Resource Planning (ERP)	6	3
E-mail (E- fulfillment, E-Procurement)	89	-
Radio Frequency Identification Device (RFID)	9	13
B2C e-commerce (Customer relationship management systems)	-	16
E-Business Collaboration (Supplier relationship management systems)	-	23
Point-of-Sale (POS)	49	-
E-marketplace	-	-
Electronic Collaboration Forecasting Planning and Replenishment	4	4
Enterprise Application Integration (EAI)	-	-
SAP Advanced Planner and Optimiser (SAP APO)	-	3
Other:	JDA	Promotion Optimiser

Table 4.6.1 (extracted from the previous chapter) showed that the most frequently used systems are in-house systems, email and point-of sale systems. The respondents recommended that SAP, RFID, e-business collaboration and B2C e-commerce systems be introduced. Table 4.3.1 also shows that, 38% of the respondents indicated that only one business-to-business (B2B) information system was implemented within Massdiscounters in the past five years, while 17% of the respondents indicated that two B2B systems were implemented, 38% stated that three or more information systems had been implemented and 7% stated that four or more information systems had been implemented in the past five years. The implication is that new information systems innovation and rapid evolution are not evident in this particular retail business.

According to Bidgoli (2004:378), “the demands of information sharing and collaboration in extended real-time enterprise are much greater than in traditional supply chains and will require organisational innovations”. The inability to effect rapid change may create barriers to information sharing and a collaborative strategy. This research study has shown that various methods and tools are available to retailers to optimise their supply chain across extended enterprises. However the challenge is that information technology systems are not sufficiently mature to drive a strategic supply chain. Manual workarounds and manual intervention are creating bottlenecks, disjuncture and misalignment across the supply chain which results in out-of stocks, poor visibility, lack of supplier performance and the inability to forecast accurately.

Given the promotional nature of the business, in order to remain relevant and competitive Massdiscounters must recognise that the supply chain is the business sector that will provide the greatest long-term return on investment.

Massdiscounters is currently experiencing its toughest time yet in terms of sales and profit growth. The chain is performing below expectations. According to the Massdiscounters divisional review (Massmart, 2014), trading profit fell by 39.3% to R366.6 million in 2013. This can be attributed to difficult economic conditions, a lack of consumer confidence and shrinking disposable income. However underlying issues undermine the profitability and margin of this corporation. There are numerous issues and it is important to dissect the problem areas. A common complaint made by retail customers is that a store advertises products, but when the customer arrives at the store, the store is out-of-stock. This scenario represents a failure in the supply chain. Further downstream, the logistics network is struggling to respond to customer requests and weekly promotions. This is caused by a lack of alignment between the marketing, logistics, planning, sourcing, replenishment and information technology departments. Currently, these departments work toward separate objectives which are not shared. When internal collaboration is lacking, it is a losing battle to attempt to form relationships with external supply chain trading partners such as suppliers, manufacturers and customers. Individual business areas have their own opinions about what customers want and implement strategy and plans without collaborating with other business divisions and trading partners.

According to Scottsdale (2013) “Massdiscounters implemented JDAs’ demand and fulfilment system in 2013 with an objective to improve supply chain production planning and execution processes, increase forecast accuracy, reduce overstocks and inventory, gain central inventory visibility and rely on a solution to drive a leaner overall supply chain process”. However due to the infancy of the logistics network and demand and fulfilment system; remedies are being implemented slowly. In 2012 the organisation identified a need for external collaboration; however, it failed to recognise and remedy the misalignment which exists internally.

5.6 Conclusion

Todays’ organisations must move away from the silo operation of previous years and technology must be embraced as a critical driver. Without accurate information which is accessible in real-time, managers are forced to make decisions based on manual data and assumptions. The team will continue to execute decisions based on limited or disjointed planning, which further exacerbates current challenges. JDAs’ demand and fulfilment and the warehouse management system do not allow for optimised information sharing both within the

organisation and with supply chain partners. Since Walmart’s acquisition of Massmart, the group has recognised the need for an information system to bring the various business divisions together as a cohesive unit. SAP will be implemented in 2018 (Massmart, 2013). This study has shown that its implementation is well overdue. The organisation is currently using manual methods to solve store out-of-stocks, obsolete inventory in distribution centres, the slow response to customer requests and disjointed forecasting and replenishment practices. According to Roberts and Berg (2012:65), Walmart is expected to drive Massmart's commitment to central distribution and procurement. Currently procurement is done at item level and is not aligned with Walmart’s bargaining methods.

CHAPTER SIX
RECOMMENDATIONS AND CONCLUSIONS

6.1 Recommendations

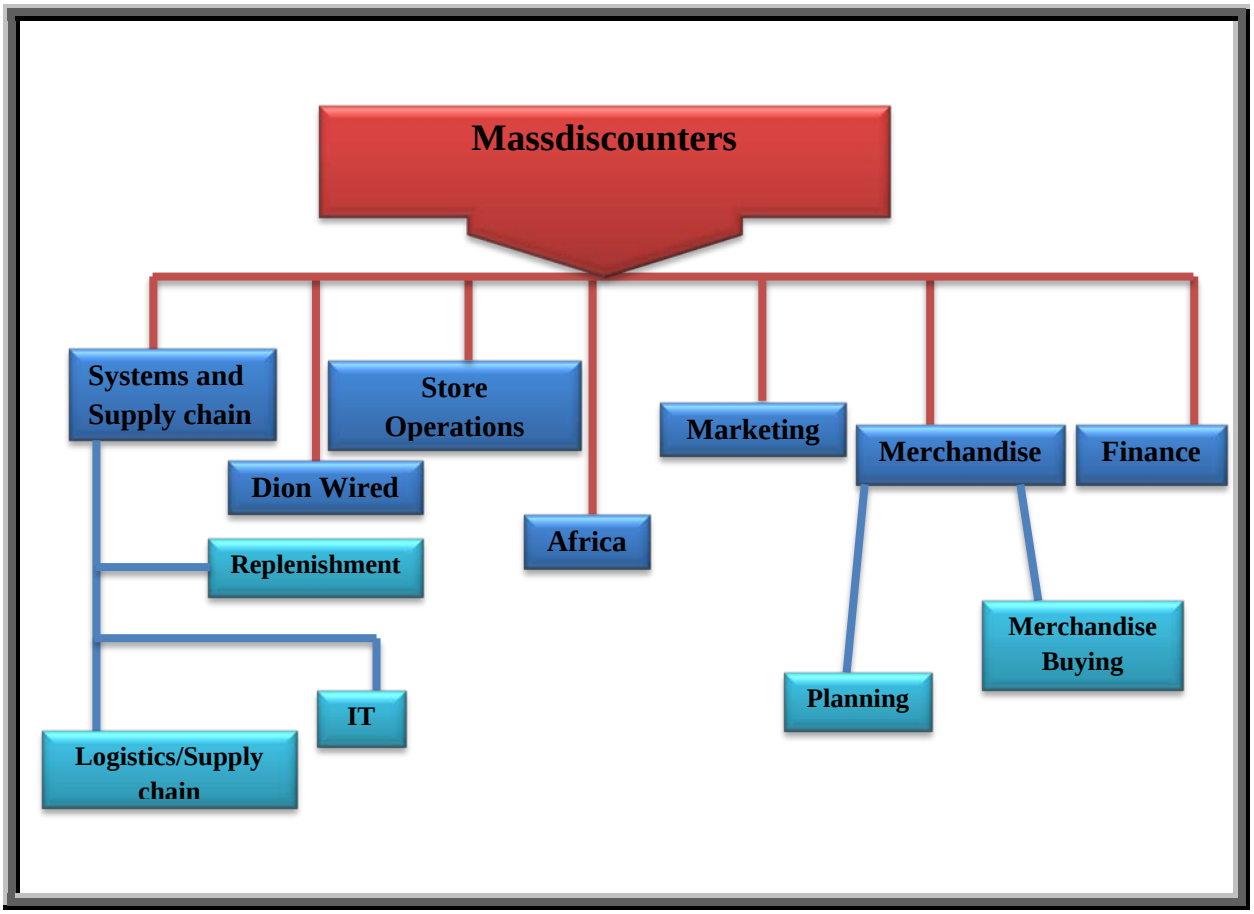
According to Shelton and Watne (2013:6), Walmart invested in SAP system technology to manage their global operation. SAP implied partnering with the business by providing reliable data, resulting in one version of the truth supported by a finance development process, information and technology. Walmart leverages technology to help support their supply chain and business strategy of everyday low prices (also known as EDLP). The EDLP strategy implies promotional activity and fluctuations in pricing remain minimal thereby reducing the complexity of managing a supply chain.

According to Arnold and Fernie (2000), "Walmart invested approximately four billion dollars in developing a system that facilitates collaboration with supply chain partners". The system uses point of sale data, average price, current inventory by store, and current on order quantity. The main reason why Walmart provides such detailed data to its vendors is that they believe that this data will enable vendors to make their supply chain more efficient, which will in turn improve their service to Walmart while lowering Walmart's costs. The system enables collaborative efforts such as vendor-managed inventory and co-managed inventory. However one challenge that remains is that all business divisions operate with a supply-chain mindset. This seems to be the challenge for Massdiscounters, whose business model is promotion-driven and vulnerable to supply chain inconsistency (Chiles & Dau, 2005:104-105).

According to Kumar (2013), "South African companies are not usually renowned for being at the forefront of technology. In many branches of supply chain the available technology is optimally used, specifically in logistics. However South African businesses are not using information to optimise the supply chain activities". According to Smartprocurement (2013) 60% of all respondents who participated in a Price Waterhouse Coopers' supply chain management survey identified "alignment between partners in the supply chain" as the most important of seven elements of supply chain maturity. Mack (2012) indicates that Walmart's acquisition of Massmart Holdings underlines the need for a mature supply chain operation. Industry experts in South Africa agree that Massdiscounters has a world-class logistics network comprising of three regional distribution centres. However its strategic supply chain activities and collaboration with trading partners will determine the economies of scale achieved by these mature facilities.

Based on the findings of this study, it is recommended that the retailer reflects and assesses the relevance of the current strategies driven by each business function. The organisational structure is currently not conducive to all business areas within Massdiscounters acting as a cohesive unit. Figures 1.2 and 1.3 illustrate that the Merchandise function manages planning, forecasting, buying and replenishment, and the Supply Chain function manages logistics and supply chain collaboration, while the Information Technology division operates separately, making information availability and visibility difficult. The same holds true for the Marketing division that decides on weekly Game advertising campaigns and promotions. It is recommended that these divisions be driven by a single roadmap rather than multiple and differentiated objectives. Further to this, the Supply Chain, IT and Merchandise divisions should operate as a single business unit that meets on a weekly basis to share information about individual areas. This study has confirmed that collaboration and supply chain performance are driven by each of these areas and must thus become the responsibility of all these stakeholders.

Figure 6.1.1: Massdiscounters proposed divisional structure



Source: Designed by researcher

Figure 6.1.1 provides a view of the suggested divisional structure of the company. The research study indicates that the supply chain business area must control logistics, planning,

replenishment and IT functions. This forces one divisional roadmap and a true retail supply chain. The supply chain is not the responsibility of a single person or business unit but of each employee within a retail organisation. This principle should be entrenched among employees across the functional areas. Once this occurs, relationships with trading partners will flourish. Without the necessary system tools information sharing entails engagement and daily discussions across business areas and suppliers. Therefore, it is recommended that the organisation make firm decisions regarding investment in information technology infrastructure that enables supply chain collaboration across trading partners. Infrastructure implementation should occur at an extremely rapid pace in order to marry the sophistication of the logistics network and JDAs' demand and fulfilment with a system such as SAP which provides opportunities to integrate with suppliers' systems. Failure to do so threatens dire consequences for the retailer, whose trading profit fell 39,3 % in 2013 (Massmart, 2014b). The distribution centres currently operate as stock storage facilities and stock levels are excessive. The organisation must create a task team to reduce inventory before adopting new sourcing activities.

Finally, Massdiscounters is encouraged to adopt an "every-day-low-prices" (EDLP) approach. This implies that promotion activities are minimised to reduce variability within the supply chain. According to Schniederjans, Legrand, Hill, Watson, Lewis, Cacioppi and Jayaraman (2013: unknown), excessive supply chain costs are attributed to pricing changes and bulk buys. Amplified fluctuations and uncertainty across a supply chain are solved by sharing actual demand information, reducing order sizes and employing a strategy of EDLP (Autry *et al.*, 2013). The study recommends that:-

1. The organisational strategy be revised such that each internal division work as a cohesive unit
2. The business structure be amended to ensure that divisions which have a direct impact on the supply chain be grouped together
3. Aggressive investment in systems and information technology tools become a driving tactic for the organisation
4. Massdiscounters ensure that information systems adopted are equipped to facilitate supply chain collaboration
5. Adoption of an "every-day-low-prices" (EDLP) approach to retail, thereby limiting supply chain variability caused by frequent price fluctuations

6.2 Contribution of the study

South African retailers are exposed to tough challenges in an economy which has witnessed a reduction in consumer disposable income. Supply chain networks in South Africa face the challenges of available technology, the risk of breach of information confidentiality, poor inventory control mechanisms and a lack of supply chain skills. The study aimed to provide information to organisations which are embarking on the supply chain journey. It highlighted the complex challenges confronting organisations that have identified a need for optimised information sharing but lack the tools to drive it effectively.

6.3 Limitations and delimitations

This study was confined to the Durban region. Therefore, data was not collected from store managers in the Gauteng and Cape Town regions. Furthermore Africa stores were not included in the study. Another limitation is that the study was confined to the Massdiscounters chain, which is only one operating format within the Massmart group. This was due to the fact that the four operating formats under the Massmart banner have completely different characteristics. For instance, Masscash is a wholesale group, Massbuild supplies building and household type products and Masswarehouse is a retail and wholesale operation. The limitation lies in the fact that, while similar challenges exist across the entire group, these were not taken into account. The delimitations are that the researcher is employed within the supply chain corporate division of the Massdiscounters business. This ensured that supply chain managers and suppliers were more willing to participate in the study.

6.4 Opportunities for further research

This research study has identified a number of opportunities for further research. Should Massdiscounters decide to make structural changes; the interest will turn to the manner in which the SAP system is rolled out. System programmes' usability for supply chain performance and information sharing could be tested by a future study.

Furthermore, a similar study could be conducted on all four Massmart operating formats. With SAP system implementation and Walmart's acquisition of Massmart, it is expected that the four operating formats will be consolidated. Stock will be purchased using joint procurement methods and will be distributed utilising a central logistics network (Roberts and Berg, 2012: 65). Given the complexity of the Massdiscounters business units; further research opportunities lie in a study of information sharing and the integration of the four formats which currently operate completely independently. In fact, some stores under these banners compete with one

another; for instance, Game and Makro compete for market share in the electronics product category.

6.5 Conclusion

This research study has confirmed that optimised information sharing across the extended enterprise depends on information systems and technological tools. The benefits of CPFR, good supplier relationship management, clearly defined supply chain distribution strategies and effective category management cannot be overemphasised. The retailer faces a challenge in recognising and acknowledging the problem areas in order to take remedial action. The state of the supply chain at Massdiscounters offers hope for the future. The real challenge will be discarding past behaviours and inefficient activities. This requires rapid change management. SAP implementation is on the horizon but only within the next four years. The logistics network and forecasting tool is in place. However, before the organisation can reap the benefits of this investment, a task team must create streamlined process drivers and foster a culture of information sharing across the organisation. As noted earlier, supply chain optimisation and effectiveness does not belong to a particular trading partner or business unit. Indeed, supply chain efficiency is the responsibility of each individual involved in a retail business.

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APPENDICES

Appendix A: Frequency Distribution, correlation and collinearity diagnostics

Table A.1: Business-to- business information technology systems

B2B IT Systems	Frequency	Percent	Cumulative Percent
One	54	38	38
Two	24	17	55
Three	55	38	93
Four or more	10	7	100
Total	143	100	

Table A.2: Information sharing across departments

Information sharing across departments	Frequency	Percent	Cumulative Percent
Hourly	78	54	55
Daily	48	34	88
Weekly	17	12	100
Total	143	100	

Table A.3: Information sharing across enterprises

Information sharing across enterprises	Frequency	Percent	Valid Percent	Cumulative Percent
Hourly	48	34	34	34
Daily	31	22	22	55
Weekly	44	30	30	86
Monthly	19	13	13	99
Less than 12 times a year	1	1	1	100
Total	143	100	100	

Table A.4: Innovative electronic systems

Innovative electronic systems		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Weekly	3	2	2	2
	Monthly	7	5	5	7
	Once a year	78	55	55	62
	Once in 5 years	54	37	37	99
	Once in 10 years	1	1	1	100
	Total	143	100.0	100.0	

Table A.5: Pearson Correlation coefficients

		1	2	3	4	5	6	7	8	9	10
Pearson Correlation	1	1	-0.332	-0.316	-0.207	-0.204	-0.094	-0.142	-0.334	-0.35	-0.083
	2	-0.332	1	0.83	0.69	0.387	-0.216	0.205	0.417	0.408	0.345
	3	-0.316	0.83	1	0.685	0.366	-0.112	0.258	0.306	0.352	0.211
	4	-0.207	0.69	0.685	1	0.518	-0.055	0.204	0.34	0.208	0.419
	5	-0.204	0.387	0.366	0.518	1	-0.025	0.109	0.465	0.383	0.452
	6	-0.094	-0.216	-0.112	-0.055	-0.025	1	0.475	-0.095	-0.373	-0.155
	7	-0.142	0.205	0.258	0.204	0.109	0.475	1	-0.016	-0.008	0.007
	8	-0.334	0.417	0.306	0.34	0.465	-0.095	-0.016	1	0.691	0.687
	9	-0.35	0.408	0.352	0.208	0.383	-0.373	-0.008	0.691	1	0.49
	10	-0.083	0.345	0.211	0.419	0.452	-0.155	0.007	0.687	0.49	1
	11	-0.032	0.07	0.014	0.06	0.294	-0.079	-0.049	0.282	0.192	0.272
	12	-0.523	0.311	0.262	0.227	0.426	0.122	0.112	0.455	0.352	0.313
	13	-0.151	0.272	0.217	0.233	0.413	0.003	0.116	0.383	0.344	0.302
	14	0.074	-0.039	-0.148	-0.036	0.207	-0.095	-0.292	0.224	0.141	0.271
	15	-0.109	-0.126	-0.132	-0.185	-0.227	0.384	0.444	-0.242	-0.209	-0.317
	16	0.076	-0.255	-0.318	-0.22	-0.083	0.176	0.471	-0.089	-0.092	-0.012
	17	-0.162	0.261	0.285	0.251	0.429	-0.23	0.15	0.455	0.616	0.402
	18	-0.374	0.391	0.364	0.275	0.373	0.039	0.078	0.574	0.475	0.541
	19	-0.029	-0.132	-0.201	-0.109	0.036	0.347	0.487	-0.123	-0.189	-0.091
	20	0.028	0.226	0.14	0.092	0.282	-0.042	0.218	0.226	0.33	0.246
	21	-0.209	0.211	0.112	0.105	0.264	-0.207	0.202	0.268	0.427	0.254

1= optimised information sharing, 2= information systems built in functions, 3= forecast collaboratively,4= information protection, 5=willing to cooperate, 6= order batching,7= forecast information exchange,8= performance problems, 9= inbound order fulfillment,10= supplier performance monitored, 11= regular promotional activity, 12= centralised distribution model, 13= risk pooling, 14= replenishment, 15= customer requirements, 16= product access, 17= product categories, 18= different models per category, 19= common objectives, 20= shelf space, 21= stock levels

**. . Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table A.6: Pearson Correlation Coefficients

		11	12	13	14	15	16	17	18	19	20	21
Pearson Correlation	1	-0.032	-0.523	-0.151	0.074	-0.109	0.076	-0.162	-0.374	-0.029	0.028	-0.209
	2	0.07	0.311	0.272	-0.039	-0.126	-0.255	0.261	0.391	-0.132	0.226	0.211
	3	0.014	0.262	0.217	-0.148	-0.132	-0.318	0.285	0.364	-0.201	0.14	0.112
	4	0.06	0.227	0.233	-0.036	-0.185	-0.22	0.251	0.275	-0.109	0.092	0.105
	5	0.294	0.426	0.413	0.207	-0.227	-0.083	0.429	0.373	0.036	0.282	0.264
	6	-0.079	0.122	0.003	-0.095	0.384	0.176	-0.23	0.039	0.347	-0.042	-0.207
	7	-0.049	0.112	0.116	-0.292	0.444	0.471	0.15	0.078	0.487	0.218	0.202
	8	0.282	0.455	0.383	0.224	-0.242	-0.089	0.455	0.574	-0.123	0.226	0.268
	9	0.192	0.352	0.344	0.141	-0.209	-0.092	0.616	0.475	-0.189	0.33	0.427
	10	0.272	0.313	0.302	0.271	-0.317	-0.012	0.402	0.541	-0.091	0.246	0.254
	11	1	0.531	0.614	0.557	-0.112	-0.13	0.538	0.13	0.006	0.28	0.08
	12	0.531	1	0.703	0.377	0.043	-0.157	0.505	0.378	0.095	0.342	0.311
	13	0.614	0.703	1	0.528	-0.006	-0.065	0.643	0.354	0.128	0.413	0.333
	14	0.557	0.377	0.528	1	-0.069	-0.276	0.351	0.201	-0.154	0.241	-0.007
	15	-0.112	0.043	-0.006	-0.069	1	0.537	-0.092	-0.063	0.641	0.17	0.319
	16	-0.13	-0.157	-0.065	-0.276	0.537	1	0.105	-0.049	0.658	0.188	0.412
	17	0.538	0.505	0.643	0.351	-0.092	0.105	1	0.394	0.037	0.425	0.41
	18	0.13	0.378	0.354	0.201	-0.063	-0.049	0.394	1	0.063	0.213	0.269
	19	0.006	0.095	0.128	-0.154	0.641	0.658	0.037	0.063	1	0.279	0.404
	20	0.28	0.342	0.413	0.241	0.17	0.188	0.425	0.213	0.279	1	0.589
	21	0.08	0.311	0.333	-0.007	0.319	0.412	0.41	0.269	0.404	0.589	1

1= optimised information sharing, 2= information systems built in functions, 3= forecast collaboratively,4= information protection, 5=willing to cooperate, 6= order batching,7= forecast information exchange,8= performance problems, 9= inbound order fulfillment,10= supplier performance monitored, 11= regular promotional activity, 12= centralised distribution model, 13= risk pooling, 14= replenishment, 15= customer requirements, 16= product access, 17= product categories, 18= different models per category, 19= common objectives, 20= shelf space, 21= stock levels

**. . Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table A.7: Pearson Correlation Coefficients

		1	2	3	4	5	6	7	8	9	10
Sig. (1-tailed)	1		0	0	0.007	0.007	0.131	0.046	0	0	0.161
	2	0		0	0	0	0.005	0.007	0	0	0
	3	0	0		0	0	0.091	0.001	0	0	0.006
	4	0.007	0	0		0	0.255	0.007	0	0.006	0
	5	0.007	0	0	0		0.384	0.098	0	0	0
	6	0.131	0.005	0.091	0.255	0.384		0	0.13	0	0.032
	7	0.046	0.007	0.001	0.007	0.098	0		0.427	0.462	0.468
	8	0	0	0	0	0	0.13	0.427		0	0
	9	0	0	0	0.006	0	0	0.462	0		0
	10	0.161	0	0.006	0	0	0.032	0.468	0	0	
	11	0.353	0.203	0.436	0.237	0	0.173	0.28	0	0.011	0.001
	12	0	0	0.001	0.003	0	0.074	0.092	0	0	0
	13	0.036	0.001	0.005	0.003	0	0.488	0.083	0	0	0
	14	0.189	0.321	0.039	0.334	0.007	0.13	0	0.004	0.047	0.001
	15	0.098	0.067	0.059	0.014	0.003	0	0	0.002	0.006	0
	16	0.183	0.001	0	0.004	0.162	0.018	0	0.144	0.138	0.445
	17	0.027	0.001	0	0.001	0	0.003	0.036	0	0	0
	18	0	0	0	0	0	0.323	0.178	0	0	0
	19	0.365	0.058	0.008	0.097	0.336	0	0	0.072	0.012	0.139
	20	0.368	0.003	0.048	0.137	0	0.31	0.004	0.003	0	0.002
	21	0.006	0.006	0.091	0.105	0.001	0.007	0.008	0.001	0	0.001

1= optimised information sharing, 2= information systems built in functions, 3= forecast collaboratively,4= information protection, 5=willing to cooperate, 6= order batching,7= forecast information exchange,8= performance problems, 9= inbound order fulfillment,10= supplier performance monitored, 11= regular promotional activity, 12= centralised distribution model, 13= risk pooling, 14= replenishment, 15= customer requirements, 16= product access, 17= product categories, 18= different models per category, 19= common objectives, 20= shelf space, 21= stock levels

**. . Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table A.8: Pearson Correlation Coefficients

		11	12	13	14	15	16	17	18	19	20	21
Sig. (1-tailed)	1	0.353	0	0.036	0.189	0.098	0.183	0.027	0	0.365	0.368	0.006
	2	0.203	0	0.001	0.321	0.067	0.001	0.001	0	0.058	0.003	0.006
	3	0.436	0.001	0.005	0.039	0.059	0	0	0	0.008	0.048	0.091
	4	0.237	0.003	0.003	0.334	0.014	0.004	0.001	0	0.097	0.137	0.105
	5	0	0	0	0.007	0.003	0.162	0	0	0.336	0	0.001
	6	0.173	0.074	0.488	0.13	0	0.018	0.003	0.323	0	0.31	0.007
	7	0.28	0.092	0.083	0	0	0	0.036	0.178	0	0.004	0.008
	8	0	0	0	0.004	0.002	0.144	0	0	0.072	0.003	0.001
	9	0.011	0	0	0.047	0.006	0.138	0	0	0.012	0	0
	10	0.001	0	0	0.001	0	0.445	0	0	0.139	0.002	0.001
	11		0	0	0	0.092	0.061	0	0.061	0.472	0	0.17
	12	0		0	0	0.307	0.031	0	0	0.128	0	0
	13	0	0		0	0.471	0.221	0	0	0.064	0	0
	14	0	0	0		0.206	0	0	0.008	0.034	0.002	0.465
	15	0.092	0.307	0.471	0.206		0	0.138	0.226	0	0.021	0
	16	0.061	0.031	0.221	0	0		0.107	0.28	0	0.012	0
	17	0	0	0	0	0.138	0.107		0	0.329	0	0
	18	0.061	0	0	0.008	0.226	0.28	0		0.227	0.005	0.001
	19	0.472	0.128	0.064	0.034	0	0	0.329	0.227		0	0
	20	0	0	0	0.002	0.021	0.012	0	0.005	0		0
	21	0.17	0	0	0.465	0	0	0	0.001	0	0	

1= optimised information sharing, 2= information systems built in functions, 3= forecast collaboratively,4= information protection, 5=willing to cooperate, 6= order batching,7= forecast information exchange,8= performance problems, 9= inbound order fulfillment,10= supplier performance monitored, 11= regular promotional activity, 12= centralised distribution model, 13= risk pooling, 14= replenishment, 15= customer requirements, 16= product access, 17= product categories, 18= different models per category, 19= common objectives, 20= shelf space, 21= stock levels

**. . Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table A.9: Unstandardised coefficients

Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	1.711	.093		18.407	.000	1.527	1.895		
	Centralised distribution model	-.144	.020	-.523	-7.284	.000	-.183	-.105	1.000	1.000
2	(Constant)	1.584	.092		17.312	.000	1.403	1.765		
	Centralised distribution model	-.226	.026	-.824	-8.706	.000	-.278	-.175	.505	1.980
	Risk pooling	.113	.025	.428	4.525	.000	.063	.162	.505	1.980
3	(Constant)	1.609	.088		18.270	.000	1.434	1.783		
	Centralised distribution model	-.209	.025	-.759	-8.202	.000	-.259	-.158	.486	2.057
	Risk pooling	.124	.024	.473	5.159	.000	.077	.172	.496	2.016
	Different models per category	-.042	.011	-.255	-3.622	.000	-.064	-.019	.842	1.187
4	(Constant)	1.413	.107		13.203	.000	1.201	1.624		
	Centralised distribution model	-.209	.025	-.761	-8.460	.000	-.258	-.160	.486	2.057
	Risk pooling	.094	.025	.356	3.678	.000	.043	.144	.419	2.388
	Different models per category	-.042	.011	-.258	-3.778	.000	-.064	-.020	.842	1.188
	Replenishment	.073	.024	.225	3.044	.003	.026	.121	.721	1.387
5	(Constant)	1.357	.107		12.664	.000	1.145	1.569		
	Centralised distribution model	-.213	.024	-.776	-8.776	.000	-.261	-.165	.484	2.066
	Risk pooling	.079	.026	.302	3.097	.002	.029	.130	.399	2.509
	Different models per category	-.044	.011	-.269	-4.009	.000	-.066	-.022	.838	1.193
	Replenishment	.072	.024	.220	3.033	.003	.025	.119	.720	1.388
	Shelf space	.040	.016	.174	2.556	.012	.009	.071	.820	1.220
6	(Constant)	1.409	.106		13.269	.000	1.199	1.619		
	Centralised distribution model	-.207	.024	-.755	-8.721	.000	-.254	-.160	.481	2.081
	Risk pooling	.084	.025	.321	3.368	.001	.035	.134	.396	2.522

	Different models per category	-.032	.012	-.194	-2.732	.007	-.054	-.009	.717	1.395
	Replenishment	.067	.023	.206	2.900	.004	.021	.113	.717	1.396
	Shelf space	.049	.016	.212	3.136	.002	.018	.079	.786	1.272
	Inbound order fulfillment	-.041	.015	-.201	-2.806	.006	-.070	-.012	.699	1.431
7	**(Constant)**	1.235	.115		10.740	.000	1.007	1.462		
	Centralised distribution model	-.210	.023	-.764	-9.147	.000	-.255	-.164	.480	2.083
	Risk pooling	.088	.024	.335	3.638	.000	.040	.136	.396	2.527
	Different models per category	-.047	.012	-.285	-3.876	.000	-.070	-.023	.618	1.619
	Replenishment	.054	.023	.166	2.387	.018	.009	.099	.695	1.438
	Shelf space	.046	.015	.201	3.074	.003	.016	.076	.784	1.276
	Inbound order fulfillment	-.055	.015	-.271	-3.751	.000	-.084	-.026	.641	1.561
	Supplier performance monitored	.080	.024	.248	3.348	.001	.033	.128	.612	1.634

a. Dependent Variable: optimised information sharing

Table A.10: Excluded variables

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics: Tolerance	VIF	Minimum Tolerance
1	Information systems built in functions	-.187[b]	-2.525	.013	-.209	.903	1.107	.903
	Forecast collaboratively	-.193[b]	-2.644	.009	-.218	.931	1.074	.931
	Information protection	-.093[b]	-1.260	.210	-.106	.948	1.054	.948
	Willing to cooperate	.023[b]	.290	.772	.025	.818	1.222	.818
	Order batching	-.031[b]	-.432	.667	-.036	.985	1.015	.985
	Forecast information exchange	-.084[b]	-1.168	.245	-.098	.988	1.013	.988
	Performance problems	-.121[b]	-1.507	.134	-.126	.793	1.261	.793
	Inbound order fulfillment	-.189[b]	-2.512	.013	-.208	.876	1.141	.876
	Supplier performance monitored	.089[b]	1.183	.239	.100	.902	1.109	.902
	Regular promotional activity	.342[b]	4.282	.000	.340	.718	1.393	.718
	Risk pooling	.428[b]	4.525	.000	.357	.505	1.980	.505
	Replenishment	.316[b]	4.333	.000	.344	.858	1.166	.858
	Customer requirements	-.087[b]	-1.209	.229	-.102	.998	1.002	.998
	Product access	-.006[b]	-.082	.935	-.007	.975	1.025	.975
	Product categories	.137[b]	1.654	.100	.138	.745	1.342	.745

	Different models per category	-.206[b]	-2.721	.007	-.224	.857	1.166	.857
	Common objectives	.021[b]	.291	.772	.025	.991	1.009	.991
	Shelf space	.235[b]	3.171	.002	.259	.883	1.133	.883
	Stock levels	-.051[b]	-.678	.499	-.057	.903	1.107	.903
2	Information systems built in functions	-.213[c]	-3.095	.002	-.254	.898	1.114	.489
	Forecast collaboratively	-.208[c]	-3.073	.003	-.252	.929	1.076	.493
	Information protection	-.127[c]	-1.844	.067	-.155	.938	1.066	.500
	Willing to cooperate	-.038[c]	-.495	.621	-.042	.793	1.261	.483
	Order batching	.005[c]	.071	.944	.006	.972	1.029	.491
	Forecast information exchange	-.101[c]	-1.495	.137	-.126	.985	1.016	.504
	Performance problems	-.157[c]	-2.085	.039	-.174	.785	1.274	.465
	Inbound order fulfillment	-.241[c]	-3.447	.001	-.281	.858	1.165	.491
	Supplier performance monitored	.051[c]	.715	.476	.061	.889	1.125	.494
	Regular promotional activity	.236[c]	2.795	.006	.231	.603	1.658	.424
	Replenishment	.220[c]	2.850	.005	.235	.721	1.387	.425
	Customer requirements	-.071[c]	-1.060	.291	-.090	.996	1.004	.503
	Product access	-.026[c]	-.382	.703	-.032	.971	1.030	.493
	Product categories	-.037[c]	-.417	.677	-.035	.581	1.721	.394
	Different models per category	-.255[c]	-3.622	.000	-.294	.842	1.187	.486
	Common objectives	-.005[c]	-.076	.939	-.006	.984	1.017	.501
	Shelf space	.162[c]	2.214	.028	.185	.824	1.214	.471
	Stock levels	-.108[c]	-1.515	.132	-.127	.877	1.140	.491
3	Information systems built in functions	-.152[d]	-2.159	.033	-.181	.815	1.228	.479
	Forecast collaboratively	-.150[d]	-2.171	.032	-.182	.849	1.177	.481
	Information protection	-.082[d]	-1.211	.228	-.103	.901	1.110	.485
	Willing to cooperate	.026[d]	.343	.732	.029	.749	1.335	.473
	Order batching	.007[d]	.103	.918	.009	.972	1.029	.473
	Forecast information exchange	-.094[d]	-1.443	.151	-.122	.984	1.017	.486
	Performance problems	-.038[d]	-.461	.646	-.039	.603	1.658	.463
	Inbound order fulfillment	-.169[d]	-2.277	.024	-.190	.732	1.366	.482
	Supplier performance monitored	.216[d]	2.858	.005	.236	.691	1.448	.484
	Regular promotional activity	.194[d]	2.338	.021	.195	.588	1.700	.410
	Replenishment	.225[d]	3.044	.003	.251	.721	1.387	.419
	Customer requirements	-.091[d]	-1.403	.163	-.119	.989	1.011	.483
	Product access	-.026[d]	-.390	.697	-.033	.971	1.030	.475
	Product categories	.032[d]	.365	.716	.031	.553	1.807	.394
	Common objectives	-.001[d]	-.014	.989	-.001	.983	1.017	.486
	Shelf space	.179[d]	2.567	.011	.213	.821	1.219	.465
	Stock levels	-.072[d]	-1.030	.305	-.087	.857	1.167	.483
4	Information systems built in functions	-.107[e]	-1.500	.136	-.127	.766	1.306	.411
	Forecast collaboratively	-.090[e]	-1.241	.217	-.105	.750	1.333	.409

	Information protection	-.043[e]	-.643	.522	-.055	.864	1.157	.409
	Willing to cooperate	.030[e]	.417	.677	.036	.749	1.336	.410
	Order batching	.030[e]	.463	.644	.040	.958	1.043	.417
	Forecast information exchange	-.015[e]	-.218	.828	-.019	.810	1.235	.397
	Performance problems	-.044[e]	-.538	.591	-.046	.603	1.659	.418
	Inbound order fulfillment	-.156[e]	-2.146	.034	-.180	.729	1.372	.413
	Supplier performance monitored	.187[e]	2.493	.014	.208	.676	1.480	.419
	Regular promotional activity	.120[e]	1.374	.172	.117	.513	1.951	.384
	Customer requirements	-.076[e]	-1.209	.229	-.103	.983	1.017	.419
	Product access	.033[e]	.490	.625	.042	.891	1.122	.406
	Product categories	.028[e]	.337	.737	.029	.553	1.808	.345
	Common objectives	.053[e]	.814	.417	.069	.915	1.093	.405
	Shelf space	.174[e]	2.556	.012	.213	.820	1.220	.399
	Stock levels	-.024[e]	-.349	.728	-.030	.809	1.236	.396
5	Information systems built in functions	-.129[f]	-1.843	.068	-.156	.756	1.323	.394
	Forecast collaboratively	-.097[f]	-1.367	.174	-.116	.749	1.336	.391
	Information protection	-.040[f]	-.603	.547	-.052	.864	1.158	.389
	Willing to cooperate	.011[f]	.148	.883	.013	.740	1.352	.393
	Order batching	.039[f]	.626	.533	.054	.955	1.047	.398
	Forecast information exchange	-.055[f]	-.791	.430	-.068	.772	1.295	.386
	Performance problems	-.050[f]	-.633	.528	-.054	.602	1.660	.398
	Inbound order fulfillment	-.201[f]	-2.806	.006	-.234	.699	1.431	.396
	Supplier performance monitored	.168[f]	2.261	.025	.190	.667	1.498	.398
	Regular promotional activity	.114[f]	1.335	.184	.114	.512	1.952	.368
	Customer requirements	-.111[f]	-1.776	.078	-.151	.946	1.057	.398
	Product access	-.014[f]	-.204	.839	-.017	.825	1.213	.393
	Product categories	-.017[f]	-.204	.839	-.017	.528	1.893	.340
	Common objectives	.010[f]	.154	.878	.013	.850	1.176	.392
	Stock levels	-.168[f]	-2.097	.038	-.177	.572	1.749	.391
6	Information systems built in functions	-.092[g]	-1.300	.196	-.111	.720	1.388	.393
	Forecast collaboratively	-.064[g]	-.907	.366	-.078	.725	1.380	.390
	Willing to cooperate	-.031[g]	-.478	.633	-.041	.862	1.161	.387
	Willing to cooperate	.044[g]	.626	.532	.054	.719	1.391	.392
	Order batching	-.059[g]	-.835	.405	-.072	.727	1.376	.396
	Forecast information exchange	-.090[g]	-1.300	.196	-.111	.751	1.332	.381
	Performance problems	.105[g]	1.120	.265	.096	.412	2.425	.396
	Supplier performance monitored	.248[g]	3.348	.001	.277	.612	1.634	.396
	Regular promotional activity	.120[g]	1.438	.153	.123	.512	1.953	.367
	Customer requirements	-.173[g]	-2.759	.007	-.231	.873	1.146	.396
	Product access	-.041[g]	-.608	.544	-.052	.808	1.237	.390
	Product categories	.126[g]	1.339	.183	.114	.402	2.490	.334

	Common objectives	-.071[g]	-1.012	.313	-.087	.722	1.386	.385
	Stock levels	-.123[g]	-1.513	.133	-.129	.540	1.851	.391
7	Information systems built in functions	-.123[h]	-1.802	.074	-.154	.709	1.411	.392
	Forecast collaboratively	-.063[h]	-.923	.357	-.080	.725	1.380	.389
	Willing to cooperate	-.123[h]	-1.858	.065	-.159	.748	1.338	.383
	Willing to cooperate	-.014[h]	-.195	.846	-.017	.674	1.484	.390
	Order batching	-.041[h]	-.608	.544	-.052	.722	1.384	.396
	Forecast information exchange	-.096[h]	-1.448	.150	-.124	.750	1.333	.381
	Performance problems	-.049[h]	-.480	.632	-.041	.320	3.125	.320
	Regular promotional activity	.082[h]	1.008	.315	.087	.501	1.995	.364
	Customer requirements	-.119[h]	-1.835	.069	-.157	.784	1.276	.395
	Product access	-.063[h]	-.972	.333	-.084	.800	1.249	.388
	Product categories	.112[h]	1.231	.220	.106	.401	2.496	.333
	Common objectives	-.056[h]	-.819	.414	-.071	.718	1.392	.385
	Stock levels	-.130[h]	-1.660	.099	-.142	.540	1.852	.390

Table A 11:Excluded variables

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics		
						Tolerance	VIF	Minimum Tolerance
7	Information systems built in functions	-.123[h]	-1.802	0.074	-0.154	0.709	1.411	0.392
	Forecast collaboratively	-.063[h]	-0.923	0.357	-0.08	0.725	1.38	0.389
	Willing to cooperate	-.123[h]	-1.858	0.065	-0.159	0.748	1.338	0.383
	Willing to cooperate	-.014[h]	-0.195	0.846	-0.017	0.674	1.484	0.39
	Order batching	-.041[h]	-0.608	0.544	-0.052	0.722	1.384	0.396
	Forecast information exchange	-.096[h]	-1.448	0.15	-0.124	0.75	1.333	0.381
	Performance problems	-.049[h]	-0.48	0.632	-0.041	0.32	3.125	0.32
	Regular promotional activity	.082[h]	1.008	0.315	0.087	0.501	1.995	0.364
	Customer requirements	-.119[h]	-1.835	0.069	-0.157	0.784	1.276	0.395
	Product access	-.063[h]	-0.972	0.333	-0.084	0.8	1.249	0.388
	Product categories	.112[h]	1.231	0.22	0.106	0.401	2.496	0.333
	Common objectives	-.056[h]	-0.819	0.414	-0.071	0.718	1.392	0.385
	Stock levels	-.130[h]	-1.66	0.099	-0.142	0.54	1.852	0.39

Table A.12: Collinearity diagnostics

Model		Eigen value	Condition Index	Variance Proportions (Constant)	Centralised distribution model	Risk pool	Different models per category	Replenish	Shelf space	Inbound order	Supplier perform
1	1	1.988	1.000	.01	.01						
	2	.012	12.837	.99	.99						
2	1	2.978	1.000	.00	.00	.00					
	2	.015	14.180	.96	.08	.23					
	3	.008	19.905	.04	.92	.76					
3	1	3.918	1.000	.00	.00	.00	.00				
	2	.060	8.111	.04	.01	.02	.98				
	3	.015	16.346	.92	.08	.25	.01				
	4	.007	22.865	.04	.91	.73	.00				
4	1	4.903	1.000	.00	.00	.00	.00	.00			
	2	.065	8.709	.01	.00	.01	.96	.01			
	3	.016	17.365	.25	.18	.20	.04	.12			
	4	.010	22.027	.37	.27	.16	.00	.44			
	5	.006	28.195	.36	.55	.63	.00	.42			
5	1	5.868	1.000	.00	.00	.00	.00	.00	.00		
	2	.067	9.331	.01	.00	.00	.94	.01	.04		
	3	.032	13.472	.02	.02	.01	.01	.04	.93		
	4	.016	19.031	.24	.19	.19	.04	.11	.01		
	5	.010	24.109	.35	.28	.15	.00	.43	.00		
	6	.006	31.110	.38	.51	.64	.00	.41	.02		
6	1	6.831	1.000	.00	.00	.00	.00	.00	.00	.00	
	2	.070	9.879	.01	.00	.00	.66	.01	.04	.04	
	3	.037	13.578	.01	.01	.01	.15	.03	.19	.58	
	4	.030	15.066	.01	.01	.00	.15	.01	.75	.34	
	5	.016	20.533	.23	.19	.19	.03	.11	.01	.00	
	6	.010	26.296	.34	.31	.16	.00	.41	.00	.03	
	7	.006	33.665	.39	.48	.63	.00	.43	.01	.01	
7	1	7.818	1.000	.00	.00	.00	.00	.00	.00	.00	.00
	2	.070	10.567	.01	.00	.00	.56	.01	.04	.03	.00
	3	.037	14.499	.01	.01	.01	.11	.03	.22	.51	.00
	4	.031	15.895	.01	.00	.00	.17	.01	.68	.30	.02
	5	.020	19.913	.07	.14	.17	.00	.01	.04	.04	.15
	6	.011	27.146	.03	.31	.03	.03	.57	.00	.07	.14
	7	.008	31.798	.38	.10	.27	.11	.01	.00	.04	.64
	8	.006	36.258	.48	.44	.52	.02	.37	.01	.00	.05

Appendix B: Questionnaire

UNIVERSITY OF KWAZULU-NATAL

School of Management, IT and Governance

Master's Research Project

Researcher: Kashmira Naidoo (0833545509)

Supervisor: Mr T.P Mbhele (031-2607524)

Research Office: Ms P Ximba (031-2603587)

Title: Optimising Information Sharing within the Massmart Supply chain Network

The purpose of this questionnaire is to generate information from employees of the organisation regarding the supply chain information sharing initiatives and structures of the Massmart group. The information that is provided by your company is strictly private and confidential to the researcher. The questionnaire will take approximately 10-15 minutes to complete.

Thank you for participating!!!

CONSENT

I ***(Optional)*** _____ (full names of participant) hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participating in the research project. I understand that I am at liberty to withdraw from the project at any time, should I so desire.

_____ _____

Signature of Participant Date

Section A: The following questions relate to personal details. Please tick the appropriate answer.

1. Your Gender

Female		Male	

2. Indicate the number of years working in this organization:

Less than 1	1- 3	4 - 6	7 – 10	Over 10

3. What is your job status/level:

Top management	Middle management	First-level	Non-managerial

4. How many business-to-business information technology systems have been implemented in your organization for last 5 years?

One	Two	Three	Four or more	Namely:

5. How often does your organisation share information across departments?

Hourly	Daily	Weekly	Monthly	Less than 12 times a year

6. How often does your organisation share information across enterprises?

Hourly	Daily	Weekly	Monthly	Less than 12 times a year

7. How often does your organisation introduce and implement innovative electronic systems?

Weekly	Monthly	Once a year	Once in 5 years	Once in 10 years

Section B: This section aims to obtain information on dichotomous questions *(Yes or No)* with regard to general perceptions, information sharing and the impact of information technology systems. Please tick the appropriate box below.

8.	The organisation does share information with upstream supply chain partners in order to avoid demand variability	**Yes**	**No**
9.	The organisation does make use of CPFR systems to enhance Supply Chain partnering	**Yes**	**No**
10.	The organisation does believe that internal collaboration (within the various business divisions) has value- adding outcomes by reducing cost and improving efficiency	**Yes**	**No**
11.	The organisation does believe that external collaboration (with and among trading partners such as suppliers, distributors and 3PLs) has value-adding outcomes to mitigate demand variability	**Yes**	**No**
12.	The organisation does share information with and access information from suppliers prior to making any strategic decisions	**Yes**	**No**
13.	The organisation does have a clearly defined distribution strategy (centralised vs decentralised supply chain model)	**Yes**	**No**
14.	Optimised information sharing enhances integrated supply chain activities across the extended enterprises	**Yes**	**No**
15.	The magnitude of supply chain value- added performance outcomes are supported by a CPFR model across functions and enterprises	**Yes**	**No**
16.	Electronically-enabled information sharing tools enhance integration, co-ordination and collaboration in supply chain networks	**Yes**	**No**

Section C:The following questions are based on a Likert scale ranging from 'Strongly agree' (5) to 'Strongly disagree' (1). Please tick the most appropriate answer.

Collaborative Planning, Forecasting and Replenishment (CPFR)

	Strongly agree	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**
17. Your organisation's Information systems have built –in functions which facilitate collaboration with supply chain trading partners	5	4	3	2	1
18. Your organisation is able to forecast and plan collaboratively with supply chain partners through integrated Information systems	5	4	3	2	1
19. Your organisation has a high degree of understanding with supply chain partners about					

protecting exchanged business information	5	4	3	2	1
20. Your organisation has a high degree of willingness to cooperate in business activities with trading partners	5	4	3	2	1

Please rank the Perceived benefits of Collaborative Planning, Forecasting and Replenishment (CPFR) in order of importance

	Not at all important	**Not very important**	**Neutral**	**Somewhat important**	**Extremely important**
21. Decrease inventory	5	4	3	2	1
22. Reduce out-of-stocks	5	4	3	2	1
23. Increase sales	5	4	3	2	1
24. Improve service levels	5	4	3	2	1
25. Improve internal Communication	5	4	3	2	1
26. Improve relations with trading partners	5	4	3	2	1
27. Improve forecast accuracy	5	4	3	2	1

The following questions are based on a Likert scale ranging from 'Strongly agree' (5) to 'Strongly disagree' (1). Please tick the most appropriate answer.

Supplier relationship management

	Strongly agree	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**
28.Your organisation does make use of order batching	5	4	3	2	1
29. There is mutual exchange of information (with trading partners) regarding production, forecasts, plans and schedule requirements	5	4	3	2	1
30. Suppliers and retailers are committed to flexibility and solving performance problems	5	4	3	2	1
31. Order fulfillment for inbound deliveries at regional distribution centres (RDCs) are at a satisfactory level	5	4	3	2	1
32. Suppliers performance is monitored on an on-going basis	5	4	3	2	1

Push versus pull supply chain strategies

33. Your organisation encourages regular promotional activity	5	4	3	2	1
34. Your organisation makes use of a centralised distribution model in its supply chain	5	4	3	2	1
35. Risk pooling is an advantage of a centralised distribution strategy	5	4	3	2	1
36. Your organization replenishes stock from regional distribution centre to store	5	4	3	2	1
37. Your regional distribution centres always hold the acceptable amount of the right product, to satisfy the requirements of your customers	5	4	3	2	1
38. Consumers are able to easily access to the product they are looking to purchase at the retail store	5	4	3	2	1

Category Management

39. Product categories are clearly distinguished	5	4	3	2	1
40. Differing supply chain models are used to manage each product category	5	4	3	2	1
41. The various product/department teams work toward common supply chain goals and objectives	5	4	3	2	1
42. Store shelf space is allocated to a product category based on rate of sale of that product (customer demand)	5	4	3	2	1
43. Each retail store has optimal levels of stock per product category	5	4	3	2	1

Section D:

Which of the followings electronic information systems are used by your organization to share information with supply chain trading partners?

Systems:	**Using**	**Recommended**
Extranet (SAP)		
Electronic Data Interchange (EDI)		
In-house system		
Integrated Electronic Supply chain Management (e-scm)		
Enterprises Resource Planning (ERP)		
E-mail (E- fulfillment, E-Procurement)		
Radio Frequency Identification Device (RFID)		
B2C e-commerce (Customer relationship management systems)		
E-Business Collaboration (Supplier relationship management systems)		
Point-of-Sale (POS)		
E-marketplace		
Electronic Collaboration Forecasting Planning and Replenishment		
Enterprise Application Integration (EAI)		
SAP Advanced Planner and Optimiser (SAP APO)		
Other:		

End of questionnaire

Thank you for participating.

Appendix C: Confirmation of Ethical Clearance

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

20 August 2013

Ms Kashmira Naidoo 205507384
School of Management, IT and Governance
Westville Campus

Protocol reference number: HSS/0812/013M
Project title: Optimising information sharing within the Massmart supply chain network

Dear Ms Naidoo

Expedited Approval

I wish to inform you that your application has been granted Full Approval.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number. Please note: Research data should be securely stored in the discipline/department for a period of 5 years.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

.....
Dr Shenuka Singh (Acting Chair)

/px

cc Supervisor: Mr TP Mbhele
cc Academic Leader Research: Professor B McArthur
cc School Administrator: Ms Hazvinei Muteswa

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Appendix D: Letter from English specialist

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2 June 2014

This is to confirm that I have edited the thesis, "Optimising information sharing within the Massmart supply chain network", by Kashmira Naidoo, student number 205507384.

Yours sincerely,

(Ms) Deanne Collins (MA)

Professional Editor