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Emerging technology influences on the merchandise practises of a retailer: A study of Massbuild South Africa

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in Supply Chain Management
by

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Declaration

I, Amelia Rajkumar **(211529887),** declare that:

- The research presented, except where otherwise indicated, is my original contribution.
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Signature:  **Date: 03 July 2021**

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List of Abbreviations and Acronyms

4IR:	Fourth Industrial Revolution
AI:	Artificial Intelligence
AO:	Assortment Optimisation
APS:	Advanced Production Systems
BI:	Business Intelligence
CKS:	Computer Kited Systems
DATP:	Driver Assisted Trucking Platooning
DIY:	Do It Yourself
EDI:	Electronic Data Interchange
ERP:	Enterprise Retail Planning
E-SCM:	Electronic Supply Chain
F & R:	Forecast and Replenishment
IoT:	Internet of Things
IT:	Information Technology
NFC:	Near Field Communication
POS:	Point of Sale
RDC:	Regional Distribution Centres
RDT:	Resource Dependency Theory
RFID:	Radio-Frequency Identification
SAP:	System Application and Product
SC:	Supply Chain
SCM:	Supply Chain Management
SRM:	Supplier Relationship Management
TOET:	Technological Organisation Environment Theory
VR:	Virtual Reality
WMS:	Warehouse Management System

Abstract

Background: Retailers across the globe are embracing technological advancements in their merchandise and distribution processes. Technology is changing the way every retailer conducts business by helping to create efficiencies, save money, and provide better products and services. Retail companies are also adopting technology to their advantage.

Purpose: The purpose of this research is to understand the impact newer technology implementation has on a retailer's processes, specifically regarding merchandise and distribution. The study examined the current technology available to Massbuild and how these factors impact its daily processes. A prominent challenge in retail is the implementation phase of adopting newer technology, which requires management decision-making.

Methodology: This research study is exploratory. The methodology was qualitative and utilised a semi-structured in-depth interview approach with twelve senior management employees at Massbuild. A purposive sampling method was used to help select participants who fit the criterion. The empirical findings provide insightful and vital information on the benefits and challenges of technology on merchandise and distribution processes.

Findings: The research findings highlight the emerging technologies that will help a retailer focus on improving existing merchandise and distribution processes. The research participants interviewed emphasised particular technologies used by Massbuild and its evolutionary change over the past ten years. There has been a strong emphasis on automation, artificial intelligence and assortment optimisation within Massbuild. Regarding implementation of technology, interview participants provided insight into possible solutions to challenges they encounter within their respective employment roles.

Contribution: Technology is at the forefront of retail and is continually evolving. There are in-depth studies available regarding technology in retail, especially with the influence of the fourth industrial revolution. This research provides fresh insights into the retail field of merchandise and distribution, and provides fruitful insight for future researchers.

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Chapter One:

Introduction to the Study

1.1 Introduction

In a globalised retail environment, a prominent factor that has affected the lives of retailers and customers is the influence of 'technology emergences' (Hart, 2018). At present, the global traditional retail model is not just under pressure but has been forced to incorporate technological change to remain relevant. Because of new technology, retailers have transitioned at a rapid rate, which has required retailers to engage with their customers through improved merchandise and distribution processes (Sopadjieva, Dholakia & Benjamin, 2017, p. 5). Merchandise and distribution are the heart of retail; the success of these two components is dependent on a retailer's ability to adopt the best technologies into its processes. Despite the vast vicissitudes that coexist with the influence of newer technology, retailers ought to persevere in the market by incorporating the best and most cost effective in-house technology to enhance their processes across their supply chain (Lehtisalo, 2018, p. 5) De Villiers, Nieman and Niemann (2017, p. 4) state that technology has made it possible for the world to create a variety of prospects for collaboration within subdivisions of retail. Simultaneously, technology has enabled retailers' capability at a scale, which has not been experienced before (Inman & Nikolova, 2017, p. 12).

Across the retail landscape, there has been an increased rate of technology adoption and technology improvements in a retailer's model. The objective has remained consistent in focus – to add value continuity to products and services rendered to meet customer needs. Through the empowerment of technology, retailers have experienced different methods of understanding purchase behaviour, to enhance better merchandise and distribution processes (Grewal, Roggeveen, & Nordfält, 2017, p. 93). The study aims at understanding the influence of emerging technologies in retail and the influence it has on the merchandise and distribution processes of Massbuild. Existing literature supports the study in understanding the impact of emerging technologies and how it has influenced vital decision-making in merchandise practises. A business report by Khumalo (2019) highlights Massmart as a critical wholesale and retail player in the South African retail market, which forms the case study for this research. Massmart has four operating divisions – Massbuild, Masswarehouse, Massdiscounters and

Masscash. Each division operates independently based on the product mix of the retailer (Massmart, 2018).

The emergence of technology has influenced the objectives of merchandise and distribution at Massmart; as a result, there is a need to centralise these functions through the use of SAP tools. Further, adoptions of other technologies will save the retailer on costs. Currently, each chain operates independently (Massmart, 2018). The focus of this study is on Massbuild, which has a centralised distribution model, with headquarters in Gauteng. According to Palattella, Dohler, Grieco, Rizzo, Torsner, Engel and Ladid (2016, p. 1), many retailers that are influenced by the emergence of new technology provide not only effectiveness and efficiency but offer a financial return on investment by implementing tools such as the Internet of things (IoT). Internet of things is described as the network of physical objects such as sensors, software and other technologies which provide retailers with endless opportunities (Pang, Chen, Han & Zheng, 2015). Internet of things can be used to enhance customer experience, reduce costs and drive growth, and improve overall retail performance. In a multifaceted retail environment driven by technology, customers can be overwhelmed with the amount of information that technology provides both online and in store.

In the retail environment, the merchandise department drives its purchasing decisions. Therefore, through the use of newer technologies (e.g., robotics, cloud computing and artificial intelligence), these technologies can further strengthen the buying power of the department, therefore requiring strategic decisions about which technology to adopt. The term ‘artificial intelligence’ is used to describe machines that mimic ‘cognitive’ functions that humans associate with the human mind, such as learning and problem solving (Gregory, 2020). It is critical to understand the technological influences that change the game so that retailers can better understand the evolving practices in merchandise. With the rapidly evolving retail landscape, retailers have to adopt business models that are data predictive (Grewal, Roggeveen & Nordfält, 2017, p. 94). Retailers are now able to draw significant insights from technological advancements such as big data, AI and demand planning tools to predict customer behaviour and purchasing patterns better (Grewal, Roggeveen & Nordfalt, 2017, p. 95).

1.2 Problem statement

The study focuses on emerging technologies and how they have influenced a retailer's merchandise and distribution processes within the South African context. The purpose of this study is to investigate the influence of emerging technologies in merchandise and distribution processes within Massbuild. In addition, the research problem recognised an opportunity for increased understanding in academia of how technological emergences influence merchandise and distribution processes. As the footprint of Massbuild stores has expanded, deliveries have become more complex and lead times extensive. Massbuild has had to embrace a re-engineered design of the supply chain network to fit enhanced processes (Massmart, 2018). Walmart America has an excellent merchandise and distribution model for integrating technology (Heller, 2018). However, Massmart has a journey to travel regarding the collaboration of distribution, warehousing and merchandise before incorporating emerging technologies (Chinner, 2019). The study aims to contribute to the existing literature on collaboration, which is specific to Enterprise Retail Planning (ERP) and forecasting tools. These are considered to be emerging and existing technological advancements that influence the merchandise and distribution departments, respectively (Scholtz, Kapeso & De Villiers, 2017).

The above-mentioned technological tools have had an upstream effect on the supply chain, as technology has become prominent and remains a central point of discussion. Further, this entails real-time information sharing on factors such as inventory positioning in merchandise and centralising distribution hubs (Mbhele, 2016, p. 6). A study conducted by Alicke, Rachor and Seyfert (2016, p. 20) suggested that operational objectives should be led by merchandise and facilitated through the use of technology, which assists in providing a seamless flow of information to better coordinate plans and achieve organisational objectives. It means that a strong, established, practical, and feasible relationship of technology within the retailer is fundamental. Technology is perceived as a living, breathing organism and a crucial part of merchandise and distribution in retail (Hogg, 2017, p. 5). The current challenge in South Africa (SA) is that management needs to make cognisant decisions after careful consideration of business objectives and strategies, then proceed to develop technological infrastructure.

1.3 Aim of the study

The study aims to understand the influence of emerging technologies on a retailer's merchandise and distribution process within the South African retail landscape. The current

technological emergences – for example, AI – offer an opportunity for retailers to enhance their merchandise processes, to be automated, faster, reliant, and provide accurate data (Hogg, 2017, p. 2). In the business context, an emergence is referred to as the process of coming into being or of becoming important or prominent. According to Hasenfuss from Business Day (2017), Walmart has the resources and financial commodities to enhance Massmart's current deployment of technology that is outdated. The aim is to acquire a greater understanding of how emerging technologies can enhance Massbuild, which has had a great deal of technological advancements in the past two years. The research seeks to draw attention to how technological emergences can benefit both the retailer and its employees, which ultimately enhances the retailer's profitability (Inman & Nikolova, 2017). The research is geographically limited to Massbuild South Africa.

1.4 Research questions

1. What is the current role of technology in merchandise and distribution processes within Massbuild, South Africa?
2. How does the availability of different technologies influence Massbuild's merchandise and distribution processes within South Africa?
3. What are the benefits that Massbuild can acquire when incorporating newer technologies into its merchandise and distribution processes in South Africa?
4. What are the challenges associated with Massbuild adopting technological progressions into its merchandise and distribution processes in South Africa?

1.5 Research objectives

1. To examine the current role of technology in merchandise and distribution processes within Massbuild, South Africa.
2. To understand the influence of the different technologies available to Massbuild's distribution and merchandise processes in South Africa.
3. To determine the potential benefits that Massbuild South Africa can acquire when incorporating the emerging technologies into merchandise and distribution processes.
4. To examine the challenges associated with Massbuild adopting new technological progressions into merchandise and distribution processes.

1.6 Significance of the study

This study will assist both academia and the retail industries at large, as technology and people revolutionise around the concepts of 'emerging technologies'. Previous studies undertaken by Dlamini (2017, p. 4) highlighted that technology is advancing at a rapid speed to new paradigms of technological emergences and it is important for retailers to understand customer behaviour to help tailor their business operations better. Research conducted by Seedat (2017:4) stated that there was an academic need to understand the speed at which technology has been adopted through SA retailers, especially in light of the high financial investments required. A study by Joshi (2019) focused on modern technologies and how these have gifted retailers with several technological advancements which have led to the influence of the fourth industrial revolution (4IR). The 4IR is defined as the fusion of advances in artificial intelligence (AI), robotics, and the Internet of things (IoT), amongst various other technologies (McGinnis, 2018). The 4IR can be recognised as one of the main factors in the rise in technology emergences in merchandise and distribution (Joshi, 2019). The introduction of advanced technologies has led to the automation of a number of workflow processes, benefiting retailers by their use of data-centric approaches and customer-centric product strategies in merchandise processes. However, it is crucial to identify which changes are worth adapting to, and which changes will be short-lived and replaced by another (Gillwald, 2019).

Retailers ought to be cognisant of the emerging technologies available in order to build a resilient and agile supply chain. In a perpetually volatile trading environment, retailers need to rethink which operational and merchandise strategies are sensible and which call for a deeper level of insight and collaboration (Stiles, 2018). This can be achieved by harnessing technological tools such as storing data in the cloud, machine learning and artificial intelligence (AI), which enable a retailer to be responsive and plan for what is to come. The influence of the technologies on processes allows a retailers to save on operational costs, and reduces time and resources required. Cascio and Ramiro (2016, p. 2) stated that with the emergence of technologies, a digital era has come, where businesses are focused on trade of products and services via digitised data, information and knowledge that is based on an infrastructure of information and communication technologies.

A fundamental understanding of how technology has changed work in an organisation also identifies how emerging technologies have assisted in improving the bottom line and managing

organisational growth. The researcher uses the term ‘merchandise’ as opposed to purchasing throughout this study as the retail environment refers to merchandise as purchasing within their respective trading environments. This is further supported by the data findings and analysis from chapter four in which participants referred to merchandising as the commonly accepted term within the Massmart Group.

As indicated in the previous paragraph, the influence of the 4IR is significant to Massmart, as emerging technologies such as AI and big data have become fundamental in the decision-making of merchandise and distribution (Joshi, 2019). Walmart currently uses big data to create emotions to stimulate purchasing. Their main leverage on big data is to optimise shopping experience for customers when they browse the Walmart store or browsing the website through mobile devices when they are in motion (Bradlow, Gangwar, Kopalle & Voleti, 2017, p. 79). A similar approach was adopted by Masswarehouses (Makro) through the use of a customer card to study customer purchase patterns. Retailers that use data analytics now have the resources to satisfy customer demands, enabling merchandise to plan stocks better (Palazzo, 2018). Tipping and Kauscher (2016, p. 6), in their research, signify the importance of the internet and how the internet has been an emerging trend that has enabled communication between internal employees, stakeholders and customers around the world through chatbots and specialised software. The research studies the phenomenon within Massbuild, also known as Builders Warehouse, to identify which technologies have had positive outcomes in the merchandise department’s processes and have created a competitive advantage for the retailer. Academics and practitioners in the supply chain might find the case study useful as it aggregates significant views with reference to technological emergences and how the retailer reacts to changes within its retail environment.

1.7 Background of the research

According to the South African Reserve Bank (2017), retailers are in a transition phase due to the developments brought about by new technology. The retail section within the SA economy remains important, considering the contribution of customer consumption levels to the country’s GDP. Chui, Manyika and Miremadi (2016, p. 6) described how technology is evolving information management in the form of software applications and operational activities through the knowledge of material variability, and the nature of research processes. A study conducted by Alicke *et al.* (2016, p. 13) emphasized the emergence of technology as

a conductor and facilitator of better service, rather than focusing on the end point. Kost (2020) identified that managers need to make tactical technological decisions in considering all implications involved and how staff may interact with technological adoptions. According to Shaw (2018), adoption of emerging technologies in retail practises is continually hampered by high costs of bandwidth and data storage. However, this limitation should not retract from reshaping offerings to customers that will reduce long term costs and enable expansion to more customers. Ultimately, retailers are shifting their focus to the emergence of new technologies as a solution to drive foot traffic and increase customer engagement, move stock quicker, and improve the overall shopping experience in-store, using a digitised approach (Shaw, 2018). Inskip (2019) stated that at Massmart, there has been a digital revolution that has been perceived as an opportunity to better serve customers and enhance employees' experience, making their roles more efficient. The assistance of technology has created a demand in orders thus resulting in increased sales and systematised the order fulfilment process, thereby directing the overall supply chain towards success, with minimal human intervention. SAP has been a major influence on merchandise and distribution (SAP Hana, 2020). The adoption of SAP has led to immediate notifications, allowing for accurate forecasts and order volumes, and efficient inventory management, to reduce costs and delays in distribution.

The influence of new emerging technologies is explored in this study, as well as the potential benefits and challenges that retailers encounter when implementing emerging technologies into their merchandise and distribution operations. There has been a lack of research regarding the influence of emerging technologies in SA retail with reference to merchandise and distribution. In order to ascertain an understanding of this phenomenon, it is vital to explore how employees and customers relate and interact with technology (Nöjd, Trischler, Otterbring, Andersson & Wastlund, 2020, p. 88). The underlying theme of this research highlights the influence of emerging technologies within a retailers' merchandise and distribution processes. The output of the new technology is used to determine whether it is optimally integrated with the buy-in and delivery process, thereby increasing the efficiency of the entire supply chain.

1.8 Background of the company

Massmart is the third biggest retailer in South Africa and Africa. It consists of the following chains: Masswarehouses, Masscash, Massdiscounters and Massbuild. The majority of the chains operate from a decentralised distribution centre, while decision-making is ninety percent

centralised. Figure 1.1 depicts the business format of Massmart. The research is based on the Massbuild chain and its merchandise and distribution processes. Massbuild is predominantly a general merchandise Do It Yourself (DIY) Hardware store for home improvement and leisure products. The current business model for Massbuild is continuously evolving into a convenient customer store, to own the market in DIY and Home Improvement. The merchandise team at Massbuild makes use of a push-pull distribution strategy based on sales achieved through customer demands. The distribution network at Massbuild SA consists of three regional distribution centres across Gauteng, Cape Town and KwaZulu-Natal, with the Gauteng Regional Distribution Centre distributing across Africa to regional stores. However, stock fulfilment is not achieved timeously and some stores have to wait on stock, which poses a constraint to the delivery model. Massbuild is currently in an alliance with the other chains to share distribution facilities.

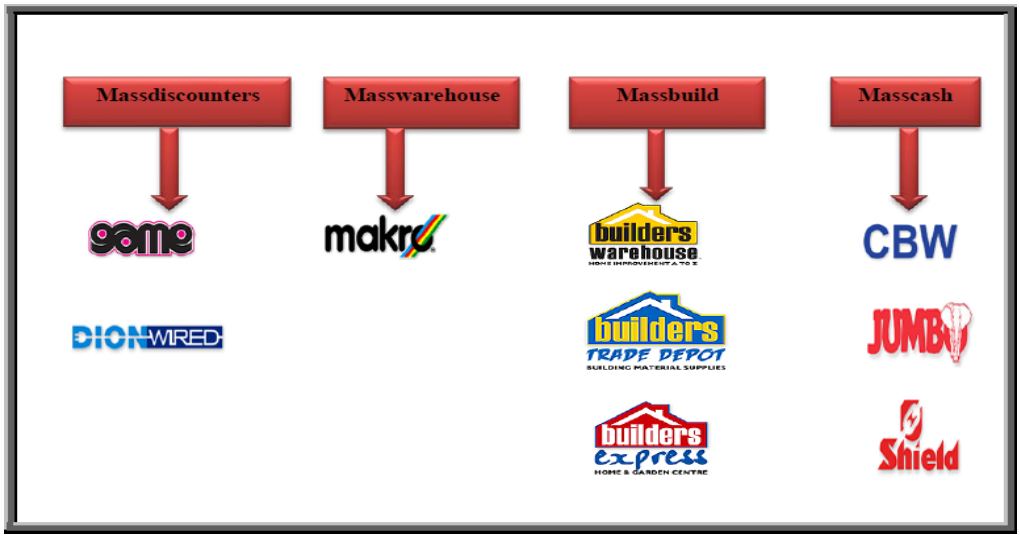

Figure 1.1: Business overview

Source: Massmart, 2018.

The divisions that exist at Massbuild are discussed in the next section, namely, supply chain, IT, merchandise, finance and marketing. This helps gauge the organisational structure that exists within the retailer. In addition, the supply chain consists of logistics and IT, which are driven by the supply chain director who has been in the position for five years. Conversely, supply chain and merchandise continue to be seen as two different departments, as both have independent goals. The retail model is a highly promotion-driven business, which is why Massbuild needs to strive towards taking market share from its external competition. According to Hayward (2018), Masswarehouses and Massbuild are currently the only two market players

that have successfully integrated Systems Applications and Products (SAP) software solutions that are seamless and efficient to process point of sale. Masscash and Massdiscounters are currently in the process of also integrating SAP. Soon all four chains will be sharing regional distribution centres to perform a central order purchasing function; for this to be successful, a tremendous level of collaborative planning and replenishment is required among all active supply chain participants (Letaba, 2018, p. 2).

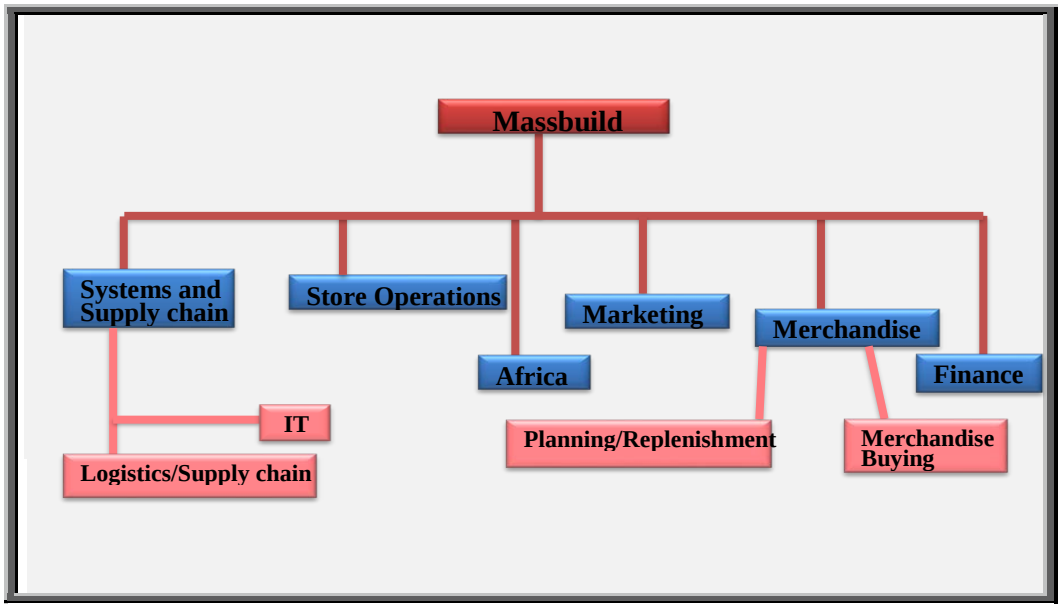

Figure 1.2: Massbuild divisional structure

Source: Author's own construct

The above figure illustrates the divisional structure at Massbuild. The merchandise department is responsible for buying, selling, costing, standardising, product sourcing, forecasting and placing orders for a retailer. Merchandise is the heart of retail and varies from procurement (Hogg, 2017, p. 1).

1.9 Limitations of the study

- The main focus was on Massbuild (a division of Massmart Holdings) within the merchandise and distribution departments; hence data was not compared against other retailers but rather with the other groups that exist within Massmart, such as Massdiscounters and Masswarehouses.

- It was challenging to arrange meetings with top line management due to their availability and time constraints. Interviews were swift and prompt due to time constraints.
- The sample size of twelve participants in this research was small, possibly limiting the variety of opinions and suggested recommendations.

1.10 Motivation for the study

The research focus is on Massbuild, a chain within the Massmart Group. Massbuild is known as a DIY home improvement retailer which is founded on an innovation-driven model. The retailer has experienced slow technological progression, which, in 2014, reflected in reduced trading profit (Massmart, 2018). With a focus on merchandise and distribution, it has sought to develop internal integration of systems for the benefit of both the end customer and supplier. Economies around the world are becoming more interconnected, and supply chains are expanding globally. In this context, focal points of order fulfilment, product sourcing, warehousing and distribution have sparked interest of scholars and practitioners. With Massbuild as the selected retail chain in this study, many South African retailers can find insightful information on how the retailer has conceptualised emerging technologies as both beneficial and detrimental (Ninaus, Diehl, Terlutter, Chan & Huang, 2015, p. 1). The insight provided by the data findings suggest that many retailers struggle when it comes to implementing technology that fits their business strategy and aim. The findings suggest that more needs to be investigated regarding top management and their decision-making when adopting emerging technologies into their retail operations.

1.11 Theoretical framework adopted for this study

- *Emerging technologies and value adding processes*

Emerging technologies have changed the dyadic firm-customer relationship into a many-to-many landscape (Beirao, Patricio & Fisk 2017). According to Teixeira, Patricio, Huang and Fisk (2017, p. 5), retailers have sought to introduce advanced technology options to enhance a customer's journey; for example, the integration of Omnichannel that links customer and retailer. The aim is to enhance service delivery and customer experience through automation, by providing relevant information regarding purchases and complete offerings. The emergence of better technology in merchandise, such as in buying and planning, allows buyers and

planners to fulfil customer needs faster, resulting in repeated purchases as they personalise a customer's shopping experience (Hagberg, Sundstrom & Niklas, 2016, p. 2). The emergence of technologies has added value to retailers as they transform their traditional space into a more digitised way of operating. The era of technology compels a deeper understanding of practical applications of new technology. It is thus helpful to draw on academic research that focuses on the successful implementation of new technology and critical indicators of the challenges encountered when incorporating technologies into practice. The theoretical framework for this study provides a fruitful and fertile framework. The study applies various theories to gain a broader picture of the impact of new technologies on businesses when they adopt new emerging trends into their merchandise activities (Flanding, Grabman & Cox, 2019, p. 19).

- *Emerging technologies perceived as a double-edged sword and the role of age*

Emerging technologies can be perceived as a double-edged sword, primarily due to customers' access to superior and tailored services that increase their sense of autonomy (Hoffman & Novak, 2015, p. 12). A prime example is a customer comparing an online store to a traditional brick-and-mortar store that has different price points. The emergence of various technologies affects the experience of retail business, which includes perceived ease of use for employees, enjoyment, and the propensity of the majority to embrace new technology. However, side effects resulting from the use of more modern technology include intrusiveness and privacy concerns (Nöjd *et al.*, 2020). Previous studies on the adoption and implementation of emerging technologies show conflicting results with reference to age. For example, Yusif, Soar and Baig (2016, p. 180) found age-specific barriers for technology adoption. In contrast, Blut, Wang and Schoefer's (2016, p. 397) study found no relationship between age and the use of technology advancements. Hence, it is essential to assess how age acts as an influence in the general experience of technological adoption into retail processes specific to merchandise and distribution.

1.11.1 Technology Organisation Environment theory

The Technology Organisation Environmental theory known as the TOE framework, created in 1990 by Tornatzky, is regarded as the 'Fleischer method of technical innovation'. The process of innovation was described as stretching the development of innovation, led by engineers and entrepreneurs, through to adoption and implementation of those innovations by users within

the business. The TOE structure is a component of this phase; that is, it refers to how a company takes up the technology implementation process. This organisational theory suits the study well as it focuses on three separate elements: technical, organisational and environmental. These three are favourable to the influence of technological implementation. Baker (2018) suggests that a retailer's old technology is still important as it sets a comprehensive limit on the choice and pace of technological transformation that a retailer can undertake.

The above contexts of TOE can be further described as technology development through organisational conditions. The decision-makers in the organisational hierarchy can reconfigure and capture descriptive measures on scope, organisational culture, business strategies, and complexities of the managerial structure. This is measured by centralisation and vertical differentiation. In this case, the system includes both human and non-human actors, retailers, and technology – a force in the network that deals with the perception of cumulative norms and techno-centric projections of other systems (Awa, Ukoha, Emecheta & Liu, 2016). The TOE theory is an ideal framework in the context of retail, and it will assist in understanding how retailers process decision-making regarding technology implementations on a tactical, strategic and operational level. The framework serves as a guide throughout the study, as it assists Massbuild in its approach to adopt emerging technologies into its processes. An example is adopting AI to automate order forecasts and the decisions that middle and top management need to engage in to adopt the best system-based approach.

1.12 Literature review

The role of technology has become fundamental to both the retail and supply chain in daily merchandise and distribution processes, especially pertaining to the control of information and market knowledge (Woetzel, Sellschop, Chui, Ramaswamy, Nyquist, Robinson, Roelofsen, Rogers & Ross, 2017, p. 59). Technology offers retailers a competitive advantage over the traditional brick-and-mortar stores that have not evolved to use technology. The current goal at Massmart is to increase its ability to respond, through speed and flexibility, to a market that is continuously changing, while depending on big data to collect and analyse customer data through differentiation (Inskip, 2019). In retail, big data refers to large volumes of data used to understand customer patterns and trends that assist retailers to attract more customers (Barasch, 2019, p. 1). Technology remains a key enabler in Massmart's business as it can speed up processes and save delivery costs to the company as a whole (Nirco, 2018). More retailers have

become consciously attentive to and aware of technology in the business environment. A retailer like Massbuild, therefore, ought to stay ahead of the curve by maintaining global technology standards so as to compete with rivals Cashbuild and French-owned retailer Leroy Merlin.

With the emergence of newer technologies in retail, supply chain functions have been influenced by popular technological forces such as Radio Frequency Identification Development (RFID) and Near Field Communication (NFC). RFID technology enables retailers to automatically identify products flowing through the chain; the product contains a sensor tag which is used to enable its complete tracking, thereby creating visibility for the retailer (Bowles, 2020). NFC is described as short range wireless technology allowing secure and straightforward communication between electronic devices (Adam, Lorant & Hajnalka, 2015, p. 616). Through the evolution of technology in retail, payment processes have been influenced by the above-mentioned technologies and have made processes easier for retailers to manage. The implementation of technologies in merchandise (buying) has made it easier and accessible for customers to make purchases through their smartphones (Oka, Ghai, Venkatesan & Bagri, 2017, p. 16). A study by Pribanic (2018) highlighted an ongoing challenge in supply chain management: that is, to continually improve technology that will assist a retailer's distribution processes and align objectives that create seamless coordination of activities. This can vary from order fulfilment (the responsibility of merchandise planning) to customer satisfaction.

The literature review examines the current influence of emerging technologies on merchandise and distribution with a view to understand the effects of the various technologies available, and uncover the potential benefits and challenges of implementing technological advancements.

1.12.1 The influence of technology in retail and supply chain

Supply chain management, also referred to as the systematic and strategic coordination of business functions across a particular retailer or business, has benefited immensely from technology and emerging innovations (Watson, Wysocki & Buckin, 2018, p. 1). Technology has had the effect of increasing profitability and efficiency for most functions of a retailer, especially the merchandise and distribution departments. As customer patterns change, the availability of big data will enhance the ability of technology to satisfy customer demands using

an improved technology-driven supply chain network. A study undertaken by Paramount Mortgage Group (2018) found that retailers who make use of information tools (IT) improve customer service through the positive influence of AI, big data and automation that provide overall customer satisfaction through order fulfilment. Throughout history, innovation has led to new technologies that benefit retailers and customers (Watson, *et al.*, 2018, p. 1).

The influence of Omnichannel in retail is in the integration of online and physical channels, integrating these into a seamless customer experience. An example is providing stock visibility on the online site to track stock availability in the store of the customer's choice. Many retailers are currently integrating it into their retail operations (Kaur, Osman, Bakar, Fazil & Singh, 2020, p. 69). A key objective identified at Massbuild (2018) was to implement a successful Omnichannel strategy towards innovation, customisation and personalisation of a shopper's experience. The influence of Omnichannel has improved inventory levels and provided more visibility to stores so that they can identify order fill rates and costs, and localise deliveries for customers. A study undertaken by McKinsey (2016) found that SAP Forecasting and Replenishment has automated orders to reduce the number of stock outs, improve stock flow and manage accurate ordering parameters for regional distribution centres and stores (Alicke, Rachor & Seyfert, 2016, p. 15).

In the market, modern retailers and e-commerce businesses are growing vastly using big digital technologies, raising concern over the challenge of cyber risks in the interconnected networks. This can be overcome by the development of in-house infrastructure and close coordination between IT, merchandise and supply chain. In this age of big data and AI, retailers need to use the latest technologies like robotics to point out empty shelf spaces (Vincent, 2017). Federman (2019) stated that the influence of automation and machine learning has started to develop a kind of learning that understands repeatable behaviour in customer patterns, enabling a retailer to gather data from customers to make sound business decisions. The below diagram illustrates disruptive and critical technology trends and their role in the merchandise department of a retailer; these factors directly impact the overall supply chain at distribution, warehousing and store levels.

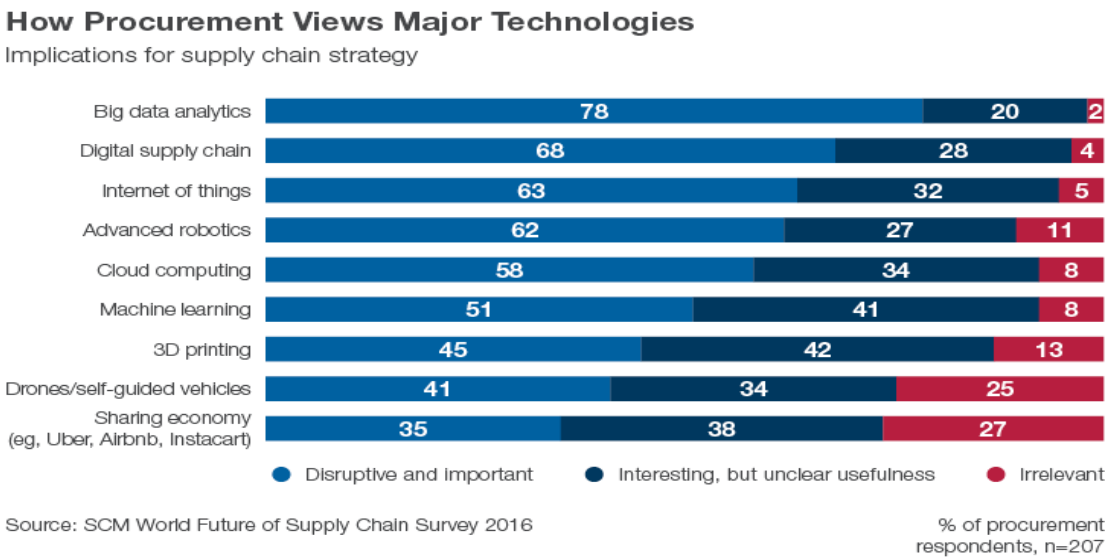

Figure 1.3: Digitisation in the supply chain – five key trends

Source: O'Marah, 2016.

1.12.2 The current market technological trends available to retail

As highlighted in previous paragraphs, technology is seen to be at the forefront of any industry and is driving supply chains to become more resilient and embrace change. The influence of technology has led to inventory becoming demand-driven, impacting what is called the bullwhip effect. Wiedenmann and Grobler (2019, p. 553) defined the bullwhip effect in the supply chain as an approach to increased order variability, moving from the lowest level to the highest. According to Chopra and Meindl (2016, p. 510), several studies have highlighted a reduction in the bullwhip effect as retailers opt for a demand-driven supply chain. Retailers have managed to save on substantial costs and have leaner stocks, thereby reducing day stock cover (DSC). The emergence of technological advancements has become revolutionary in supply chain channels within retail, enabling a retailer to have an optimised distribution channel that is precise, accurate, efficient, reliable, and has real-time information readily available (I-Scoop, 2017).

- **Big data**

In the realm of technology, big data influences the supply chain by optimising distribution and ensuring that the data provides solutions to enhance productivity, optimise the supply chain

orders, reduce costs, improve customer satisfaction index and shape customer demand (Sanders, 2016, p. 27). Globally, big data has become a widely accepted concept in supply chain, especially when leveraging data to optimise supply chain distribution and ordering processes, which improves operational efficiencies and reduces ordering and distribution costs (Bradlow, Gangwar, Kopalle & Voleti, 2017, p. 4). Big data assists retailers in becoming more customer-centric, with optimal focus on customer preferences and shopping behaviours in order for the merchandise department to buy and tailor better deals for customers (Sanders, 2016, p. 28). This increases profitability and reduces stock holdings on slow moving items.

- **Software Advancements and APS**

A current trend available for retailers is software advancements such as APS and JDA Assortment optimisation tools. Modern-day technology and internet-based software assist in simplifying processes and reducing shipping errors (Raj & Raman, 2017, p. 41). Advanced Planning Systems (APS), referred to as the advent of data explosion and data mining that uses big data and analytics to transform a supply chain, solves existing business problems and creates new opportunities. This would assist with Massbuild's online platform, to better manage back-end operations and online queries through responsive sensing analytics (Raj & Raman, 2017, p. 41). An evolving trend in software advancements is retail systems that are beneficial to the retailer; common software is a Point of Sale (POS) system that allows a retailer to gather customer information promptly, view stock live across stores, take transactions, and provide digital marketing such as e-receipts to the customer (Adhi, Burns, Calais, Davis, Hough, Lal & Mutell, 2020, p. 4).

- **SAP (System Application Programme)**

For retailers to be successful, they need to strike the right chord with customer relationships, to instil trust and encourage engagement. Retailers ought to be robust, with good ERP software solutions that meet customer and business needs and expectations. An SAP system allows for businesses to manage store inventories effortlessly, manage receipts and replenishment, and plan and automate orders (Arora *et al.*, 2020, p. 10). The influence of an SAP system allows a retailer to leverage newer technologies to support digital transformation strategies such as Omni-POS and assortment optimisation tools. SAP enables a retailer to respond quickly – something essential for a retailer. In order to do this, data is critical for gaining insights to make

decisions at a granular level, taking into consideration trends, opportunities and risks to carry out tasks using predictive algorithms (Bungarz & Abdooli, 2017, p. 2).

- **Innovation, how to stay competitive**

There are several innovation trends available in the market to retailers; however, based on current business needs, a retailer ought to be cognisant of its own strategic objectives (Guest, 2020). Many retailers have realised the importance of competition; competition amongst retailers forces retailers to be innovative and different, which can contribute to the overall growth of the retailer. Virtual reality has influenced a retailer's space by offering a fresh, innovative way of meeting customer expectations for engagement and experience. Retailers like IKEA, a European DIY and hardware retailer, have demonstrated to customers how to create a perfectly designed kitchen before buying units for their home (Guest, 2020). Innovation through the use of technology has led to advancements in creating new paradigms such as the Internet of things (IoT). IoT is described as the interconnectivity of devices through a network which is powered by sensors, actuators, RFID and the internet to enable connection anytime (Dlamini, 2019, p. 1). The above-mentioned technologies are innovations in the digital era and are important for a retailer like Massbuild to integrate to remain relevant.

- **Automation**

The role of automation in retail channel networks has reshaped business models, expanded the value chain, and built enterprises with fewer layers and a better educated and trusted workforce driven by real-time data and analytics. The winners in the retail sector are those who grasp the consequences and respond rapidly to resolve them (Begley, Hancock, Kilroy & Kohli, 2019, p. 5). Automation can be described as robotising sequential processes in a supply chain to deliver responsiveness and agility. Automation allows for robotisation, creating a seamless supply chain that connects and automates sales, forecasting, supply planning, manufacturing and distribution (Lehmacher, Betti, Beecher, Grotemeier & Lorenzen, 2018, p. 3). The requirements of the retail margin have made automation necessary and not a choice. Retail margins have increased with retail margin pressures generated by intense competition and investment in e-commerce, and retailers are using technology to sustain and bolster margins (Begley *et al*., 2019, p. 8). The presence of automation in retail enables merchandise and distribution to collaborate and simplify the flow of goods from the point of origin to a final

consumption point, thereby ultimately improving the cost-to-serve model and lowering costs across the supply chain.

1.12.3 Benefits gained through the adoption of newer technology

The business model Massmart has set up for itself aims to empower decision-making about the needs of its customers and internal stakeholders, using a three-tiered approach of the strategic, tactical and operational framework set by the group. The selected industry for this research study is Massbuild, a division of Massmart Holdings. Massbuild's business strategy is to be faster, efficient and relevant to the market. They are considered to be leader stakeholders in their trading markets and are sub-Saharan Africa's most trusted DIY and home improvement retailer. The benefits that retailers can gain are briefly discussed below.

- **Centralised distribution**

There are ranges of different sales channels and platforms, varying from brick-and-mortar to e-commerce sites in the field of distribution (Sabell, 2016). In the last few years, customers have become familiar with online shopping, which means that distribution ought to ensure the creation of time-sensitive channels. There is an increased need for distributors to work collaboratively with retailers, suppliers and producers to exchange details in real time, including delivery schedules and inventory levels, to ensure that consumer needs are met and they are highly satisfied (Sabell, 2016). With state of the art vehicle tracking systems, a retailer can use data for their own benefit, allowing them to access certain information regarding truck routes and expected time of arrival (RCS Logistics, 2018). At Massmart, the current tool deployed is Trackmatic, a tool discussed in the literature review and data analysis sections of this study.

- **E-supply chain**

The e-supply chain refers to business operations that leverage e-business technology to assist and maximise value-added activities in the supply chain (Joshi, 2019). A technology-influenced retail supply chain includes the variety of processes a business uses to get its product to its customers. These activities entail purchasing raw material, assembling products, and packaging and transporting them to the customer. The goal of any retail business is to get products to customers immediately and to reduce costs, which can be achieved through the aid of technology (Tom, 2019). A study by Songalia (2017, p. 3) states that the emergence of e-

commerce is restructuring the face of distribution through improved technology usage. For the successful integration of the e-supply chain, retailers ought to restructure their merchandise and distribution processes and metrics, and adopt uniform standards for online and in-store operations (Chaturvedi, Martich, Ruwadi & Ulker, 2018, p. 59).

- **Better collaboration and visibility**

The key to achieving supply chain collaboration and visibility is a common system that enables retailers and employees to take calculated moves and to be alerted to any changes that occur, so as to make real-time adjustments in order for their supply chain to run smoothly (Clark, 2018).

Technology in distribution and merchandise requires visibility and better control to effectively manage the cost of resources that will meet customer requirements (Alicke *et al.*, 2016, p. 10). However, the challenge lies in how retailers leverage technology and provide a platform where interconnected parties, such as customers, suppliers and stakeholders, can interact and collaboratively share information on planning and executing tasks.

- **Faster and cheaper**

The future of the supply chain appears complicated, but it will be cheaper and efficient in the long run (Alicke, Azcue & Barribal, 2020). Retailers spend substantial resources on 'distribution and warehousing', with additional costs incurred such as inventory holding, labour and rent. These can undergo tremendous change with the usage of technology. Potentially, transportation can be a considerable saving factor as this contributes more than half of the total supply chain expenses. A study by Boyd and Holton (2018) found that emerging technologies provide real time information about work facilities, enabling manufacturers to invest in constant improvement of labour standards. The option to 'shop and collect' or 'buy and collect' saves customers' time and retailers can prepare them in time to be delivered or collected from the store. Currently, Massbuild utilises Parcel Ninja for their online channel, and Makro has designated pick up points.

1.12.4 Challenges associated with implementing newer technology in business processes

In moving toward the adoption of emerging technologies, the supply chain is faced with a number of challenges. These can be classified as systematic disruption, cyber threats, union

disputes and even financial constraints that impact the overall supply chain. The particular challenges have been mitigated with employee cooperation, collaboration and planning to manage constraints. A study conducted by PWC in 2018 highlighted that technology adoption is still a challenge for distribution in retail.

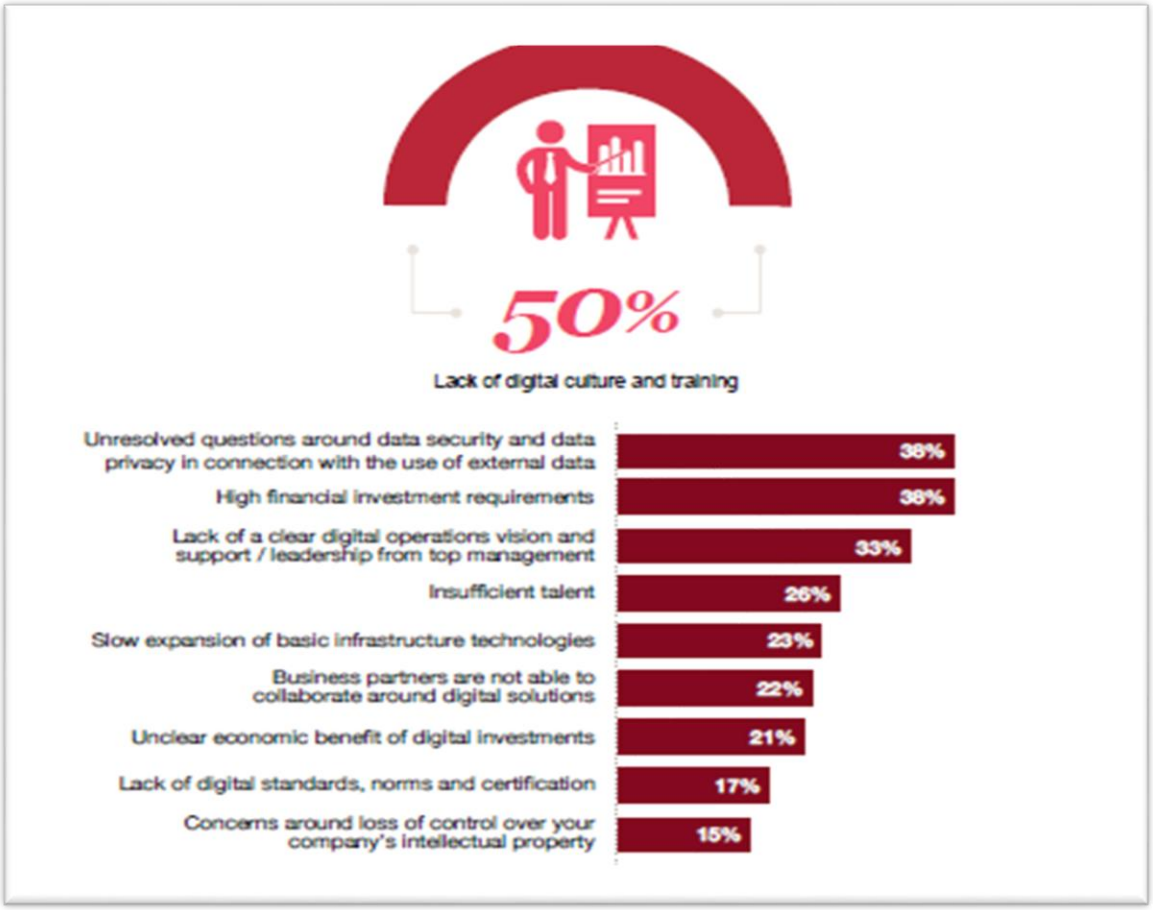

Figure. 1.4 Lack of digital culture and training is the biggest challenge facing a retailer's distribution

Source: Schrauff and Geissbauer, 2018.

Technology is changing how distribution operates within retail. 'Digital fitness' is a prerequisite for success; only successful retailers can understand how to use a wide range of new technologies, from data analytics to automation and platform solutions. The retailers who choose not to adopt new technologies risk obsolescence (Schrauff & Geissbauer, 2018, p. 8). With so many technologies available, management needs to focus on investment, with a clear definition of their digital strategy integrated into their business strategy.

The following have been identified as ongoing challenges:

- *Distribution*: It is time-consuming to learn new systems only for them to be replaced much quicker than expected; employees are required to learn newer systems in a shorter space of time and this could lead to a variety of system errors (Kearney, 2017). Macro-environment factors such as labour strikes and political influences affect order fulfilment and lead times; therefore, technology may not be able to counteract the external environment.
- *Demand on availability*: To manage stock levels efficiently, retailers have shifted away from shelf availability to demand on availability, which is a leaner approach (Nicasio, 2020). However, this is not always accurate as SAP forecasts are usually based on the previous 12 months and in unforeseen circumstances, depending on the merchandise categories, there could be triple the demand on products that SAP cannot foresee. The tools harnessed need to optimise success through retailers getting to understand their customers well, which in turn enhances planning for their store operations and enables better sourcing for replenishment (Ghai & Venkatesaan, 2017).
- *Inventory optimisation:* There are challenges posed with inventory optimisation; this stems from the difficulty of forecasting further into the future, which increases complexity (Paul, Essam & Sarker, 2016, p. 58). Inventory software that uses real-time analytics to determine demand relative to current inventory levels can only be beneficial if the retailer's master data is correctly maintained (Melanie, 2018).

1.13 Research design

The research study was conducted by means of a case study research approach using primary data obtained through semi-structured interviews. The use of a qualitative research approach is holistic and is appropriate for a descriptive study requiring a rich set of data from different sources; it enables a better understanding of the individual participants, including all views, experiences and attitudes (Creswell & Creswell, 2018, p. 43). Researchers make use of an exploratory research design when little is known about a phenomenon and the problem has not been defined clearly (Saunders, Lewis & Thornhill, 2019, p. 24). This design does not seek to provide definitive and final answers to research questions, but discusses the research subject at different levels of depth (Boru, 2018, p. 3). The exploratory research design forms the basis for

more definitive research based on the scope of the analysis and relates back to the research questions and objectives.

The researcher selected a case study approach based on its reputation as an effective methodology to investigate and understand complex issues in real world settings. A qualitative case study methodology assisted the researcher to study complex phenomena within their contexts (Yin, 2018). The case study approach assisted the researcher to add strength to what is already known from previous research.

1.14 Choice of methodology

As indicated above, the research design and choice that best suited this study was a qualitative research study using a case study research design to collect data. The researcher used a purposive sampling method to select participants, and selected an inductive research approach. The rationale for selecting a case study research approach was that it enables the researcher to tackle new problems on which little to no previous research has been conducted. For this study, the researcher made use of semi-structured interviews using an interview guideline to help structure the interviews. This research instrument was used to provide reliable and detailed answers about technological expectations and advances in retail. The data obtained from the merchandise employees was considered to be informative, useful and noteworthy. The qualitative data allowed the researcher to thoroughly investigate the initial scope of the inquiry using an exploratory research design supported by a thematic analysis that presented rich data. This improved the data investigation and the ability to collect information rich in data through an interview guide, and justified the rationale for choosing a qualitative study to resolve the research question.

1.14.1 Sample size and population

The business divisions targeted for the purpose of this research were supply chain and merchandise. The sample size consisted of twelve participants comprised of buyers, planners, managers and supply chain analysts within Massbuild's merchandise and supply chain departments. These individuals met the criterion of being knowledgeable and having worked in many retail businesses; hence their experience is valuable, and they were capable of answering the research questions.

1.14.2 Sampling method and research instrument

One cost-effective and time-effective method of sampling is non-probability sampling. A sample size of twelve participants that hold senior management positions was ideal for the purposive sampling method. This approach was appropriate for this study as it enabled examination of an anthropological situation in which researcher derived the benefits of an intuitive approach. A semi-structured interviewing approach was used as a research tool, allowing the researcher to determine perceptions and understand the narratives about personal experiences.

1.14.3 Pilot study

According to Sabarwal (2016), a pilot study is a critical step in the exploration of intervention in key problem areas where findings can assess whether new technologies have had a positive or negative effect on industries. A pilot study interview was conducted with the manager of supply chain at Massbuild. The individual possesses a large knowledge base and is highly experienced, and he was able to provide in-depth information on distribution and merchandise as well as the changes that have occurred in Massmart's distribution and merchandise processes in all chains of Massmart, specifically Massbuild.

1.14.4 Data analysis

The data analysis consisted of a combination of the researcher's notes and recordings taken during the interview. The researcher omitted information that was not relevant to the study as it deviated from the topic. The data analysis tabulated similarities, themes and patterns, which assisted the researcher. A thematic analysis was utilised during this study as it assisted the researcher in describing, organising and analysing the data. It assisted in addressing the research problem – to understand the impact technology has on a retailer's merchandise and distribution processes – by discussing the current market trends and gaps. Thematic analysis is a flexible approach that can provide rich and detailed information and can be tailored to fit the nature of the study.

1.15 Ethical considerations

In order to conduct the study, permission was first obtained in the form of a gatekeeper's letter. The study required authorisation to examine the various business divisions and this was received by means of a signed letter of consent attached to the research instrument. The

University of KwaZulu-Natal requires all personal data gathered to remain strictly confidential and to be preserved in the records of the University. A gatekeeper's letter was provided by the Massbuild HR and supply chain director who authorised access to information.

1.16 Limitations and delimitations of the study

A delimitation of the study was access to information governed by the Walmart Ethics Policy. The researcher is currently working in the Massbuild Merchandise Division and has built important relationships with middle and top management. Access to information on all four divisions was difficult as Massdiscounters and Masscash were based in Durban at the time the study was conducted. The limitations of the sample size were that the researcher was limited to a sample of twelve individuals due to time constraints of top management. The second limitation was the researcher had limited access to the other retail chains, such as Masswarehouses, Masscash and Massdiscounters of the Massmart Group. Furthermore, the trading partners involved in the analysis did not have access to comprehensive data and other specific information and documents which could have assisted the investigation. During the analysis, the researcher attempted to prevent the formulation of personal views and the exercise of boardroom judgment.

1.17 Format of the study

The outline of this study is described below:

- *Chapter one* - Introduction: Chapter one is an overview of the research, providing a mini synopsis of the study's background, the research objectives and the issues related to the problem statement. The aim and significance of the study is expressed in order for the reader to gain a deeper understanding of the study. Restrictions are set out in this chapter.
- *Chapter two* - Literature review: A significant section concentrating on the influence of emerging technologies within retail processes, each objective is examined in relation to the aim of the study. Further, the literature is discussed in conjunction with the theoretical framework, which is supported by the use of academic journal articles.
- *Chapter three* - Research methodology: The research design is discussed along with target sample size and research instrument used. Ethical considerations and the elimination of bias are discussed further.

- *Chapter four* - Overview: The penultimate chapter includes a detailed discussion of the research goals and answers to the research questions. The results of the actual empirical investigation are addressed in this chapter.
- *Chapter five* - Conclusion and recommendations: The final chapter concludes the research and provides recommendations, including those for future research.

1.18 Conclusion

Retail channels such as merchandise and distribution have been influenced by newer technology, and this has become a key enabler for retailers such as Massbuild to compete on a global scale. Darwin's (1859, p. 203) theory states that "living things evolve as their parts (organs, biomolecules) mutate"; in the context of retail, theorists advise that it is essential that retailers adapt to change. Each component of a supply chain supplies critical information that enables a business to perform at its best (Hogg, 2017, p. 1). It is evident from the literature that technology has now made forecasting demand easier and more accurate. In a supply chain, technological advancements enable a retailer to incorporate new developments in software and AI in ordering and distributing products. The theoretical framework and motivation of the study indicates that strong collaboration is required from top, middle and bottom level employees, to work collaboratively around the traditional supply chain methods used (Zeev, Sharma & Ginodia, 2017, p. 2). The study addresses the research objectives in relation to distribution and merchandise. A qualitative methodology was used to gather secondary and primary information from past literature and the research conducted, allowing the research to determine whether the influence of new trends has been effective or detrimental to the business's SCM and distribution chains. Information was gathered utilising face-to-face interviews, thus eliminating room for bias. The research objectives helped identify the influences of technology and how retailers have bettered their distribution and end supply chain processes.

Chapter Two:

Literature Review

2.1 Introduction

The presence of technology in retail has enhanced many organisations; it is therefore vital that retailers stay updated with technological developments. Although traditional brick-and-mortar retail remains a priority, technological advancements must be made by retailers to remain relevant to customers' evolving needs (Adhi, Burns, Calais, Davis, Hough, Lal & Mutell, 2020, p. 6). The emerging technologies perceived to be popular for retailers include robotics, smart warehousing, big data, IoT and AI. These technologies are highlighted as influences on the supply chain, especially order fulfilment, supplier sourcing, distribution and warehousing; they all contribute towards effectiveness, efficiency, reduced lead times and cost-saving for a retailer's supply chain (Khuan & Raman, 2018, p. 5). According to Cascio and Montealegre (2016, p. 350), the above-mentioned emerging technologies have been assisting retailers to do things better and faster, and are enabling change in businesses.

The research reviews various peer-reviewed journals and secondary academic resources to interpret the progress, direction and relevance of emerging technologies within the retail landscape. The literature review explores the relationship between existing literature and how this relates to the study of the influence of technological emergences applicable to Massbuild. A study conducted by the World Economic Forum (Kearney, 2017, p. 399) stated that technology adoption by retailers has steadily increased over the years. World class retailers are striving to achieve faster growth rates, reduce manual efforts, and rely on automated processes. Modgil, Patyal and Agrawal (2015, p. 28) argued that the retail environment has become increasingly competitive as there are daily new market entrants that create pressure on existing retailers to compete. The influence of technology has impacted customer demand as customer purchasing patterns are continuously evolving through the Internet of things (IoT) (Reinartz, Wiegand & Imschloss, 2019, p.1). A number of retailers have retained higher service levels and customised products, prompting customer satisfaction, through the innovation of technological emergences such as IoT, big data and AI (Alicke, Azcue & Barribal, 2020, p. 9). There are various factors a retailer has to consider when digitalising and automating its retail processes, as these have significant effects on the transformation of occupations and job

profiles that could ultimately challenge social policies and create unrest in the workforce (Sima, Gheorghe, Subic & Nancu, 2020, p. 1). According to a study conducted by Kruh, Martin, Clark, Coonan and Pratt (2017, p. 1), retail leaders should be accustomed to change as they are continuously dealing with changing customer shopping habits, channel shifts, economic and political uncertainties, and disruptive new competitors. The study further suggested that for a retailer to succeed and thrive in 'tomorrow's market,' a new retail model is required that is enabled by automation. It is imperative for retailers to understand the implications of what is being called the Fourth Industrial Revolution, as this is a technological emergence that impacts a supply chain. The 4IR, known as Industry 4.0, is described as a process of computers and automation systems that seamlessly integrate the once disparate physical, digital and biological environments. This involves a series of digitisation of a retailer's supply chain functions (Guoping, Yun & Aizhi, 2017, p. 629).

The Fourth Industrial Revolution refers to the era of technological evolution that integrates networks and physical processes. Through the influence of 4IR on supply chain processes, retailers are embracing existing technologies in newer ways by working smarter, streamlining processes and enhancing the way customer demands are met in a sustainable way (Kearney, 2017, p. 399). A number of key technology emergences are identified and substantiated in the literature review. Arora, Catlin, Forrest, Kaplan, and Vinter (2020, p. 9) identified that IoT has been beneficial to retailers as it allows the merchandise and distribution team to use a pull demand-based strategy using technology which creates optimisation and efficiency through the supply chain network, thereby providing detailed shipment tracking, transparency and integrity control. Dlamini's (2017, p. 5) research noted that IoT is expected to give rise to new technology opportunities, enabling new technologies and services that will take advantage of retail opportunities. This envisages a future in which customers have access to a self-configured, self-managed, smart technology ecosystem that is accessible at any time and everywhere (Nolin & Oslon, 2016).

The next section of the literature review introduces supply chain terminology and its relevance to the study. Based on the above findings from various researchers, there has been limited research conducted on the new technology utilised by retailers in South Africa (SA), which has highlighted a significant gap. Hounsom and Van Niekerk from Deloitte South Africa (2020) stated that an emerging technology implemented in the South African market is called

'connected retail'. Connected retail is influenced by several different technologies which are now available to retailers, for example, IoT and AI. Hogg (2017) and Seedat (2017) have highlighted the influence of technology on SA retailers, limited to the purchasing function of retail.

The Literature Review is structured as follows:

Table 2.1: Literature review break down

Section 2.2 – 2.5	Main concepts and relevance to the study.
Section 2.6 – 2.10	Role of technology in merchandise and distribution processes.
Section 2.11 – 2.17	Influence of the different technological emergences in merchandise and distribution processes.
Section 2.18 – 2.29	Benefits a retailer can acquire when incorporating new technological emergences.
Section 2.30	Theoretical framework used for this study.
Section 2.31	Examples of retailers with successful implementations of emerging technologies
Section 2.32	Challenges associated with adopting technology into merchandise and distribution processes.

2.2 Supply chain management in retail

In the retail industry, supply change management (SCM) is a highly comprehensive method used by small and large retailers who have a common objective of moving goods from raw materials production to manufacturing, and supplying the finished product to the consumer. Supply chain management originates from the 1980s and gained momentum during the 1990s when senior managers grasped the concept (Coyle, Langley, Novak & Gibson, 2017, p. 12). A well-organised supply chain management system involves optimising the functionality of operations to be quick and effective (Klearb, 2017, p. 397). More than ever before, supply chain management has become an important part of the retail industry, as it is necessary for retailers to thrive. Supply chain management has the power to boost customer support, minimise costs and increase the financial position of an organisation (Wilson, 2017, p.1). Letaba's (2018, p. 2) research highlighted the technology roadmaps to success in retail and how retailers should go about screening and adopting emerging technologies. A study by Johnson (2018, p. 1), for

the Cape Peninsula University of Technology, emphasised the influence, adoption and use of e-commerce within the SA environment. The study indicated the importance of technological advancement, underlining it as a vital component in a retailer's supply chain management as it sets the precedent for the future success of a retailer.

Rondero, Flores, Smith, Morales and Malacara (2019, p. 889) believe that an evolved supply chain management system holds the key to a digitalised innovative supply chain; however, certain hurdles ought to be identified early to stay competitive. The influence of technology on the supply chain enables a transition towards an interconnected sequence of planning and development solutions that operate in unison to establish awareness around each focal point of the supply network (Kearney, 2017). Through the integration of technology in distribution and merchandise, retailers can experience lower production and operational costs with accelerated lead times. However, to accomplish this, retailers need to utilise an integration strategy that eradicates multiple application use and integrates planning and reporting solutions into a single module that is open to all users within the organisation (Schniederjans, Curado & Khalaj, 2019, p. 2).

According to Armstrong (2017), retailers consider the supply chain to be a critical component with massive cost implications; lowering costs is a top priority, especially to maintain a competitive advantage in the market. Westerveld (2017, p. 1) stated that due to technology, supply chains have become more transparent than they ever were. The role of supply chain management is intensifying and becoming more strategic in terms of value creation, whilst digital solutions contribute to retail development. With relevance to this research study, SCM reflects a deliberate effort on the part of the supplier to build and manage supply chains in the most effective and efficient way possible (Lehtisalo, 2018, p. 5). Supply chain management has been influenced by technology; digitalised communication and networks are integrated across platforms, share real-time information, and make business-to-business processes less complex. Svahn, Mathiassen and Lindgren (2017, p. 2) stated that the most important aspect now in retail is to leave the traditional approach behind, together with its operating models, and to keep an open mind about future supply chain processes through the use of technology, while in the process updating the current retail model.

2.3 Logistics in retail

Literature has described logistics as 'strategic acquisition' to manage the movement, storage, and flow of products and services related to the organisation's network channels in a way that is profitable (Stuart, 2020, p. 83). Rondero *et al.* (2019, p. 893) explained that logistics constructs part of the supply chain; it is an aspect that prepares, implements and manages the movement of products stored between the point of origin and the point of consumption in order to meet the needs of the customer. The emergence of new technologies creates strategic opportunities for retailers to form competitive advantages in their merchandise and distribution departments. The degree of success, however, lies in the selection of the right technology available in terms of the organisational culture, infrastructure and management policies (Bhandari, 2017, p. 11). With relation to logistics, information, communication and automation technologies have dramatically increased the speed of detection, data collection and processing with a high degree of accuracy and reliability.

According to Hou (2021, p. 100), the current century has seen efficient methods of electronic communication via various technologies available in the market. Previous to the 1960s, all record keeping and transactions were manually recorded. Computerised data opened the door to huge opportunities for innovation in logistics planning, optimisation of inventory and truck routing (Robinson, 2018). Technologies mainly came from operations research that researchers could only examine in theoretical models. The presence of technology in logistics has been transforming daily business operations such as ordering, warehousing, and distributing products. The increase of real time knowledge exchange and reliable distribution systems makes the supply chain ideal for technical innovation and RFID sensor technology (Khuan & Raman, 2017, p. 10). The evolution of technology in distribution is pushing the boundaries and changing the way retailers conduct business, using improved technology to increase productivity in their supply chain (Shapiro, 2020).

A critical factor making logistics a differentiation point is technology; the role of technology in logistics has been more diversified with recent developments in technology. It is recognised that the appropriate use of technology can enhance logistics and create new business models (Choi & Song, 2018, p. 1). The use of technology in logistics can reduce the uncertainty in a complex supply chain and fast changing markets, and increase technological options for innovation (Hoffman & Osterwalder, 2017, p. 25).

2.4 The role of technology in retail

Retail is a term used to describe the sale of goods and services from a business to a consumer for their own use (Hameli, 2018, p. 7). Retail supply chain management is a process of getting products to consumers through deliveries by the vendor to the store, or distribution centre to the store. It encompasses a number of steps, from obtaining raw materials to make a product, to order fulfilments (Provincial Department of Treasury – Gauteng, 2016). The role of technology in retail concerns almost every aspect of retail operations for both online retailers and brick-and-mortar stores. For example, retail inventory software helps small businesses behind the scenes by directing supply chain processes with the use of big data analytics. Technology supports retail in improving sales and assisting retailers to retain productivity in processing payments (Wilson, 2017, p. 1). With reference to the retail industry, the most appealing technology is the internet as it delivers the opportunity to access information that assists the retailer in meeting customer demands. As a result, transformation and change are inevitable in retail (Mehta, 2017).

According to Grewal, Roggeveen and Sethuraman (2020, p. 309), technology is constantly evolving as a global phenomenon; it is essential for retailers to survive in competitive markets and is also a means to enhance service delivery and customer fulfilment. However, various countries in the world adopt technologies at different times and in many ways, depending on their infrastructure, customer culture, economic climate and competitive atmosphere. Sawers (2019, p. 1) states that technology is revolutionising retail in terms of the way businesses, employees and customers interact with each other; for example, the use of smartphones and the internet. We live in a world where there are easier ways of processing things. The evolution of technology has made daily living easier and convenient. The presence of technology has had an effect on retail, enabling customers to make comparative decisions on products, with the option of shopping online or traveling to the nearest store to complete their purchasing decision (Gezgin, Huang, Samal & Silva, 2017, p. 3).

2.5 The significance of merchandise in retail

The term merchandise is often used throughout this study as this is a commonly accepted term in retail. Within the Massmart Group, purchasing is referred to as merchandise. Purchasing is a backbone department to a retailer; in a retail environment, the ‘purchasing’ department role

is to ensure sufficient product on shelves at all given times (Verbruggen, 2021, p.1). The term merchandise varies across different types of business, but in the context of retail, merchandise management is an entire department that decides what products to stock, how much to carry in stores, where it should be displayed and how it should be priced. Merchandise is perceived as the 'money-maker' in retail and is the profitability driver of retail (Jones, 2019). As Brimblecomb, McMahon, Ferguson, De-Silva, Peters, Miles, Wycherley, Gunther, Chappell, Chatfield and Catherine (2018, p. 463) stated, merchandising is a process initiated by a manufacturer, supplier or retailer to position products at the point of sale to stimulate customer purchase (e.g. promotions, aisle displays, gondola ends, power wings) and increased product facings at eye level. A philosophy for merchandising sets the guidelines and principles that retailers abide by to reflect the target market and position themselves competitively. Merchandise is responsible for driving every product decision, from what product and product lines to stock, to allotted shelf space, to product pricing and turnover strategies (Zentes, Morschett & Klein, 2016, p. 10).

The influence of technology on merchandise is tremendous. At the same time, retail managers often claim that technology is not a panacea but rather assists 'merchants' (also referred to as buyers) to increase the efficiency of stock and merchandising standards in the store. Technology has built mobile applications that customers can download, allowing the capture of real-time insights (Sawers, 2019, p. 1). As a result, retailers are enabling customised, efficient shopping journeys through the digital tools that buyers regularly use. The assistance of technology aids in measuring the impact on the relationship between retail and merchandise (POS, 2017). Merchandising is dependent on visual displays, which is why space planners use software to space plan using planograms. This allows the merchandise department to have greater exposure of stock at a local, regional and national level. A retailer that is equipped with the right technologies can recognise the complexities with which items are displayed and interpreted in particular markets, and that increase sales in the sector (Rienartz *et al*., 2019, p. 35).

The literature review aims to address each objective, drawing on peer and academic opinions to formulate a substantive argument. The first research objective, the current role of technology within merchandise and retail processes, is discussed in the sections to follow.

2.6 The current role of technology in retail

As customers continue to exert power in a golden age of choice fuelled by technology and the use of the internet and smartphones, retailers face technological upheavals that have left many to reinvent their businesses. In a developing retail market like South Africa, retailers face slow economies, droughts, unemployment, and the need to engage with customers on a wide social scale with concerns like inequality and sustainability (Temkin, 2020, p. 1). According to Mulder and Frazer (2020, p. 10), terminologies like AI, big data and machine learning create a sense of anxiety among retailers as the skills required for these technologies in the SA retail industry is still scarce. In contrast, in the 1960s, technology was limited. Now, with emerging technologies, it is difficult to transition from theory to practice. There are numerous new innovations that have emerged over the last decade, including the Internet which has changed the scenario of retail operation in the market place (Songalia, 2017, p. 1). Technology has evolved, affecting a retailer's strategy as well as operations. The role of technology in retail is vital in meeting customers' demands through a multi-channel supply chain network (Sadar & Sadar, 2016, p. 1). Kersten (2017, p. 400) suggests that the rise of technology in the supply chain has provided opportunities to put theoretical operations models into gear, leading to visionary planning and optimisation across the value chain. A study by McKinsey (Alicke, *et al.,* 2020, p. 2) found that the application of technology has vastly increased the standard of living and has assisted supply chains in growing opportunities for employment and skills development.

Table 2.2: A view of technology advancements in the supply chain industry

2018	2021	2022	2023	2024	2025	2026	2027
Storage of AI	Robot and Services	The Internet of and for Things	Implantable Technologies	Ubiquitous Computing	3DPrinting and Consumer Products	Driverless Cars	Bitcoin and the Blockchain
		Wearable Internet	Big Data for Decisions	3D Printing and Human Health	AI and White Collar Jobs	AI and Decision Making	
		3D Printing and Manufacturing	Vision as the New Interface	The Connected Home	The Sharing Economy	Smart Cities	
			Our Digital Presence				
			Governments and Blockchain				
			A Supercomputer in Your Pocket				

Source: Zeev, Sharma & Ginodia, 2017.

The above figure depicts the different stages that business theorists claim will be future technological advancements and how the supply chain industry will move towards this. Supply chain management and technology are simultaneously growing at an exceeding rate, but unfortunately, many retailers are still entrenched in outdated systems and lengthy processes (Hufford, 2019). According to Zeev *et al*. (2017, p. 10), retailers face the challenge in demand forecast accuracy and unexpected disruptions which can dramatically affect a retailer's competitive edge and ability to deliver products promptly. Retailers face the risk of still using traditional technological approaches as opposed to integrating newer technologies such as AI and IoT (Arora *et al.*, 2020, p. 24).

According to Mogdil, Patyal and Agrawal (2015, p. 28), previously, the Kanban system was used to maintain information, and currently, there are a host of different inventory systems available to retailers. As it stands, the influence of technology has assisted supply chain management to gain several benefits, such as maintaining inventory accuracy and stock visibility (Fan, Tao, Deng & Li, 2015, p. 1). Through the influence of technology, suppliers are able to fulfil customer needs with various advanced technologies such as Radio Frequency Identification Development (RFID), Artificial Intelligence (AI), and Enterprise Retail Planning (ERP) systems. Okeke (2018, p. 15) describes advancements in technology as fundamental and influential for growth and success in the merchandise and distribution divisions of retail. Stubbs (2017) claims that many retailers currently utilise a Point of Sale (POS), which effectively allows for a customer to make payment for products at a store. The system serves as a central component for the business, where sales, inventory and customer management merges; a system like this is often integrated into SAP.

Hassoun (2017, p. 1) stated that the role of technology has enabled opportunities for supply chains to connect easily by converting sales into repetitive orders in real-time and then transporting them directly into the supply chain for order fulfilment. Scioscia (2019, p. 1) claims that data analytics is currently a tool retailers rely on as it is a fundamental component of the technology distribution tool bag. Transformation in retail is often difficult; however, the digitisation of information and the applied use of innovative technologies present the opportunity to drive value throughout the supply chain (Shepley, Hartigon, Parrott, Hillman, Bredmus & McGoff, 2017, p. 2). The figure below indicates the relationship that coexists between buying (merchandise), distributing and selling. All three relationships are dependent

on each other for a seamless transaction; the effectiveness of the relationship is based on planning and executing (Magana, 2018). The current role of technologies has an effect on all three tiers, which ultimately requires a demand-pull strategy as opposed to a push-pull base strategy.

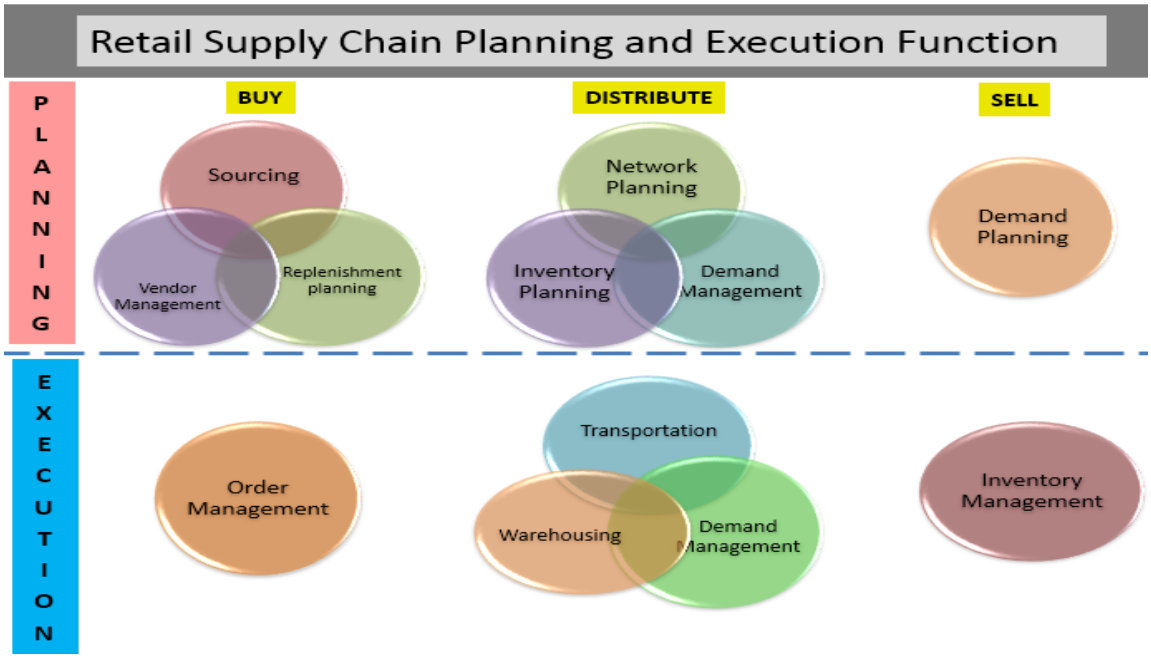

Figure 2.1: Walmart retail supply and execution functions

Source: Magana, 2018.

2.7 The role of buying in retail and how technology influences the buying process

A buyer's responsibility is to ensure products appear with the retailer's end vision, in the right quantities and at the right time, ensuring no stock-outs. The buyer works closely with the planner, supply chain and operation store staff to ensure accurate forecasts and trends, to plan stock levels and monitor performance (Heller, 2018, p. 2). Technology has assisted buyers through technology developments such as range optimisation software, reliable tracking through Enterprise Resource Planning (ERP) systems, and mainly big data. The presence of big data can now assist buyers in reading customer patterns that allow them to source, plan and predict customer behaviours, to enhance sales and be competitive (Chandani & Lamphere, 2017, p. 1095). The entire buying process can be improved and streamlined to be efficient using

technology. The presence of automation can save time and money in the buying process (Esmaeilpour & Fakhraei, 2018, p. 450). According to Javier and Javier (2015, p. 499), the role of technology in buying processes reduces human errors, saves money and assists with forecasting and planning through SAP forecasting and replenishment tools.

2.8 Traditional approach vs. technology-driven supply chain (SC)

There is a distinct difference between a traditional supply chain versus a technology-driven supply chain, also known as digitised. Traditional supply chains rely on a combination of electronic and paper-based processes and documentation, which makes record-keeping time consuming, tedious and Excel-based. A retailer using a conventional approach is often characterised by functional and geographical silos that do not easily exchange information. In comparison, in a digital supply chain, there is software such as ERP that records data, analyses data and uses predictive algorithms. This technology-driven supply chain has the capability to provide improved system reliability, agility, and effectiveness (Huddar, Kumatagi & Latte, 2017, p. 35). A technology-driven supply chain is the most significant change in society and history, according to Treadwell (2019), who stated that the adaptation to survive relies on how well retailers respond to the macro environment. As a result, the true way of adapting to technology is via automation processes, data collection analysis and full integration of IT applications across a retailer. The growth in digitalisation, mobile shopping and smart technology is disrupting the long-standing superiority of traditional methods that have been used by retailers for generations (Reinartz, Wiegand & Imschloss, 2019, p. 2).

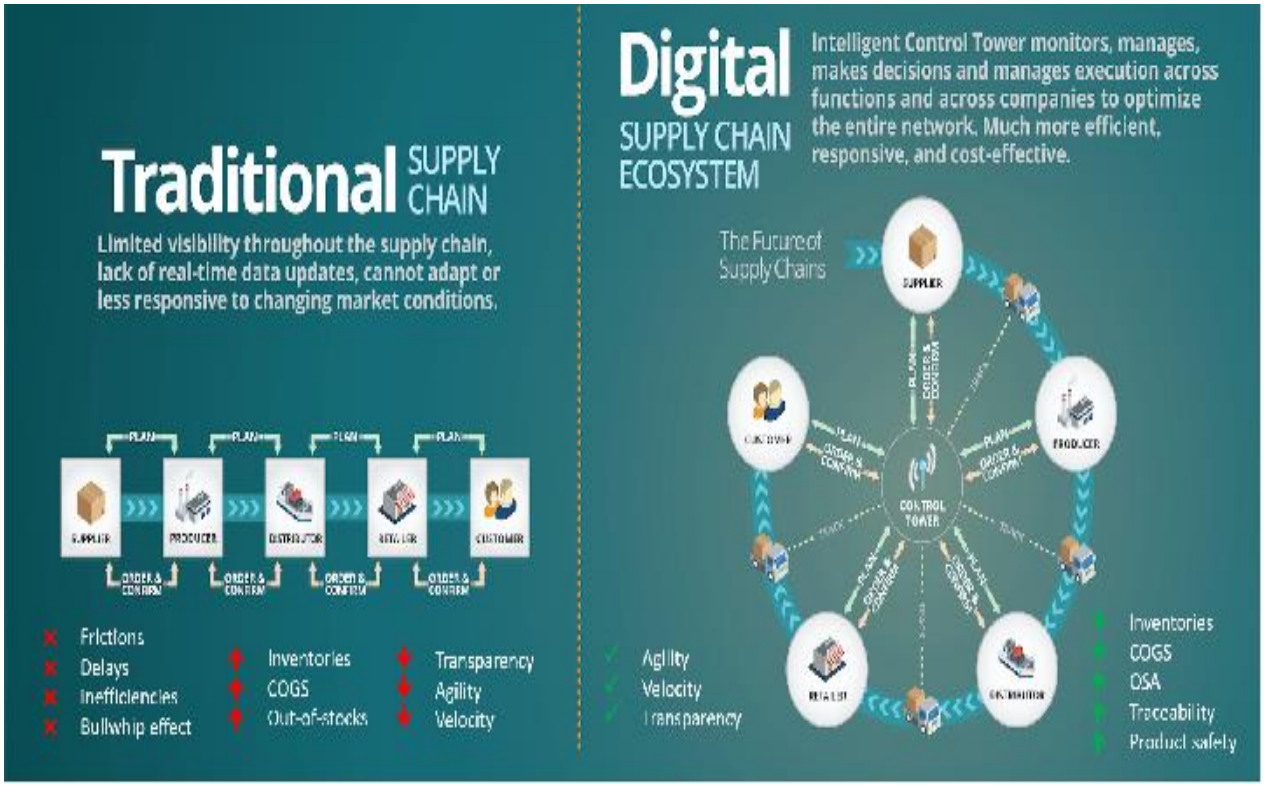

Figure 2.2: Traditional supply chain vs. digital supply chain

Source: Duckworth, 2019

The above figure depicts a traditional supply chain vs. a digital supply chain. According to Schrauf and Berttram (2016, p. 15), a technology-driven supply chain is a central control hub that oversees the entire SC using technology enablers, which are managed through an overarching data analytics engine. In comparison, the traditional SC has a very limited view of the entire SC and cannot control all functions within a supply chain (Duckworth, 2019).

2.9 The current role of Omnichannel in retail

According to Roberts (2020, p. 1), Omnichannel in retail is a multi-channel approach to sales that focuses on delivering consistent customer service, whether online from a mobile device, a desktop or a brick-and-mortar shop. Omnichannel encourages retailers to ensure that goods are readily available at the right time, in the right quantity and at the right price (Krueger, 2015). Fiorletta (2016, p. 2) stated there is a greater need for collaboration on a macro and micro scale across retail, which can be achieved through Omnichannel retail strategies. Seedat (2017, p. 4) stated that the technology-driven customer journey encompasses the complete life cycle, from discovery to loyalty, which is complex. Retailers are continually seeking newer ways to invest

in applications and software to create a customised experience. Omnichannel is an approach that many retailers are encouraged to use in their business. Currently, SA retailers Dischem and Pick n Pay have an integrated Omnichannel in their business (Wood, 2020). According to Seedat (2017, p. 15), the explosion in technology has given unsurpassed exposure to the parochial customer of the vast global market, which has reshaped the competitive landscape for the traditional brick-and-mortar retailer.

Technology has allowed for Omnichannel to exist; it provides visibility for information-sharing and collaboration across merchandise, and for operations to exceed customer expectations. The below figure highlights how Omnichannel, through technology, elevates customer experience and in-store processes such as merchandising, promotions and marketing (Ramanathan, Govindu & Kannan, 2017). The below figure highlights the seven key elements that combine best practices with technological opportunities that retailers can achieve through an Omnichannel approach (Briedis, Harris, Pacchia & Ungerman, 2019, p. 1).

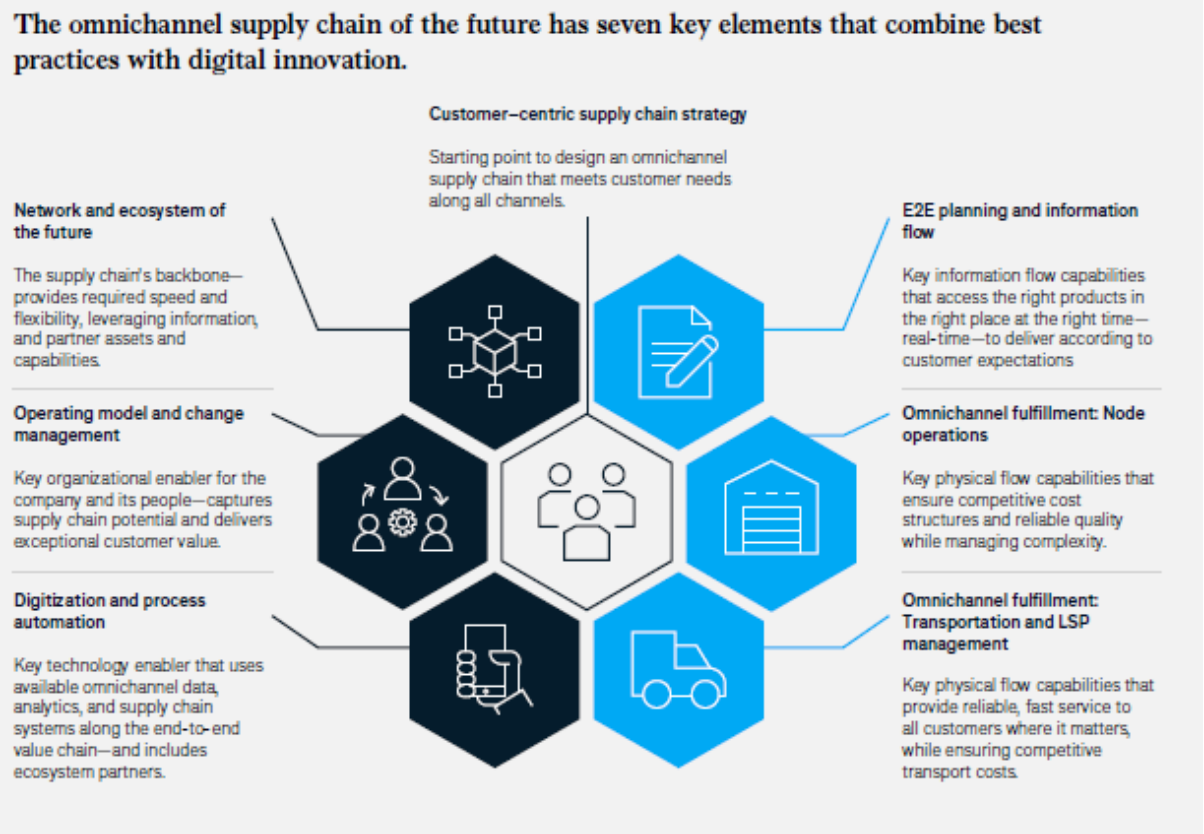

Figure 2.3: The Omnichannel supply chain of the future

Source: Briedis, Harris, Pacchia & Ungerman, 2019

2.10 Established technologies in retail processes

During the 1990s, logistics boomed and was fuelled by the emergence of ERP systems, which motivated the success of the Material Requirements Planning system (MRP). This was developed during the 1970s and 1980s (Kawshala, 2017). In spite of the hurdles to integrate multiple databases that seldom existed in businesses, ERP systems were functional by the year 2000 (O'Shaughnessy, 2019). This resulted in data being available, accurate and improved, and highlighted the need for better planning and integration amongst buying and distribution. Today, the result of implementing ERP into retail has brought about advanced planning and scheduling (APS) software, mainly for distribution and warehousing to manage orders and deliveries. Retailers globally have recognised the opportunity to apply cloud-based technologies to their supply chain strategies and operations, to improve knowledge and profitability (Yusif, Soar & Hafeez, 2016, p. 179). Established technologies within distribution and warehousing can assist retailers to re-adjust and plan routes that save time, resources and money on deliveries, thereby avoiding any shortfalls. The increased availability of real-time data through ERP and MRP software has enabled retailers to become much more flexible in terms of their supply chains (Norwich University, 2016, p. 4).

Retails stores that have followed the traditional approach are being challenged by various retail service channels, which consist of the internet, email and interactive systems. The advantages of technology in distribution are that it reduces lead-time and optimises inventory, creating shelf presence and product availability (Salam, Panahifar & Bryne, 2016, p. 888). The use of technology in merchandise and distribution creates customer empowerment, and the customer becomes consciously aware of the service rendered by the retailer, stimulating future purchases (Lipow, 2020). Tailored ERP software has become necessary for many retailers, and they can benefit from ERP to optimise inventory, summarise sales, and manage payrolls and shipment strategies. Retail ERP combines all systems to holistically managed business function on a single database (Jones, 2019, p. 1).

The next section of the literature review addresses research objective two, which is to understand the influence of the different technologies available to Massbuild.

2.11 Identifying the influence of technology in a retailer's supply chain

At the pace technology is transitioning, in the next era, supply chain networks will become familiar with digital technology transformation in the supply chain. Currently, a technology-influenced supply chain is perceived to be at an intermediate stage between traditional and third generation, which many academics have characterised as the 4IR (Oke & Fernandes, 2020, p. 3). According to Columbus (2019), AI and machine-learning technologies are influencing the future of supply chain planning as these technologies can take massive amounts of demand data sourced through channels that are continuously growing. Sowinski (2019) stated that the potential for new technologies that transform the SC and deliver real-time visibility is powerful and a step towards achieving a robust supply chain with a host of features and capabilities. Research conducted by Gezgin *et al.* (2017, p. 4) found that the main reason behind technology gaps lies with management, as gaps occur when current technology is replaced quickly by something newer and better.

Cascio and Montealegre (2016, p. 353) categorised the influence of technology as either disruptive or sustaining. Sustaining technology is described as incremental improvements to established technology while disruptive technology refers to technology that often has performance issues and requires refinement. Hogg (2017) stated that retailers often have trouble capitalising on the potential efficiencies and cost savings as underlying technologies expand, so it may disrupt an organisation's way of working. According to Chaturvedi, Martich, Ruwadi and Ulker (2017, p. 60), business analysts claim that over the next two decades, technology will have an influence on costs, making products cheaper. Technology will be a supply chain driver as retailers continue to adopt a wide range of technologies from robotics, IoT and big data. These technologies will reduce spending on resources by consumers, thereby reducing the manufacturing costs and so forth. Chrisos (2019) highlights that the influence of technology is beneficial to a supply chain, strengthening its supply chain functions, and providing real-time visibility and better control.

2.11.1 The impact of technology on suppliers in retail and the supply chain

The impact of technology on a retailer's supply chain has always been important. There are several new technologies and innovations that are continuously enhancing the functions of a supply chain, such as RFID, AI and vehicle tracking (Chui, Manyika & Miremadi, 2016, p. 3). These technologies impact a supplier's order fill rate and service levels if the technology is not

implemented as a phased approach, as suppliers have specific delivery schedules. The universal agreement between a supplier and supply chain lies in the opportunity to reduce costs and improve efficiency to pursue their strategic objectives, and this can be achieved through technology. The below diagram was extracted from a survey by *Supply Chain Digest* (Gilmore, 2017), where most vendors suggested that not all retailers apply the same metrics, as these are based on the different technologies the retailer adopts. For example, Amazon's core business is online in comparison to Walmart, which is the largest brick-and-mortar store in the United States of America (USA). These two organisations deploy different technologies based on their business fit (Johansson, 2018).

The feedback derived from the *Supply Chain Digest* survey suggested that vendor compliance programs had a set variety of rules that were relative to vendor shipments, ranging from barcoding, labelling issues and fill rates. The essence of the survey highlighted that 79% of retailers have technology compliance programs to help vendors manage orders, shipping and lead times to warehouses and store sites which was better than the 29% who used a commercialised package. This survey is of relevance to the study, as it is a clear indicator that technology influences a supplier's ability to fulfil orders, based on what a retailer's selection of technology is to its distribution function. The results could be detrimental if the technology is not aligned to the retailers' strategy, resulting in high costs for both supplier and retailer. Figure 2.4 encapsulates a snapshot of current views on vendor compliance conducted by retailers. One can argue that technology has envisioned the buying landscape in vendor compliance and managing the relationship, with various tools being digitised.

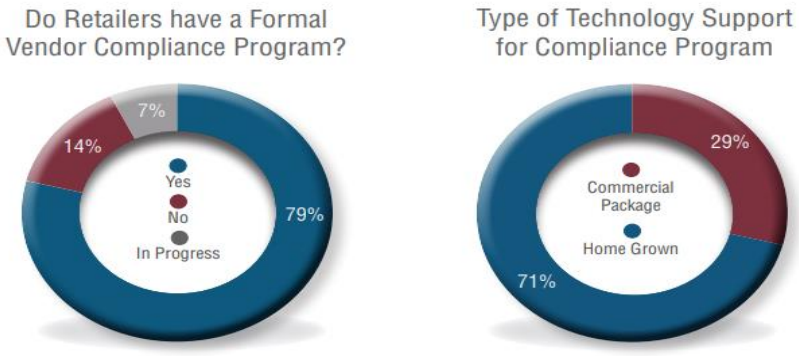

Figure 2.3: The state of retailer-vendor supply chain relationships: A benchmark study

Source: Gilmore, 2017.

Klappich (2019, p. 2) states that having a good digital platform in place assists with today's technological disruptions; further, it comes with a wealth of capabilities that allow supply chain managers to respond with speed and precision. A positive vendor-supply chain relationship allows for better monitoring and visibility using the resources that technology provides; this will not just improve business efficiencies but create long-term solid relationships. According to Noel (2015, p. 1), whilst technology can help to improve internal operations, it can also strengthen buyer-supplier relationships. Typically, supplier relations are often undervalued. However, retail buyers ought to establish favourable relationships with suppliers to ensure quality products and service. Johansson (2018) found that the influence of technology has simplified merchandise and distribution processes by simplifying the supply chain network and allowing payments to be processed promptly. This is handled through various technology solutions, for example, Sage and Oracle.

2.11.2 Fourth Industrial Revolution (4IR)

The Fourth Industrial Revolution (4IR) reflects an age of technological progress that will increasingly boost human-machine ties. This is expected to open up new business opportunities and fuel economic growth around the global economy (Alicke, Azcue, & Barribal, 2020, p. 4). The relevance of the 4IR on the supply chain is that it improves the merchandise and distribution departments of a supply chain in terms of cost, service and agility. Cordon's (2017, p. 2) findings concluded that the 4IR in the supply chain will increase operational efficiency in the entire supply chain, and the IoT will be useful for logistics. In short, the digital revolution is introducing a new paradigm in the supply chain, rather than simply providing the right product, the lowest cost and the accepted standard of service. Today, retailers are concerned about increasing sales revenue that will add value to customers; this can be achieved by converting a linear supply chain into a technology driven supply chain (Khuan & Raman, 2017, p. 65). This is dependent on clearly defining new capabilities of emerging technologies that can add support to an organisation and assist it in achieving a successful technology-driven supply chain.

In order for any retailer to succeed in capitalising on the Fourth Industrial Revolution, the basics need to be done right; thus, there has to be an adequate supply of advanced engineering talent. This means that people in regular jobs should acquire skills that deal with the disruptive effects of newer technologies in their work environment (Jones, 2019). In essence, the 4IR can be

described as a ground-breaking plan for retailers, companies and individuals around the world to embrace revolutionary technologies such as artificial intelligence (AI) and robotics (Davis, 2016). The Fourth Industrial Revolution does not consider these technologies in isolation; rather they are complementary to everyday tasks, particularly in the distribution and purchasing processes (Alicke *et al.*, 201, p. 22). An effective way to consider it is in the context of the previous three industrial revolutions (Getsmarter, 2019).

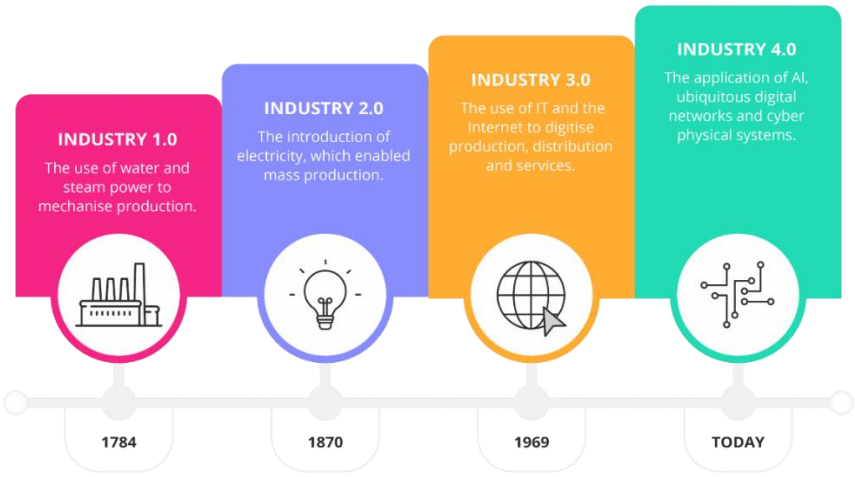

Figure 2.5: Timeline of industrial revolutions

Source: Getsmarter, 2019

It is evident from the above figure that the industry is evolving as a result of emerging technologies. The presence of 4IR in retail has increased workflow efficiencies and improved the use of talent across distribution and merchandise (Ramlall, 2020, p. 2). Artificial Intelligence is augmenting humans and is perceived to be powerful, more efficient, and more effective. Essentially, AI is giving buyers, planners and supply chain analysts valuable time back to refocus on their organisation's competitive advantage (Oosthuizen, Botha, Robertson, & Montecchi, 2020, p. 2). A retailer that incorporates distribution and merchandise practises with 4IR initiatives challenges the traditional functions of retail that use manual interfacing processes with system based processes; for example, SAP replenishment systems which are demand-driven (Bradley, Hirt & Smit, 2018, p. 2).

Below are current technology influences of the Fourth Industrial Revolution.

- **Cloud computing**

Cloud computing and its role in the 4IR is an important factor in accelerating digital transformation in a supply chain. The cloud reflects a radical shift in the way retailers obtain and use technology tools. It is part of the digital revolution of Industry 4.0 (Dempski, Redding, Scaff, Schmaltz & Voelker, 2018, p. 5). Retailers that make use of cloud computing can benefit by being able to access data from any period of time. Further, it can assist in planning dynamic routing, in central administration, and in defining roles based on application usage (Phintraco, 2019). Dempski *et al*. (2018, p. 1) stated that the process of implementing cloud technology is not a linear process, but that steps need to be taken to a finite stage. Large retailers have assigned project teams responsible for current projects; their task is to modernise the systems by integrating technology into the cloud, allowing for full data migration and accessibility to users across the business (Oh & Choi, 2020, p. 1).

- **Automation**

The presence of automation in retail empowers brands with better data, increased efficiency and overall cost savings benefiting the business. Automation as a result of the 4IR allows for less error-prone manual tasks and allows employees to focus on core functions of their jobs (Sheehan, 2020, p. 1). Automation in today's supply chain is vital in inventory management, which is a critical component of the merchandise department, allowing it to manage stocks across various locations; this is complex and may result in dead stock, costly purchasing decisions, and potential stock outs (Cerasis, 2017). Alicke *et al*. (2020) for McKinsey Global (2020), predicted automation would continue to have a significant impact on inventory management and daily control operations that dictate strategic goals. The importance of automation in retail is driven by innovation and can easily be found in retailers like Walmart, which has been known for its high investment in information technology related to achieving real-time data collection by automating many of its distribution and merchandise functions (Choi & Song, 2018, p. 1).

2.12 Electronic Data Interchange software: Trackmatic

Electronic Data Interchange (EDI) is characterised as a computer-to-computer exchange of business documents in a standard electronic format between business functions (Jones, 2019, p. 3). According to Trackmatic (2018), Trackmatic is a vehicle tracking app that harnesses the

power of mobile devices, turning drivers into a centralised role in the supply chain. Vehicle tracking is a widely used technological emergence that distribution and retailers are using around the globe. The Great Depression taught retailers the value of cost control, and monitoring fuel tracking, engine tracking and drivers allows a business to gain control over its distribution (Martins, 2020, p. 1). In the past, real-time notifications were only available on a vehicle via black box telematics. The software enables driver mobility solutions to participate in business, resulting in material and cost-saving measures to create meaningful changes to customer experience (Deckers, 2019). The software provides supply chain visibility through knowledge sharing across chains. Trackmatic provides a platform for mediums to provide quality and meaningful feedback, which calls for effective debriefing (Trackmatic, 2019). Delivery scorecards make driver incentive systems easier to track, execute and reward. All areas of the fleet are consolidated into a powerful cloud-based application to make processes seamless and create consistency across the supply chain network when it comes to distribution, visibility, and information sharing, no matter the size of the fleet (Pederson, 2019).

In an emerging economy, technology EDI software needs to be implemented faster to boost the overall business by enabling visibility into the operating levers that will produce powerful data (Trackmatic, 2019). The challenge that many retailers encounter is on-time delivery, and the challenge lies within logistics as it continues to be more complex and difficult (Regan, 2020). It is essential that a customer is kept informed and engaged throughout the delivery process as the delivery has to occur at the right time, place and quantity, free of transit damages. A successful delivery channel makes execution profitable and effective route planning less complex (Preece, 2020, p. 24). The solution encompasses simple address validation, reducing wasted kilometres, less overtime, and the ability to meet customers' expectations in a specified period (Trackmatic, 2019).

2.13 SAP reporting tools

In an era that has changed the way retailers operate, the Covid-19 pandemic has uncovered important aspects about the state of business reporting as it has revealed that retailers ought to stay engaged with their data (Vader, Martin & Qian, 2020, p. 1). Retailers are currently in a position where they need to plan what to do next, with unexpected disruptions and laser focus on financial performance. SAP reporting tools are a vital commodity to retail, as management and middle management need to be cognisant of demand changes, customer buying patterns,

and global supply chain disruptions (Deckers, 2019). According to Whyte (2020), as powerful as SAP tools may be, experience fosters understanding and the tools may not be as user-friendly to employees. SAP Business Intelligence (BI), a reporting tool, is software used by many businesses to retrieve, analyse and transform data into useful business insights (Bungarz & Abdooli, 2017, p. 4). This includes data visualisation, data warehousing, dashboards and reporting. Big data has gained prominence through the popularity of SAP BI as businesses track, generate and compile business data to make informed choices and study customer purchasing patterns (Whyte, 2020).

2.14 Interconnect retail through Omnichannel

A multichannel method of producing sales that aims at providing seamless customer service using technology is described as Omnichannel (Hänninen, Kwan, & Mitronen, 2020, p. 4). Omnichannel utilises channel experience, real-time integration and virtual reality in some instances. Mishra (2020, p. 2) states that customers are continuously researching online prior to purchasing in-store, but it is often difficult to trace which channels are contributing to in-store traffic sales. Therefore retailers reduce channel conflicts by increasing credit sales to in-store employees. According to a survey conducted by Gupta (2020) for the year ending 2020, there has been an increase in the demand for integrated customer experience which amplifies the need for perfect execution. The Omnichannel makes it easier to manage orders and reduce inventory costs. Orendorff (2020) states that Omnichannel is the future for interconnected retail; the term may appear foreign now but soon many businesses will be using the Omnichannel approach as it assists buyers and planners to reduce inventory and accurately forecast based on the rate of sale of products. In a diverse retail market such as South Africa, it is imperative that retailers invest in acquiring only those emerging technologies that fit their customer profile; for example, mobile payments through interconnected retail (Mulder & Frazer, 2020, p. 20).

2.15 Enterprise Resource Planning (ERP) & Enterprise Warehouse Management (EWM) systems

ERP is one of Massmart's core systems; this is a system that aims at integrating business processes into one comprehensive centralised solution that all areas of the business has access to (Trackmatic, 2019). In order for successful implementation of an ERP system, all employees

need to be engaged, and the approach from management ought to be open-minded in order to quickly acquaint with the software for everyday use (Kubicka, 2018, p. 240). Along with the improved visibility and insight that ERP systems provide, implementing the ERP system across all departments allows for more uniform reporting. Enterprise Resource Planning acts as the main system that reads into other systems such as SAP Forecasting & Replenishment (F&R), Enterprise Warehouse Management (EWM) and Point of Sale (POS) (Mohamed, Musthafa & Faiz, 2020, p. 70). SAP EWM is a mature system that has been valuable to many retailers such as Dischem, Clicks and PnP. However, there are still many retailers that are not aware of the value EWM adds to distribution and warehousing; for example, embedded solutions across planning and distribution that allow for processes to be integrated and seamless (Kargudn, 2018, p. 1).

2.16 Range Assortment Optimisation software

As a retail buyer, the challenge lies in maximising sales, profit, and space. Living in a hyper-competitive world with a vast number of emerging technologies, selecting the right product for resale is critical (Gibson, Styrna & Robertson, 2017). The American-based software was developed by Walmart America as an assortment optimisation tool to help buyers arrange their relevant categories across geographical points. This tool integrates with space planning, using point of sale information, store sizes and disposable income per site. The assortment ranging software, JDA software, relies on big data that it retrieves from the SAP ERP system (Joshi, 2019). JDA assists the merchandise team to range products accurately according to sales, margin and profitability in stores. The benefits of JDA software are increased sales and margins, improved customer satisfaction, and reduced overstocks (JDA, 2018). In order for merchandise and distribution departments to stay competitive and innovative, retailers ought to focus on investing in the best available technology that fits their needs in order to stay responsive, which will improve visibility, flexibility and control over inventory costs.

Figure 2.4: Manufacturing planning: Inventory optimisation

Source: JDA, 2018.

Transforming the supply chain into a source of competitive advantage is difficult in the midst of large consumer demand and volatility. The above diagram illustrates the presence of Omnichannel and the importance of JDA for retail, which essentially decreases inventory prices, increases service levels and introduces versatile positioning strategies along with inventory policies that significantly adjust to market conditions (JDA, 2018). These variables are largely influenced by how an organisation handles supply production and distribution and where it deploys inventories. JDA provides an inventory management approach that creates a long-term sustainable competitive advantage by aligning day-to-day inventory plans with top-level priorities on a continuous basis (Joshi, 2019). According to Mahar and Wright (2017, p. 491), as more retailers begin to compete using Omnichannel, the only way for retailers to win the hearts and minds of the customer is by having the right products available at the right time, place and at the lowest cost, which is attainable by using the optimisation software tool as buyers are able to tailor custom products, thereby benefiting merchandise.

The next section of the literature review addresses the potential benefits that Massbuild can acquire when incorporating emerging technologies.

2.17 The benefits of emerging technologies

The more links in a supply chain, the more the supply chain is prone to be convoluted and complex, resulting in errors and delays (Mussomeli, Gish & Lauper, 2016, p. 2). The benefit of adopting emerging technologies into supply chain processes is that it allows for simplified

processes, thereby improving efficiency and reducing expenditures. According to PWC South Africa (Temkin, 2020), retailers should invest in technologies that provide speed, agility and efficiency to respond promptly to market demands. A central database, point of sale system, big data, automation and a forecasting system are a few tools that are essential to any retailer, big or small. A study conducted by Deloitte India (Ramanathan, Govindu & Kannan, 2017, p. 6) found that the next best thing retailers can achieve is to understand their customers through the advantage of integrating technology solutions into merchandise and distribution processes. Retailers may improve their supply chain by increasing their use of technology, which has the potential to increase profitability and productivity. Increased competitiveness between supply chains has taken place in individual companies, as technology has unquestionably played an integral role (Watson, Bucklin & Wysocki, 2018, p. 5).

The next section describes the various benefits retailers can gain through implementing emerging technologies into their overall supply chain.

2.18 Improved supplier relationship management

Oghazi, Rad, Zaefarian and Mortazavi (2016, p. 1) stated that technology has influenced and assisted retailers in managing suppliers by allowing them to share information easily; this includes supplier sales, stock, service levels and order fill rates. Whatson (2019) emphasized how the gap that exists between supplier and retailer indicates the importance of communication and visibility to maintaining strategic supplier relationships. As many retailers have yet to determine their strategic suppliers, technology can aid in developing these relationships.

Nyamasege and Biraori (2015, p. 25) explored how technology helps to assist with the ongoing challenges of inventory management and how vehicle tracking and shipment tracking have helped retailers and suppliers jointly. Supplier partnerships are crucial in efficient decision-making, and a process followed at Massbuild is rebates (Massmart, 2019). A rebate is the amount charged to a supplier by a retailer on products purchased from the supplier for the use of promotional activity or as a primary incentive for the business to gain income. Rebates are essential to a retailer as the income from rebates can be invested in technology developments to improve its retail processes (Gilbert, 2018).

2.19 The adoption of technology by merchandise and their suppliers

The next section discusses how technology adoptions by buyers in merchandise have assisted suppliers in key areas, as extracted from *Supply Chain Digest* (2018). The figure below is the researcher's own construct.

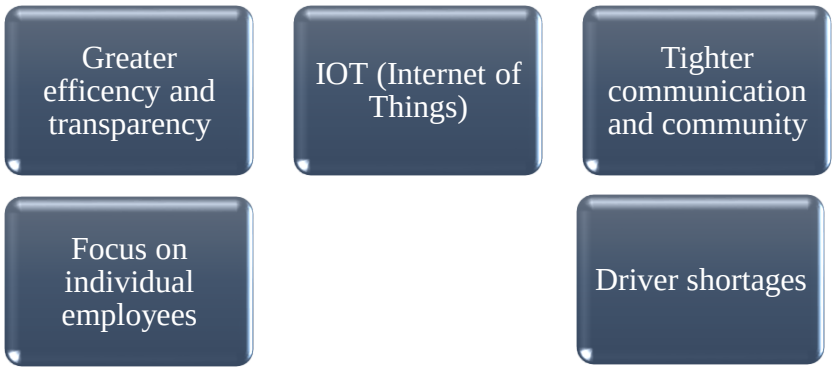

Figure 2.5: The 5 key traits adopted by merchants and suppliers

Source: Supply Chain Digest, 2018.

- **Greater efficiency and transparency**

Among the technologies available to retail is radio-frequency identification (RFID), a popularly accepted method globally which utilises captured data that has been automated (Victor, 2017). These sensors can easily be attached to clothing garments, inventory, or nearly any consumable. RFID technology makes it easier for the supply chain to trace products, and applies to a variety of aspects in the supply chain, such as storage location tags. This reduces labour costs by streamlining data capturing, and reduces errors that tend to occur during manual processes. The added benefit for both buyers and suppliers is to gain real-time information efficiently across a supply chain, which influences the decision on how businesses quickly respond, in order to remain relevant (Raj & Raman, 2017, p. 4). The integration of emerging technologies makes it easier to manage customer relationships, provide easy system access across the business, and provide visibility on purchase orders and tracking reports of distribution activities (Choi & Song, 2018, p. 4). The benefit of technology for both supplier and supply chain allows for a sustainable long-term relationship, allowing both parties to identify inefficiencies and bottlenecks for greater transparency and efficiency (Oka, Ghai, Venkatesaan & Bagri, 2017, p. 1).

- **Focus on individual employees**

The focus on individual employees through the usage of mobile devices has led to uniformity and has varied over time. Smartphone technology now offers suppliers and shippers the opportunity to equip employees with devices suitable to their position (Silver, Smith, Johnson, Jiang, Anderson & Rainie, 2019, p. 1); examples include walkie talkie devices used in the warehouse that communicate to a forklift driver where to pick up stock, or a device scanner that alerts for stock-outs. Smartphones are becoming increasingly recognised in supply chain operations. While they are subject to wear and tear, rugged cases have improved durability for handheld devices to withstand everyday and outdoor distribution and use (Webb, 2018). Many businesses are leveraging smartphone technology, such as Takealot which uses a smartphone device for delivery and customer signature (Tsele, 2017). Software applications, proprietary programs, and mobile interfaces use pings from smartphones so that a driver can create a breadcrumb trail of a tracked consignment (Vincent, 2019). The aid of technology here assists a supplier with increased attention on employees, from picking and packaging to distribution of a product, and technology acts as an open network of carriers.

- **Tighter communication and community**

A seamless order requires frequent communication for visibility and information sharing amongst supplier, buyer, and supply chain. Without the need to question, this form of communication makes mobile devices and real-time communication easier to run (Gezgin *et al*., 2017, p. 21). Managers on the move rely on technology to access real-time information and keep them in tune with the supply chain and changes (Richmond, 2017, p. 1). The old-fashioned contact options on a smartphone remain crucial for staff that use system-based technology, which makes big carriers quicker and more efficient as a strategic workforce. Therefore communication is vital to enhance employee productivity and boost staff morale (Wood, 2020).

- **Driver shortage drives new technology**

The Driver-assisted Truck Platooning (DATP) tool relieves the burden of drivers by allowing one driver to drive multiple vehicles in parade at once. The human driver drives one or more identical trucks which are attached to the lead truck and they follow independently (Crane, Bridge & Bishop, 2018, p. 10). DATP has the ability to cut carbon emissions through better kilometres per litre, as well as save on wages that are constantly increasing. Self-driving trucks

could save the day, filling the gap created by the shortage of drivers, particularly because self-driving trucks are not limited to eleven hours at a time behind the wheel (Bishop, Bevly, Humphreys, Boyd & Murray, 2017, p. 17). The game of trucking is being used to improve safety and combat driver shortages, attracting a new generation of drivers through automation. Gamification is a concept that uses game mechanics and dynamics to drive the engagement of key performance metrics in a non-game setting, using instinct and rewards to drive or alter current behaviour (Sykes, 2019).

- **Internet of Things (IoT)**

As described in the preceding paragraphs, IoT links vehicles, the cloud, and anything else that might function together outside the ELD. These infrastructure networks improve safety in a number of ways, such as tracking the health of drivers and assisting with lane shift and information signals (Dlamini, 2017, p. 18). These technology enablers assist with driving efficiency and on-time deliveries. Trackmatic (2019) software deployed by Massmart enables truck drivers to be more efficient on the road, and managers can track drivers at any given time. According to Giridhararajan. (2020, p. 4), IoT assists brick-and-mortar retailers by generating insights into consumer data while opening up opportunities to exploit data. For example, IoT applications may synthesize data from mobile devices and social media websites to allow traders to predict customer behaviour.

2.19 Information delivery and data exchange

The collaboration and network sharing of information between stakeholders, customers, and suppliers helps to create a clearer understanding of a customer's specifications to provide the service. The benefit of information and delivery of data exchange, also known as Electronic Data Interchange (EDI), delivers data on using a network server at any point in time (Lieg, 2019). The earliest information systems that supply chain management had access to supported individual functions, and there was no presence of inter-organisational coordination between departments, suppliers, and customers (Deckers, 2019). The relevance of information delivery and data exchange in the supply chain is to ensure that all functions are efficient, which can be achieved through an EDI system. An EDI system can assist retailers to successfully communicate with suppliers and exchange order transaction information easily, which assists with tracking inventory, automating ordering, and streamlining the entire process (Regan, 2020).

In a traditional supply chain approach, supplier selection problems arise centred on invoice costs. Therefore, key decision-making is required on countable and criteria based deliveries, flexibility, quality, cost, and quick response time. In order for a retailer to be successful, the main questions for the selection process on suppliers centre on the businesses' needs and criterion in order for suppliers to successfully meet the requirements outlined (Lieg, 2019). Common methods such as telephone, fax machines, and regular email to upstream suppliers, thereafter leading downstream to a customer, are not necessary anymore. Direct contact for negotiation, involving cost and time, is not necessary as often. EDI is described by many as an inter-organisational process, and partnerships have been shown as critical in the adoption of technology utilisation (Greedy, 2018, p. 1). The use of the EDI software as opposed to the conventional system entails high investment, but the costs of knowledge-sharing along the supply chain are drastically reduced.

Deckers (2019) suggests that EDI systems eliminate old problems and assist retailers and suppliers in reducing the size of their account departments, which helps to reduce the number of shipping errors and even out-of-stocks in the retail store (Heller, 2018).

2.20 Less value on long-term relationships

The modern supply chain places little emphasis on long-term strategic alliances and partnerships in comparison to a traditional supply chain (Modgil, Patyal & Agrawal, 2015, p. 27). The financial investment spent on technologies reduces the time spent on forging new alliances, as networks can be easily created using information on the internet (Reinartz *et al.*, 2019, p. 4). Technology has made it easier and cheaper for retailers to compete; this has impacted product offerings as retailers can now fulfil customer orders, but the price is key (Okeke, 2018, p. 1). An example is Takealot that has penetrated the South African online space and has disrupted the brick-and-mortar retailers. Suppliers are not required to pay a rebate with Takealot. On the other hand, brick-and-mortar retailers are perceived to be more expensive, thereby decreasing the long term value between supplier and retailer. The Walmart model is built on technology and continually innovating processes using newer technological advancements, which has placed less importance on forming strategic relationships with vendors (Mansoor, 2017).

2.21 Cost-saving opportunities

Retailers across South Africa would save through adopting emerging technologies in their supply chain with short-term cost-driven benefits. Retailers should participate in short-term competitive partnerships that have a long-term future (O'Bryne & Green, 2017, p. 1). The need for a democratic leadership style will result in highly responsive yet structural integration of technology, and employees will respond positively as opposed to rejecting changes. However, this type of leadership will be both costly and time consuming as all levels of management need to be involved in the steps taken to adopt new technology (Sawers, 2019, p. 2). Business transformation is crucial as many companies pursue their path to competitive advantage. The internet offers exposure through an expanded network of their trading partners to help the business adapt rapidly to change (Deckers, 2019). The key points set out above amplify the conventional analysis of the supply chain, which distinguishes between primary activities that add value to products and services for consumers and prioritises after sales support, and support for secondary activities that provide feedback and infrastructure that enable primary functions to take place.

The significant difference between a techno-influenced supply chain and a conventional one is that e-SCM is structurally focused on technology-enabled partnerships that allow succinct decisions about efficiency benefits (Arora, *et al*., 2020, p. 21). It can be argued that technology decreases manufacturing time and costs by increasing the flow of information, thereby integrating Massbuild's various distribution activities. The supply chain should be customised to the degree that it is capable of supplying a service to the consumer easily. Technology that offers low-cost real-time store analytics can detect merchandising compliance problems and quickly assign field reps only to stores in need, thereby streamlining operations and saving considerable resources (POS, 2017).

2.22 Centralised distribution

A prominent retail giant in Africa, Shoprite Holdings, has invested in an expanded central distribution network that enables the supply chain to seamlessly handle the supply of goods to stores across the African continent by centralised distribution, enabled by the latest technology (Probyn, 2017). Technology has enabled the merchandise division to easily source quality products from around the globe, ensuring consumers access to their preference, availability and value for money (Shoprite Holdings, 2019). The retailer has invested capital to grow its

infrastructure and expand the distribution network with the aid of technology. The advantage that many SA retailers can benefit from is centralisation, as there is a dedicated central buying team that sources products for all stores based on an array of information and data supplied by the Cloud using IoT and big data (Wood, 2020). This enables the merchandise department to easily track stock and manage distribution for better visibility of products and location points. Massbuild's distribution network is also centralised, assisted by the use of EWM; this helps to ascertain information that leads directly into other warehouse facilities situated in KwaZulu-Natal and Western Cape (Massmart, 2019).

Retailers have expanded their power over secondary distribution (warehouse to shop) by channelling a growing proportion of their supplies through distribution centres (DCs) (Hübner, Holzapfel & Kuhn, 2016, p. 10). Various emerging technologies create a seamless centralised distribution for 3PL's and retailers. British retailers exercise much stricter control over the supply chain than their counterparts in most other countries. Their logistical operations are heavily dependent on information technology (IT), in particular large interconnected stock refilling systems that manage the transportation and storage of a vast number of different goods (Bhandari, 2017, p. 20). The transformation of distribution centres is an increasingly critical element in a supply chain. Distribution centres need to continually evolve to meet desired expectations and become resilient in adapting a holistic approach that provides value adding tasks associated with warehousing; for example, RFID sensors that make picking easier for dispatching (Marr, 2017). Technologies enable high operational efficiencies, drive down costs and create modular and adaptable automation to promote business growth (BDC, 2016).

The transition toward the adoption of technology in distribution centres drives change throughout the supply chain network, which assists reconfiguration in the workflow. It is also critical to monitor trends that affect a supply chain on-demand, as well as monitor opportunities to improve distribution and gather competitive intelligence to benchmark performance (Alicke, Rachor & Seyfert, 2016, p. 11).

2.23 Automation

The current era we live in is exciting and new, but this is dangerous for companies that are not ready to adopt new technologies. The companies that have readily embraced new concepts and adapted well are benefiting significantly within the supply chain. One of the biggest trends in

the supply chain is automation. Anfimova (2017, p. 10) describes automation as any information that can be decoded into operating systems. Automation is not limited to billing, bills of lading, compliance and even movements throughout a distribution facility. Souran, Davood and Safa (2015, p. 42) define automation as a particular task which is automated in a sequence with a faster response time. This incorporates microprocessor systems, communication through the various networks, and software that interprets and feeds information all at once (Hogg, 2017, p. 42). A good example of the application of automation is in the distribution of power and the ability to monitor, protect, and control it during a power failure, whereby artificial intelligence is able to restore operations and maintain them safely.

Success in supply chain operations has come from automation, allowing companies such as Estee Lauder, Dischem, and Shoprite to perform tasks with minimal human intervention or interaction (Louw, 2015). Automation varies from retailer to retailer depending on the nature of the business, intelligence, cost, size, and dexterity. The distribution network of Estee Lauder is modular, as it is required to react rapidly to a dynamic retail environment (Ireland, 2018). Conventionally, automation and robots are positioned to manage tasks, which involves complex programming for implementation, though it lacks the agility to adjust easily should there be a shock in the supply chain. The automation process has become more sophisticated, reducing the setup time, requiring less supervision, and allowing for smooth integration of the legacy supply chain systems (Uzialko, 2019, p. 1). According to Louw (2015, p. 1) retail automation is often referred to as an umbrella term for anything set up on auto-pilot in a business, which essentially means a retailer can set the parameters or rules that determine when a specified action takes place.

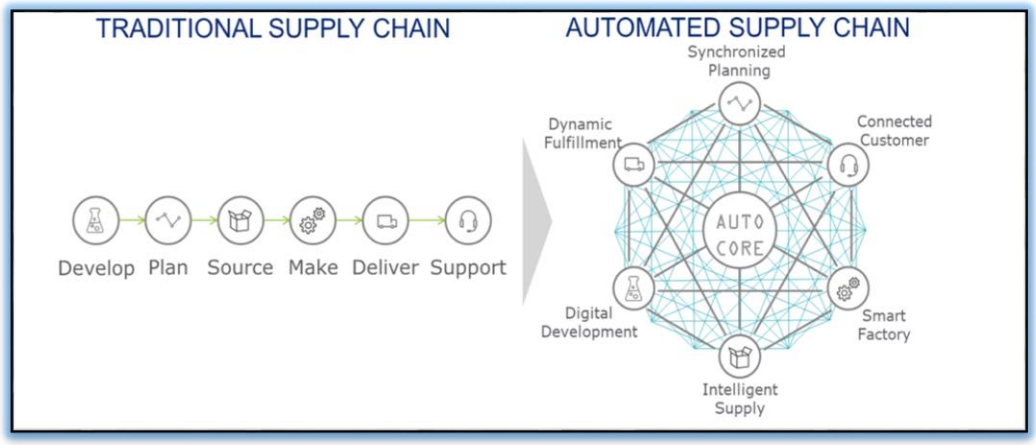

Figure 2.6: Shift from traditional supply chain to digital supply network automation

Source: Anfimova, 2017

The above diagram is an indication of the perceived benefit of an automated supply chain. The process accelerates the value chain through direct and indirect operational cost reductions by increasing income potential. Retailers can reap several benefits that decrease operating costs, increase productivity and volume, and assist ERP with compliance. Laaper, Wellener, Yauch and Robinson (2017, p. 1) suggest that an automated supply chain process should be agile in purchasing and distribution processes, which remain diplomatic and strategic to enhancing the value chain. The replacement of manual processes with a digital workflow allows for a seamless flow of information and a transformative journey (Marr, 2017).

2.24 Better collaboration and visibility

The exchange of information across the supply chain network, commonly known as electronic interconnectivity, attempts to modify the bullwhip effect for the retail goods industry (Mbhele, 2016, p. 54). Technology has enabled better adoption of network sharing across the supply chain in an attempt to improve operational supply chain performance, customer service levels, and solution development (He, Xue & Gu, 2020, p. 2). The definition of supply chain collaboration involves every member of the chain working closely to meet a customer's demands and needs. Technology has increased the speed of communication, with its vast capabilities paving the way for companies to communicate with stakeholders using newer methods. Mussomeli *et al*. (2016, p. 4) consider that the key to supply chain visibility is a standard system which allows stakeholders to work in collaboration in order to plan, be alert, and make real-time adjustments to ensure the supply chain operates efficiently. The process commences with the purchase order for goods, where a supplier can fulfil and view all charges, and provide production and inventory schedules to meet customer fulfilments (Watson *et al.*, 2018).

The complexity and uncertainty of products requires high bandwidth to store information and process it quickly to corresponding supply chains. If retailers attempt to trial new data sources, application software, software tools, and computing models alone, it creates tremendous uncertainty (Seedat, 2017, p. 4). Various retailers freely admit that they are not tech-savvy enough to capitalise off all digital capabilities available today, as well as emerging trends (Woetzel *et al*., 2017, p. 5). A retailer that invests digitally in innovative techniques relieves

the burden of having to face these challenges later. Technology assists in collaborating and creating visibility throughout the supply chains by sharing information with retail partners, thereby enabling accurate forecasting (Tom, 2019). The more information derived and shared around demand and supply between retailers and wholesalers, the more precise the demand projections become. This information communicated to suppliers can control or readjust quantities for any noticeable increases and decreases (Tipping & Kauschke, 2016, p. 10).

Forecasting and replenishment (F&R) on SAP, also known as demand resource planning, can help automate forecasting (Ludwig, 2018). Forecasting and replenishment is a time-phased tool that uses the industry-standard forecasting approach to turn shared knowledge into reliable predictions. Point of sale data, along with historical data, helps to enhance shared knowledge (Valencia, 2020). Appropriate technologies provide real-time insight into supplier production schedules; these resources facilitate cooperation between suppliers and the status quo of production. Zeev *et al.* (2017, p. 12) stated that the change in the nature of the market has made it critical to integrate different functionalities of a supply chain, for example, product development, maintenance, and logistics, across borders. The outcome of an effective automated end-to-end process results in a flexible process of bundled activities with increased visibility, thereby enabling digital supply chain success (Uzialko, 2019).

2.25 Reduces costs significantly

The on-demand manufacturing function represents a revolutionary change in purchasing and SCM, bringing together widely accepted concepts such as JIT, Kanban, and lean manufacturing (Adeyeri, Ayodeji, Akinnuli, Farayibi, Ojo & Adeleke, 2019, p. 170). This streamlines operations, and the system helps to drive waste from processes. This improves the efficiency of the supply chain, which reduces the total cost of ownership for retailers. The concept of demand manufacturing offers retailers the ability to use the same supplier for manufacturing and delivery of products. This mitigates the risk of utilising a variety of vendors and eliminates the middleman (Hagell, Kulasooriya & Brown, 2015, p. 5). The prominent presence of technology in a warehouse assists in profit leveraging with RFID technology for inventory tracking. This tailored software is specifically for warehouses with multi-level decision-making tiers (Singh, Verma & Kumar, 2016, p. 1). These assist in maintaining awareness of analytic tools and in considering IoT devices, which leads to excellent supply chain savings. The cost of labour has drastically decreased because of RFID that can tackle various tasks at

once, such as scanning, tagging, and counting items (Nöjd, Trischler, Otterbring, Andersson, Wästlund, 2020, p. 3). These costs decrease significantly, resulting in cost reductions at distribution centres. It is vital that a retailer such as Massbuild stays up-to-date on the latest technology trends.

2.26 Better customer relationships

He, Xue and Gu (2020, p. 4) state that businesses can interact with customers on a digital platform and reach a customer through mobile applications that customers use to access information on a product or to get information surrounding a product. There has been a lot of enthusiasm surrounding new technologies that improve customer service and support, and improve success for a retailer. It has been emphasized that the advancement of video, real-time messaging, chatbots, and AI have been effective in addressing customers (Redboard, 2020). A customer also can be vocal over social media platforms to express their views and experience on a purchase. The ultimate aim of supply chain cooperation is to improve visibility across the value chain in an attempt to make better management decisions that eventually minimise value chain costs. The right tools provide customers and planners with the knowledge they need to make important business decisions on the basis of available information (Ludwig, 2018).

Retailers have taken advantage of virtual reality (VR); this technology has been shaping up to be a significant game-changer for customer experience in store or online. Walmart currently maximises on the advantage of customer experience by integrating VR technology into its stores. Virtual reality provides an immersion experience that makes it possible for a user to experience things that they cannot interact with physically (Okeke, 2018). Harman (2019) highlights the significance of the latest VR trend, which is augmented reality tech, in daily operations. Retailers are also starting to explore new options to utilise innovative technologies such as VR to benefit customers and their own staff through the experience and learnings offered by virtual reality. Okeke (2018, p. 3) further suggests VR offers location-based computing in stores that quickly assists the customer to navigate to in-store promos and services with standard functionality on smartphones. This personalises the customers' shopping experience, and they can engage directly with a chat box.

The benefit of technology also assists in bridging the gap related to the points discussed below:

- **Labour**

According to Greedy (2017), a global head of marketing in Invenio states the skills shortage across the supply chain has sparked potential difficulties worldwide. The Freight Transport Association (2017) Logistics report for 2017 states that in 2016, the number of individuals working in logistics was approximately two hundred and fifty-four million, which equates to 8% of the United Kingdom workforce. Around 290 000 are European Union nationals, which is 11%. Ideally, retailers can use statistics to emphasise the need to bridge the gap by using robotics in the supply chain. Robotics has reduced the need for unskilled labour and workers by utilising technology to perform various tasks. Skills shortage and rising costs of wages coupled with decreasing costs of technology mean the latter is already aware of the need for cost-effective investment (Laaper, Wellner, Yauch & Robinson, 2017, p. 2).

- **Planning and Execution**

Banker (2018) states that supply chain planning attempts to look at solving problems by using pattern recognition to see how planners resolved similar issues in the past, and to present analogous recommendations to problems that arise. Daily demand plans require new data on how the business performed the previous day to generate a forecast. Demand planning is a useful application for machine learning that continually improves data (Greedy, 2017). Forecasts are improved using the SAP based Forecast & Replenishment system, based on sales and demand. Newer system models in supply chain forecasting and planning will enhance a merchandise planner's tasks by resolving numerous admin related and manual tasks. However, this success lies in how the team member chooses to respond to the technology change. A proposed business project strategy that is concise and clear needs to be made at the same time.

Verver (2019) suggests that as tempting as it is with new software, businesses do not need to completely utilise a system that is highly complicated, from day one. A simple system can derive at least 80% of the benefits that are embedded in an existing system/software, and provide a solid foundation to optimise further. Adoption of newer software by a business can assist with planning. However, deriving success from the newer software in the first few months of usage remains a challenge (Kearney, 2017, p. 4). Quality support is required, with an emphasis on KPI delivery and process consistency. Planning is the most critical phase of any new implementation (Schweiger, 2016). The planning needs to encompass the retail strategy, why the adoption is needed, and the gap identified, to ensure the investment is

sustainable. Execution requires that all the information is acquired and these steps are taken from the planning stage.

2.27 Inventory optimisation

Technology cooperation between a company and a supplier should be consistent with standard technology strategies and roadmaps. Academic researcher Letaba (2018, p. 15) states that cooperation of suppliers and buyers must operate at the same level of technology innovation in order to perform efficiently. This will lead to a decrease in stock holdings upstream of the supply chain as the supplier is in control of production, and distribution costs are minimised. Hogg (2017, p. 24) states that the proliferation of internet-based IT has laid a foundation for firms to electronically share rich information with partners in their supply chain (Dlamini, 2018, p. 12). Information exchange results in efficient business operations through knowledge creation and organisation of activities. The influence of technology on the supply chain relies heavily on communication with silo-oriented and decentralised supply chain processes that are low cost and meaningful to the retailer (Van De Berg & Lingen, 2019, p. 1).

The use of technology in business processes is a core competency; however, Van De Berg and Lingen (2019) strongly believe that there are a variety of challenges that come with adoption. The first can be through costs as systems are expensive; further, business vision and needs must be concise and clear before selecting the correct system to meet the business requirements (Capgemini, 2018). Successful adoption of new technology enhances the infrastructure for physical connectivity amongst supply chain members, and makes sharing easy and accessible across trading partners. Armstrong (2017) argues that the manner in which products and goods are transported has a significant effect on the level of customer service. The preferred supply chain should be coordinated with the trading partners in order to allow the retailer to reduce inventory levels, decrease old stock on the network and respond to constant customer requests. The literature confirms that the benefits associated with the influence of technology ultimately depends on the achievement of economies of scale, centralised delivery, and the ability to keep up with the best trends in its supply chain, thereby allowing the retailer to respond rapidly and to satisfy consumer requirements.

2.28 The process of adopting newer technology

Technology can seem exciting and daunting at the same time, but it often requires substantial capital injections (Ruch, 2017). Retailers have to be quite careful in the selection process, as often the technology may wear out quickly, or it is not in line with the company's vision or business strategies. Preece (2020, p. 17) states that technology implementation starts with a vision where a retailer can offer customers real-time data and visibility on products and services via a client portal. Investments in core technology are like constructing a new house; good construction means clear communication, preparation and execution. Retailers should be mindful and feel assured that they are making a big leap into this level of change without anxiety and any unforeseen setbacks (Souran, *et al.,* 2015, p. 45). If done correctly, a retailer can minimise surprises and take advantage of technology benefits quickly and efficiently.

The following steps were extracted from Ruch (2017, p. 1), founder of Roketrip.

Table 2.3: Steps to follow when implementing emerging technologies

1. Work from the ground up	*Evaluate new technology from the most basic level, what could and could not work, and the expectations of the implementation. What are the success factors that it can be measured against? Rank the business priorities against functionality and cost. However, do not undermine compatibility. Instead, opt for systems that are accessible and intuitive for users.*
2. Product Support offering	*Technology that is selected for integration should have a complete support system for mitigating risks and difficulties. Employees require training which moves away from the use of manual approaches. If there is no approach to change, new systems and technology shall not work.*
3. Impulse to rush	*The pressure to boost productivity and sales usually results in impulsive decisions that may not be the correct fit for the business. Newer technology is tempting and appealing; however, introduce a pilot program through cycling various technologies to find a suitable one.*
4. Transparency	*Transparency can reduce friction that may potentially arise with the introduction of new technology. Keeping employees in the loop and understanding their role in the process will more likely help the business achieve a seamless transition.*

5. Create Value	*The importance of building/creating value highlights the created value of technology for employees. In addition, trust is earned by valuing opinions of employees and taking the time to collect and address feedback.*
6. Maintaining Momentum	*One of the biggest challenges is for new technology to exit the gate strong; implement a team for new projects, and task them to oversee projects from start to finish by piloting and gaining sufficient market research.*

Source: Ruch (2017)

2.29 Theoretical framework

The importance of the theoretical framework in this study is to provide structure and vision as to how technology influences a retailer in the context of the supply chain. This study uses Technology Organisation Environment theory. Academics view the adoption of technology as a process that individuals decide on; it requires the ability to perceive, understand, and interact with an environment in an intelligent manner. The theoretical structure of the Technology Organisation Environment (TOE) theory was used as a lens to research the impact of emerging technologies in the Massbuild merchandise and distribution process. TOE has been commonly used to research the various technologies that make up IoT, such as RFID, cloud computing, automation and artificial intelligence (Dlamini, 2018). According to Hoti (2015, p. 5), previous researchers suggested a functional parallel exists between information systems and technological innovation adoptions. Technology innovation is a result of demand-pull and technology-drive, which means creating and providing innovation in a mature form in the capital goods market.

2.29.1 Technology Organisation Environment theory

The Technology Organisation Environment theory (TOE) was created back in 1990 by Tornatzky and Fleisher who aimed to describe factors that influence technology adoption and its likelihood (Baker, 2018, p. 1). Technology Organisation Environment theory addresses the process by which an organisation adopts technology innovations and is influenced by the technological, organisational, and environmental contexts (Awa, Ukoha, Emecheta & Liu, 2016, p. 269). The three elements below present both constraints and opportunities for technical advancement. This model addresses the manner in which a retailer acquires the need for, searches and introduces newer technologies (Awa *et al*., 2016, p. 270). The TOE model was used by previous academics to describe the adoption of inter-organisational electronic data

sharing systems, open business systems and a wide variety of general Information Systems applications (Hoti, 2015). Technology Organisation Environment theory is used by a number of sectors such as manufacturing, retail, wholesale and financial services. In each of the empirical studies that test the TOE paradigm, researchers used slightly different variables in the technical, organisational and environmental contexts. This model was selected for the present study based on the criteria and is directly in line with the research objectives (Baker, 2018).

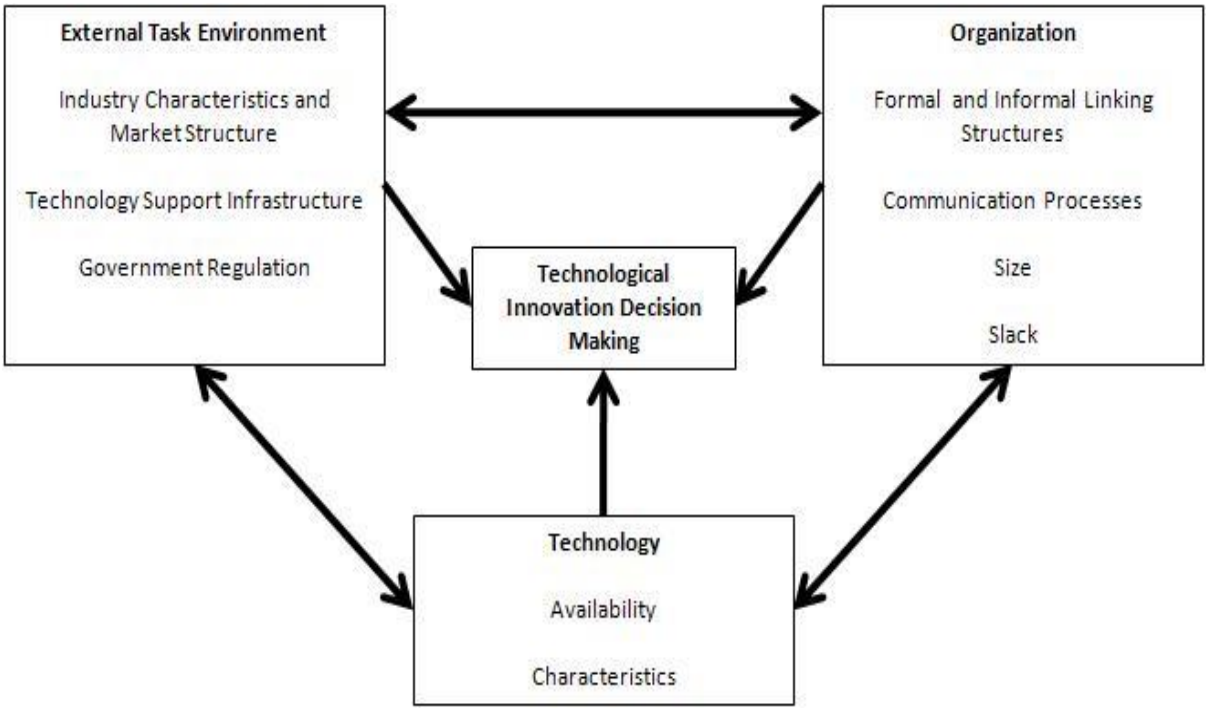

Figure 2.7: The technology–organisation–environment framework

Source: Baker, 2018.

- **Technological context**

The technological aspect refers to how technological features can affect the decision to adopt. These features include perceived benefits or advantages, obstacles, usability, the value of compliance, sophistication, testability, ease of use and perceived risk (Baviskar, 2016, p. 48).

- **Organisational context**

The focus of the organisational context is on the corporate structure, such as the size of the retailer, the number of employees, and the communication mechanism, including the level of centralisation and formalisation. Organisational structure is important in the adoption of technology and influences the social interaction between employees of retailers (Awa *et al.*, 2015, p. 271). Baviskar (2016, p. 49) argues that retailers with decentralised systems use state-of-the-art technology more than other competitors, while retailers who choose this strategy have more sophisticated technologies to enhance collaboration and communication processes inside and outside business and with partners.

- **Environmental context**

Environmental context refers to the operational facilitators and inhibitors, usually government regulations and political agendas that apply pressure on retailers. Retailers need to comply with the necessary standards that support approved infrastructures, such as access to quality ICT consultants (Awa *et al.*, 2015, p. 269).

2.30 Retailers with successful technology adoptions

The benefits that retailers can achieve through technology are endless. The technological digital retailing platform enables a company such as Massbuild to access and serve markets via its supply chain that were previously inaccessible through traditional supply chain methods. In order for any retailer to be successful, it needs to foster the adoption of new technology; nonetheless, it should not make huge changes in the supply chain processes, but rather adapt it (Chaturvedi, Martich, Ruwadi, & Ulker, 2017, p. 72). It is fundamental that all teams are involved in understanding the business and its changing methods. Leaders ought to communicate the goals and vision and explain the strategy on how this new implementation will be achieved (Lamarche, 2020). Retailers need to take advantage of artificial intelligence and its ability to draw information. They can use this information to make decisions based on large quantities of big data, decisions that will have a dramatic effect on how supply chains work in ten years.

The use of innovative technology is an indicator of power in the retail sector as it provides a competitive edge. An example of a powerful tool is artificial intelligence, which enables a quick ramp-up going forward (Pettey, 2020, p. 1). There are various businesses that have incorporated AI on their journey, such as Coca Cola, Unilever and Pepsico (Richmond, 2017).

If supply chain leaders do not plan for the eco-system in which potential supply chains will work, retailers are at risk of not forecasting and planning for the inevitable disruption. Therefore, the adoption of AI in purchasing and distribution enables better preparation for unseen challenges, such as the new coronavirus (Alicke, Azcue & Barribal, 2020, p. 5). The below figure is a European model, as the west is quicker and more responsive to technology. Limited information is available in the South African market.

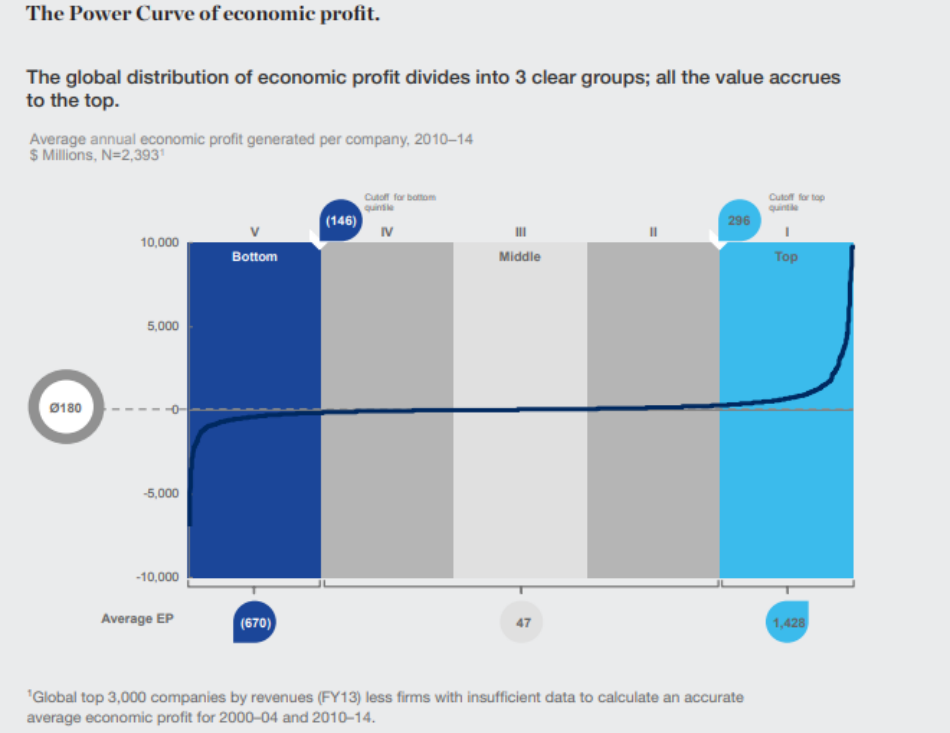

Figure 2.8: Strategy practice beating the odds model & corporate performance analytic

Source: Bradley, Hirt & Smit, 2019.

The sea change for the business-to-business and business-to-consumer context is transforming what service relationships mean. McKinsey's research highlights that forty-five percent of employee activities can be automated by adapting current technologies. This is further detailed in chapter four based on the findings (Bradley, Hirt & Smith, 2019, p. 2). Retailers ought to question approaches in the way they operate, to build skills and deliver on customer experience (Fiorletta, 2016). The reality is vital in regards to the high stakes of today's digital environment. The above figure depicts a power curve which is relevant to the RSA market.

Twenty-four businesses, making up 1% of the sample, earn 90% of the profit, which is the same as all the rest put together. Looking at the top quintile, improving profits can be seen as challenging. Most businesses have embarked on a journey to transform their supply chain operating models by reducing costs despite performance not being achieved (Briedis, Harris, Pacchia, Ungerman, 2019, p.1).

It is evident from the above figure that certain companies have taken a series of bold technology initiatives that reinforce customer experience, creating an impact that is cumulative. This is perceived as the recipe to successful transformation using technology to enhance customer experience. Technological developments are all about disrupting the way a retailer functions, and it is important to establish a next-generation model that can maintain a new level of speed, agility, performance and precision (Klappich, 2019).

The below business examples are businesses trending worldwide and within South Africa:

- **Amazon**

Amazon changed the face of retail in the 20th century by taking huge risks in deploying bold supply chain strategies through the use of innovative technology. Amazon has continuously strived to deliver products to customers in the shortest lead-time as possible, creating pressure on other giant retailers across the globe, thereby changing the way supply chain management operates (Vincent, 2019). The supply chain largely relies on outsourcing of inventory management whereby items that are not regularly purchased are stored in different locations. The nature of Amazon's business is focused on customer service and fulfilling expectations; their delivery vehicles can fulfil an order in an hour (Terdiman, 2018).

A push/pull strategy is deployed to achieve supply chain success; as warehouses are strategically placed around metropolitan areas, this results in a push strategy for products to be warehoused. The system used for automation is called 'Kiva'. The robotics are designed to pick and pack without human intervention, enabling faster warehouse activities (Roser, 2020). The next generation of robotics is aimed at robots picking orders, thereby reducing the need for human pickers (Leblanc, 2019). It is evident from the above that Amazon reduced its economies of scale and stuck to key innovative strategies that enabled them to keep their overall per unit supply cost at a minimum. According to Michigan State University (2019), Amazon

has made it difficult for other retailers to compete, which has resulted in far lower sales volume and warehousing amongst the other existing retailers.

- **Walmart**

Walmart is among the world's largest retailer and is a leader in sustainability. Walmart has now decided to compete in the supply chain space through consolidated warehousing that will optimise the country's supply chain. The distribution centres' intentions are to utilise innovative technologies that enable suppliers to fill single large orders as opposed to smaller multiple ones. Automated software scans the product output upon arrival, making information seamless, simpler, and smarter (Redman, 2019). Walmart is introducing thousands of new robots in stores throughout the United States of America (USA), a development that comes as retailers struggle to recruit and retain employees at a record low unemployment rate. Innovations by Walmart are an ongoing trend in comparison to Amazon, where automation assists in freeing up staff and enhances customer experience. Technology remains a threat for many retailers, however, retailers can just move staff around for better purposes (Heller, 2018).

- **Dischem**

Dischem attempted to create a cluster solution for the individual servers and software applications in each store to support the storage features required. Technology has assisted Dischem in addressing intermittent downtime issues at various sites across the country (Visiture Sustainability, 2018). The ability to reduce economies of scale through associating a cost with managing virtual software is ideal for remote regional offices as well as data centres. Dischem uses innovative lockstep technology, which has allowed employees to be constructive with a prepared solution instead of a reactive one.

Strauss technology, which is outsourced for Dischem, has greatly assisted the success of automation at Dischem warehousing facilities (Visiture Sustainability, 2018). Dischem trading reports were released recently, with retail revenue plummeting to 12%, achieving R9 Billion with a comparable sales growth of 5.3%. The group saw an improved margin trading volume driven by strong dispensary sales. The continual growth of technology investments by Dischem drives innovation to ensure a 100% fill rate to stores. The success rate of automation within Dischem has led to nine new store openings for the year (Dischem, 2019).

- **Shoprite**

According to Rajgopaul from Business Day (2020), Shoprite is the first SA retailer to offer QR Payment, which is available at all cashier points in their chain stores, including Shoprite, Usave, Checkers and Checkers Hyper stores. Customers are offered this unique technology by scanning a QR code at till points with their smartphones using applications like Snapscan, Zapper, FNB or Nedbank. As the retailer uses a dynamic QR code, the amount payable is automatically displayed on the customer's screen, leaving little space for error.

The next section of the literature review addresses research objective four, which is to examine the challenges associated with adopting newer technological progressions into merchandise and distribution processes.

2.31 Challenges of technology adoptions

The internet of things (IoT) is a phrase or concept introduced into the industrial environment by the fourth industrial revolution, which envisions "everything connected with everything else" (Kalms, 2018, p. 2). Premm and Kirn (2015, p. 121) state that the high demand for specialised products and services is continuously increasing. Supply chain processes have to adapt to changes in the environment, and due to the complexity, a supply chain will not function on ordinary planning and control mechanisms. Letaba's (2018, p. 20) findings refer to disruptors in retail, which are embraced by retailers with the adoption of technology, to enhance the customer experience. The findings further claim that at least twenty-five percent of disruptors form a seamless shopping experience across all channels compared to a minimal thirteen percent of traditional retailers. The list of disruptors may vary from retailer to retailer, which also reflects top management insight surrounding data-driven decision-making.

Over the last few years, Supply Chain Risk Management (SCRM) has been transformed to reflect developments in the broad market and policy categories, including new products, business lines and regulatory requirements (Prebler, Eismann, Pietrowski, Fischbach & Schoder, 2020, p. 1). This contributes to complexity, providing an opportunity to re-think and transform processes, and make them consistent and dependable. Technology assists in transforming SCRM by supporting key stages; however, it is crucial to consider the following critical points described in the next sections (Birkel, Veile, Muller, Hartmann & Voigt, 2018, p. 2).

2.32 For retailers

The focus of retailers in the past years has been on upgrading technology as part of an Omnichannel strategy. This connects physical and online stores for customers to receive a blended shopping experience (Roberts, 2020). What lags behind is investment or capital injections to fund the particular project surrounding newer technology, to improve operational functionalities. The enhancement of technology, in turn, lowers costs and protects retailers against vagaries in the market, which remains a massive issue in the retail landscape (Hubner, Holzapfel & Kuhn, 2016, p. 255). The key players cannot work with systems that do not talk to each other as miscommunication can occur, which means exposure to fatal risks across an entire supply chain, affecting the merchandise team. Having multiple systems is inefficient as they contain contradictory approaches, and raise questions amongst the various teams (Alicke *et al.*, 2020). There is no doubt that the retail environment is continuously evolving, which affects all those involved. A smart risk culture will influence the implementation of technology solutions that leverage market information and deliver on external intelligence. It is vital to financially control business tolerance towards risk by balancing uncertainty for retailers, suppliers, and key stakeholders (Federman, 2019).

2.33 Customer expectations

One of the potential risks that retailers face difficulties in adapting to is customer expectations; these are continually changing and make it difficult for businesses to adapt. In the new era, customers are drawn to businesses that allow for the experience of browsing, shopping and discovering new innovative products which permit a pleasurable experience. The issue lies in the fulfilment of customer expectations as they vary from market to market, geographical regions and amongst techno-savvy customers. A retail survey conducted by KPMG (Kalms, 2018) sought to understand what the customer is precisely looking for and how to reset expectations. Customers make decisions based on historical information, such as product, price, availability, the fulfilment of delivery, interaction, and brand loyalty (Hoffman & Novak, 2015). A retailer that decides which of these factors are critical differentiates themselves from competitors. However, product and price are commoditised, and consumers have more knowledge on products purchased than sales representatives on a store floor do (Barasch, 2019).

A customer thrives on an experience that is memorable, meaningful and personalised. Camara, Hu, Khanna, Lamarre, Patnaik, Seitz, Singla, Sood and Van Ouwerkerk (2019, p. 2) state that digitalisation is an aspect of which customers are acutely aware. At first it was alienating, and today it is quite remarkable that it has become common and banal. The above authors further suggest that the technologies aim at advancing customer experience, whilst most customers do not expect the same service across all businesses. In South Africa, Takealot sets the standard for fast and affordable delivery, and therefore customer expectations around order fulfilment are continually increasing (Tsele, 2017). However, the risk lies in the distribution, such as correct picking, accurate addresses, and 100% order fulfilment. According to Armstrong (2017), at least 38% of customers say they will not shop at a retailer that allows them to experience negative delivery. A strong brand is built on exceeding customers' expectations; that assists in faster growth through word of mouth, which is a powerful form of campaigning (Bishop, 2019).

2.34 Financial investments in software applications

A transportation management system is a system developed on a subset of supply chain management consisting of the planning, executing, and optimising of the physical movement of goods in the distribution and warehousing of products. A company such as Massbuild has to make use of a well-known transport management software system. Currently, Trackmatic is being utilised; however, information is not filtered through to operations and merchandise to trace and monitor deliveries. Morris (2016) suggests that businesses should utilise a good transportation process that is user-friendly and simplified. A complicated system will not suit business requirements as it would create bottlenecks in the supply chain surrounding lead times and order fulfilment (Westerveld, 2017, p. 1). A seamless supply chain integrated with ERP will adhere to regulatory compliance, and transportation software should ultimately save business resources and time, thereby reducing the risk substantially (Verma, 2020).

O'Bryne and Green (2017), retail executives, state that no matter how good, bad, or mediocre a business is, if it does not invest in technology, ultimately it will be left behind. The question then arises as to what a distribution centre would look like in 2045 if technology has no influence but continuously disrupts logistics as profoundly as it has since the 1990s (Morris, 2016). The assistance of a warehouse management system (WMS) has reduced the number of employees on a warehouse floor since the system has advanced considerably in the past couple

of years (Nantee & Sureeyatanapas, 2021, p. 4). The primary function of a warehouse is for faster movement of goods performed by staff, to generate efficiency and reduce labour intensiveness. O'Bryne and Green (2017) suggest that WMS solutions are powerful for system guidance across all functionalities of warehousing and distribution, especially those that are performed by forklift operators.

According to Chandani, Duffy and Lamphere (2017, p. 1097), transportation and warehouse costs continually rise as companies aim to re-evaluate key performance indicators. In South Africa, businesses are always trying to manage fluctuating fuel costs and load shedding, which impact transportation costs and amount to roughly 50% of total logistics expenditures. Supply chain professionals around the globe are reporting less inventory turnover and stock holding at the distribution facility. O'Bryne and Green (2017, p. 2) stated that in order to adapt to a market place that is continually evolving, it is imperative for businesses to know where inventory is located and how to move it successfully to its point of consumption. Retailers ought to have a holistic view of activities and information that drives execution in order to preserve sales with accurate forecasting.

The risk of relying on system-based technologies can also alter ordering cycles and lead times, ultimately reducing service levels. Chandani and Lamphere (2017, p. 1099) further outline in their article that a well-integrated system simplifies the complexity of a multi-channel distribution network. A good system can handle both large and small orders, and executes flexibility to address consumer's needs. The Transport Management System and Warehouse Management System do not have to be two left feet commodities, but rather, the idea is for the two to be fully integrated (Verma, 2020). The synchronisation of the two systems can manage exceptions and ensure visibility with increased flexibility to optimise workflows.

2.35 Automation resulting in potential job losses

The reality is that the future will become automated and augmented, and some roles will be redundant in the workforce. The World Economic Forum states that machines are already performing manual tasks that are perceived to be too difficult (Redman, 2019). Automated systems allow complex processes to be systematically organised and responsive, overcoming the anxiety associated with manual labour. People who earn in the low-middle income tier are clearly defined, with repetitive tasks. More roles are becoming supervisory, interspersed with

brief periods of activity. Paradoxically, work has become less effortful yet more tedious and fatiguing (Richmond, 2017, p. 2). Automation can create boredom inside or outside the workplace, which is not a recent observation. The growth of automation in supply chains allows for the increased risk of exploitative work and modern slavery in the supply chain (Kapadia, 2018).

According to Nike and Adidas, clothing textile and footwear jobs are at high risk of automation as 'sawbots' are growing in popularity with major clothing manufacturers. When this occurs, supply chain workers are urged to compete in the ranks of robotics and for fewer jobs at lower wages. If jobs are switched to automation, then 2.6 million Vietnamese women will lose their jobs, according to the report (Maplecroft, 2019), which ultimately brews a trade war for China and Vietnam.

Source: Verisk Maplecroft, 2018-Q2; International Labour Organization, 2017

Credit: Verisk Maplecroft

Figure 2.9: ASEAN - 5 nations, automation, and the risk in the labour market

Source: Maplecroft, 2018.

The above figure depicts the ASEAN market, where at least 90% of products and materials are procured from the eastern countries. The dark side of automation means fewer alternatives to exploitative labour and a spiral of industrial slavery that achieves sustainable development goals (Kapadia, 2018). Automated facilities bring myriad benefits; however, these cost savings

come with a social cost for a large number of low-skilled workers who depend on this brand of supply chains for jobs, resulting in the potential risk of these workers losing their livelihood.

Technology assists supply chains with implementing more comprehensive controls. An example is product recall of items that cannot be sold at the point of sale (Seedat, 2017, p. 45). The design and description of control processes should be understood and interpreted well to see results. Control systems provide automatic routines. To avoid flagging transactions and operations that are likely to be harmful (Pebler *et al.,* 2020), Verver (2019) advises that a retailer needs to improve on communication management to identify breakdowns, a common area of information disconnect which risks loss of control. Questions are formulated on who is responsible for resolving the problems, the status quo, and the follow-up. When it comes to technology adoptions where the software allows for a user to trace identification processes, this often creates trust and relationship, which needs to be managed internally by managers and employees (Knight, 2015).

Current technologies build workflow capabilities that warn workers of problems that need to be addressed and automates escalation of unresolved issues that require attention (Victor, 2017). An example is a picker not picking all the products scheduled for delivery to a store. One of the biggest challenges lies in the use of a traditional spreadsheets or a home grown system. Detailed business reporting and a visual dashboard are critical for managing supply chain risks. A well-integrated dashboard allows for highly visible benefits as well as a large volume production scale. A visual dashboard assists managers with consistent assurance and understanding (Verver, 2019).

According to Richmond (2017, p. 1), automation has a wide variety of benefits, but with e-commerce, as prominent as it has been, it comes with security threats. Security remains as pivotal as it was thousands of years ago. The introduction of automation has brought about cyber-attacks on access control systems, intelligent video surveillance, and GPS tracking devices. It is essential that a business has a cyber-division to assist in securing warehouse and distribution facilities, to monitor where goods are along a supply chain (Nagy, Olah, Erdei, Mate & Popp, 2019, p. 19). However, this will remain a threat to supply chains, especially as technology continues to advance at a rapid pace.

2.36 Conclusion

The literature findings address the influence of technology in retail and supply chain processes. Adhi, Magnus and Sanger's (2020) study identified measures that retailers can adopt which can fundamentally transform their merchandise and distribution processes, enabling a true Omnichannel experience. Similar research studies conducted by Hogg (2017) and Johnson (2018) include key points related to the research subject of emerging technologies, which helped to identify gaps in the area of research. There were various peer-reviewed academic studies in this literature review that indicated the strong need for a technological presence in retail functions, predominately 'purchasing' and distribution, in order for a supply chain to be efficient and effective in fulfilling customer needs. The benefits of implementing technologies such as AI, ERP and machine learning are boundless in supply chains, such as providing greater stock control and visibility.

In addition, the literature review discussed key points that retailers should address before adopting new emerging technologies such as ERP and application-based software into their existing practices (Alicke *et al*., 2016, p. 4). These should be determined by the business strategy and need. The benefits were highlighted extensively as to how automation, artificial intelligence and big data can benefit a retailer in making informed decisions (Hoffman & Novak, 2015). Advanced analytics is the autonomous processing of data using sophisticated tools that make recommendations and provide useful insights. Along with the potential benefits, the challenges were also highlighted. Chandani and Lamphere (2017) stated that there are multiple initiatives to manage the risks that challenge retailers, that improve performance in the overall supply chain. As technology continually evolves, retailers ought to be cognisant of the risks surrounding fraud, pricing, data phishing and of confidential information being leaked (Shaw, 2018). According to Van Schalkwyk (2019), the potential challenges that arise with technological emergences result in internal challenges such as employee resistance and job losses as a result of automation.

The TOE theory serves as a theoretical framework for the purchasing and distribution functions of this research. The emergence of technologies has been value-adding to retailers, transforming their traditional space into a more digitised way of operating. The emergence of various technologies is experienced across retailers and its successful adoption depends on the perceived ease of use for employees and the propensity for the majority to embrace radical

change using technology (Nojd *et al*., 2016, p. 2). This also presents a challenge in terms of the choice of emerging technologies that can be useful for technology innovation and how retailers can upgrade their current systems and processes. A lack of system tools implies that a retailer is not inclined to gain a competitive edge in the global market (Schrauf & Geissbauer, 2018). The content covered in the literature review aligns with the research objectives, and the relevance and significance of each aspect refers back to the research topic. The literature affirms that retailers that engage in adopting technological emergences should ultimately drive up profit and simultaneously reduce costs.

Chapter Three:

Research Methodology

3.1 Introduction

According to the World Economic Forum (Schwab, 2016, p. 2), retailers are on the verge of a technological transition that will transform the way human beings work, live and connect to one another. As highlighted in the previous chapters, supply chains around the globe are at the forefront of digitisation and are influenced by emerging technologies (Klearb, 2017, p. 398). This study investigates the influence of emerging technologies within merchandise and distribution practises at Massbuild. This chapter includes an overview of the research methodology guided by the case study approach. A thematic analysis provided a rationale for the selected research methodology. The Technology Organisation Environment (TOE) theory served as a lens to determine the influence of emerging technologies and how it impacted a retailer's merchandise practise (Baker, 2018, p. 241).

Data for this study was obtained through a qualitative research methodology using semi-structured interviews as a data collection tool. A pilot test was performed to ensure that the participants were able to answer the prescribed questions, and during this process the researcher was able to extract information. The chapter ends with an analysis of the possible research limitations affecting the outcomes of the research study.

3.2 Research approach

According to Creswell and Creswell (2018, p. 42), research approaches can be described as research plans and processes that range from general assumptions to comprehensive methods of data collection, analysis and interpretation. The choice of a research approach depends on the nature of the research problem. According to Yin (2018, p. 44), the essence of a case study is the central tendency among all types of case study which attempts to illuminate a decision or set of decisions. Therefore, the researcher applied a Robert Yin's case study approach to the study which was appropriate to address the research questions and research objectives. The researcher used the case study to describe the research approach – decisions taken, reasons why, how they were implemented and the results of the data analysis. The research steps are briefly described in the figure below (Figure 3.1). For this research, a sample size of twelve

employees, comprising merchandise buyers, managers, supply chain planners and engineers, were interviewed to answer the research questions shown below.

Sekaran and Bougie (2016, p. 23) depict a seven-step process in mapping a research study. The seven-step process was used to assist the researcher in answering the objectives and the research questions of the study. The research cycle is explained using the below model. It assists the aspiring researcher to locate where he/she is in the process to compare study designs, make choices, and conduct analysis for data interpretation. This process is insightful and informative to research academics conducting various types of research. The below steps were used to assist the researcher in determining the appropriate research approach and research design.

Figure 3.1: Seven step process in conducting research

Source: Author's own construct

The objectives of the study aimed at understanding the influence of emerging technologies on retail, with an emphasis on merchandise and distribution. The influence of emerging technologies determined the benefits and potential challenges that a number of retailers face, as well as how retailers mitigate these potential challenges.

3.3 Research questions

1. What is the current role of technology in merchandise and distribution processes within Massbuild, South Africa?
2. How does the availability of different technologies influence Massbuild's merchandise and distribution processes within South Africa?
3. What are the benefits that Massbuild can acquire when incorporating newer technologies into its merchandise and distribution processes in South Africa?
4. What are the challenges associated with Massbuild adopting technological progressions into its merchandise and distribution processes in South Africa?

3.4 Research objectives

1. To examine the current role of technology in merchandise and distribution processes within Massbuild, South Africa.
2. To understand the influence of the different technologies available to Massbuild's distribution and merchandise processes in South Africa.
3. To determine the potential benefits that Massbuild South Africa can acquire when incorporating the emerging technologies into merchandise and distribution processes.
4. To examine the challenges associated with Massbuild adopting new technological progressions into merchandise and distribution processes.

3.5 Approach to theory

An approach to theory may be either inductive or deductive, based on the research interpretation. The main factor in the relationship between theory and research is whether an inductive or a deductive research approach is utilised (Piekkari & Welch, 2018). Each research strategy follows the desired direction of data collection and analysis. The form of query, control and importance of current and past organisational events affect the choice of strategy. This allows a researcher to find an equilibrium point of balance between the result, outcome, and selected methodology. The case study approach undertaken in this study is linked to the

theoretical framework that assisted the researcher in the findings and analysis. The TOE theory created a dialogical engagement between the framework and the case study (Rule & John, 2015, p. 1). The TOE theory, research and practises within the merchandise department are discussed in relation to context in which they are located. This varies from factors of the actual situation, purpose of the activity, employees involved and resources available. The literature review and the TOE framework provide a strong foundation for the creation of the methodology, as previous findings in the literature describe the variables that are relevant as 'emerging technologies' (Sekaran and Bougie, 2016, p. 81). This is conceptualised, which forms the basis for the TOE theory, the theoretical framework of this study.

3.5.1 Qualitative research approach

According to Bhattacherjee (2020, p. 14), there are four main approaches in conducting research, namely: quantitative, qualitative, mixed methods, and pragmatic, which are mixed methods and advocacy. Creswell and Creswell (2018, p. 43) provide valuable insights on research design in addressing qualitative, quantitative and mixed methods approaches. Qualitative research is an approach taken to examine and explain the significance of individuals or groups assigned to a social or human phenomena. The data obtained in the empirical field is inductively focused on clear general themes (Sileyew, 2019). Qualitative research can be defined as non-numeric data collection, e.g. interviews, or data analysis and data categorisation techniques, including text data, videos or photographs. This approach is undertaken to explore and understand individuals' or groups' views of the research problem (Creswell and Creswell, 2018, p. 43). Qualitative research is primarily associated with interpretive research since, like interpretivism, qualitative research seeks to interpret and make sense of social reality.

Quantitative analysis is a systematic method of gathering and interpreting data from a number of different sources. This approach requires the use of statistical and mathematical methods to obtain results (Leavy, 2017, p. 39). As business and economics strongly interrelate, utilising quantitative research methods to view these areas through a single lens can result in inaccuracy and flawed assumptions (Sekaran & Bougie, 2016, p. 5). The researcher made use of a qualitative research approach to identify and explore the influence of emerging technologies within Massbuild's purchasing and distribution functions. The use of a qualitative research methodology helped the researcher investigate latent and interrelated social processes between

merchandise and distribution processes, thereby uncovering interesting and relevant issues related to previous findings derived from the literature review.

3.5.2 Deductive and inductive research

Deductive research implies deducing a hypothesis based on previous literature about a particular situation and theoretical models concerning that situation. A deductive approach aims to test an existing theory and often argues about its theoretical significance, in contrast to an inductive approach (Creswell & Creswell, 2018, p. 49). A deductive study is similar to empiricism, which stresses the rationale and proof of the theory as well as the application of the theory to the evidence acquired. The selected TOE framework is used throughout this study on the influence of technological emergences specifically within merchandise and distribution. In contrast to deductive theory, an inductive approach to research allows research results to arise from the frequent, dominant or important themes inherent in the raw data without constraints imposed by formal methodologies (Devery, 2015, p. 78).

A generic inductive approach is a qualitative research approach that has only been established over the last decade and has not been extensively discussed in the related literature, although some scholars have mentioned it (Liu, 2016, p. 129). However, there has been a growing trend of its use in qualitative academic research. A generic inductive approach is not influenced by any proven qualitative technique, such as grounded theory, phenomenology, ethnography, narrative analysis, or case study (Creswell & Creswell, 2018, p. 76). The researcher chose to focus on existing methodologies that result in paying adequate attention to the fundamental findings of social reality. This study applied qualitative research methods supported by an inductive research approach. The inductive approach assisted the researcher to work from rich data to theory. Data was collected using semi-structured interviews, and information extrapolated from the data was further supported by the literature review. An analytical induction approach was used to collect and analyse the data on the strategically selected cases in order to empirically identify the causes of the particular phenomenon. This is different from grounded theory as it focuses more on existing knowledge and theory than on participants' data (Bryman & Bell, 2016).

Further, discussions on theory building in this methodology are based on the qualitative case study research and follow the inductive reasoning instead of deductive reasoning which is appropriate to quantitative studies (Rule & John, 2015).

3.6 Research design

Research design is a framework of the methods and techniques chosen by the researcher to combine one or more aspects of research in the desired logical manner so that the research process is effectively managed. Research design is segmented into exploratory, causal and descriptive. Research design is a qualitative approach that is most commonly used in exploratory or descriptive research (Leavy, 2017, p. 124). Sekaran and Bougie (2016, p. 43) argue that exploratory research is where little is known about the phenomenon or situation at hand; there is minimal research on how research problems have been resolved. It refers to research that is primarily intended to gain insight and to become familiar with a specific situation (Bernard, Wutich & Ryan, 2016, p. 43). This type of research requires extensive preliminary research to be completed in order to become familiar with the research problem.

There are pros and cons of using a case study research design, and Yin (2018) stresses that it is important to understand and acknowledge that fact. Case study research, like all other research, complements the strengths and limitations of other types of research.

The advantages of case study research design in this study are as follows;

- A case study approach offers critical evidence to complement experiments or create hypotheses for new theories – however, in this study the researcher is not creating new theories but using existing theories to support the study (Merriam & Grenier, 2019, p. 30).
- Case studies are well suited to explain the ‘how’ and ‘why’ questions by investigating the research phenomenon. This approach is highly appropriate when the researcher has minimal control over events (Yin, 2018, p. 22).
- Yin (2018, p. 30) states that a case study approach is great in investigating units consisting of multiple variables of potential importance. It allows the researcher to retain a holistic view of real life events such as emerging technologies, employee usage of technology and managerial practises within Massbuild.

- According to Lucas, Fleming and Bhosale (2018, p. 2) the advantage of a case study approach is that it adds to existing experience and improving humanistic understanding.
- Merriam and Greiner (2019, p. 40) stress the unique strength of case studies and their ability to handle and combine multiple kinds of data collection methods (documents, interviews, questionnaires, objects and observations). Houghton, Casey, Murphy and Shaw (2015, p. 1) explain this advantage by stating that case study as a research method is non-prejudicial.

In light of the above advantages briefly outlined and supported by academia, a case study research design was applicable for this study that used an interpretative approach. The case study explores any phenomena in the data which serves as a point of interest to the researcher (Yin, 2018). The case study assisted the researcher in answering questions such as, "Do employees think that newer technology developments are beneficial to them?" and if so, then "how?" These are general questions which are meant to be investigated further. As a prelude, this initial prep work assisted to prepare the framework for the study. A case study research design provided the researcher with information that was rich in data in the form of interviews and other secondary sources. This approach eliminated biased responses and helped to identify the emerging technologies in which problems, opportunities or other situations affecting merchandise and distribution are likely to arise (Merriam & Greiner, 2019, p. 15).

3.7 Pilot study

A pilot study was conducted to identify the appropriateness of the interview questions in line with the research objectives. The pilot study was carried out with the Massbuild Supply Chain manager, who has acquired a broad knowledge base over time. The use of pilot studies is considered to be a highly effective technique for improving the validity of qualitative data collection methods and thus the trustworthiness and accuracy of findings. The advantage of conducting a pilot study is to uncover areas where the primary research project might fail. Weaknesses can easily be identified, such as where the research protocol may be lacking or whether the research methods or instruments are appropriate in answering the research questions (Letaba, 2018, p. 3). The pilot study allowed for the opportunity to revise the research questions to ensure that the questions were relevant and that they did not make participants uncomfortable or confused. The Massbuild supply chain manager was an ideal candidate with whom to test the prescribed set of questions. The pilot test determined whether the maximum

amount of information would be derived and the questions could assist with the outcomes of the research.

The objective of a case study is to conduct intensive research on a specific case, such as an individual, group, institute, or community. In this scenario, the case is the retailer Massbuild. Case studies makes it possible to identify essential factors, processes, and relationships (Yin, 2017, p. 4). Hence, the case study approach was used in conducting a pilot study. The approach gauged the level of difficulty in questions and assisted in determining whether participants would be able to understand the questions and answer with ease (Leavy, 2017, p. 116).

3.8 Research paradigm

A research paradigm reflects a researcher's beliefs about the world they live in and aspire to live in (Kivunja, 2017). A paradigm serves as a lens through which a researcher examines the methodological aspects of his or her research in order to determine the methods of research that will be used, and how the data will be analysed. Essential elements of a paradigm include epistemology, ontology and axiology. In the field of social science research, ontological issues refer to the existence of reality (Dlamini, 2018, p. 30). Ontology is described as how researchers view the world. According to Saunders, Lewis and Thornhill (2019, p. 133), there are two major ontological positions in research: objectivism and subjectivism. A researcher may develop a subjective understanding of the participants by interviewing and then evaluating the data obtained, leading to an interpretive paradigm (Bhattacherjee, 2020, p. 27).

Research that uses a functional paradigm is more likely to be underpinned by a constructive research theory. This style of research is sometimes referred to as 'positivist-functionalist'. The bottom left corner of the matrix is an interpretive paradigm. The primary subject of research conducted within this framework is how we as humans attempt to make sense of the world around us. The concern of a researcher working within this paradigm would be to consider the basic meanings of organisational existence, as opposed to stressing rationality (Dlamini, 2017).

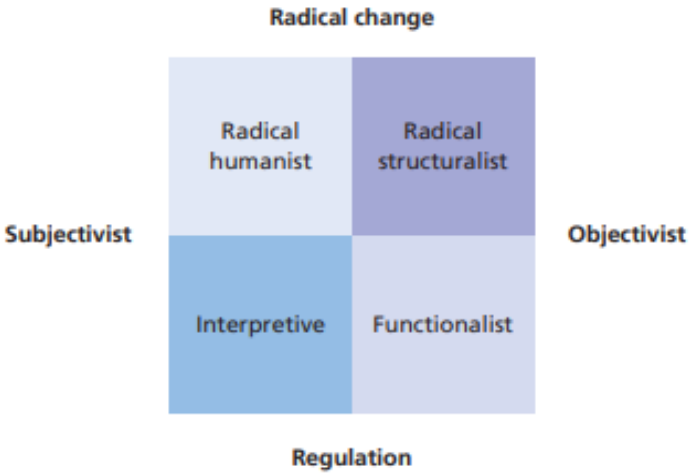

Figure 3.2: Four paradigms for organisational analysis

Source: Saunders, Lewis & Thornhill (2019, p. 140)

A researcher should have a world view of the social order through which they analyse patterns of events or actions that contribute to the research conclusion. The recommended way to gain knowledge is through an empirical research approach which uses a functionalist model or paradigm (Bhattacherjee, 2020, p. 27). Robert Yin (2018, p. 12) is explicitly constructivist in his epistemological understanding of his case study approach as his approach is "underpinned by a strong motivation for discovering meaning and understanding of experiences in context" (Harrison, Birks, Franklin & Mills, 2017, p. 25). Merriam and Greiner's (2019) approach is considered constructivist as their view is that a qualitative case study is informed through the epistemology of constructivism. Some researchers label them as 'pragmatic constructivist' as they suggest researchers follow processes in analysing, interpreting and reporting on case data (Bhatta, 2018, p. 73).

Based on the research conducted by Yazan (2015, p. 10) regarding case study approaches, the research study took a subjective ontological stance which was supported by the findings of the above researchers. The researcher held the view that the best way to gain knowledge and in-depth understanding of the emerging technologies within Massbuild South Africa retail supply chain was through interacting with participants in interviews. A functionalist approach draws a sharp distinction between the variables of a study, and looks for the differences between them (Cassell, Cunliffe & Grandy, 2018, p. 143). After clarifying its use in social research methodology, the researcher concluded that the functionalist model was consistent with most

quantitative research methods, while the interpretive paradigm was suitable for most qualitative research designs (Bhattacherjee, 2020, p. 28).

3.9 Sampling and research methods

According to Bhattacherjee (2020, p. 71), researchers cannot study entire populations due to feasibility and cost restraints. Therefore, the well thought-out collection of a representative sample of the population of interest for observation and study must be considered. It is important to choose a sample that is a true representation of the population, such that inferences drawn from the sample can be generalised back to the population of interest (Greener & Martelli, 2017, p. 68). The researcher made use of a pilot study in order to ascertain the appropriate research design for the study. The nature of the study was exploratory, which led to the researcher using semi-structured interviews as a research instrument.

3.9.1 Target population

Schindler (2019, p. 369) describes a target population as elements that take the form of groups, organisations, events or conditions an individual is exposed too. Williamson and Johanson (2018, p. 361) define the population as the community of people who may be requested to participate in the research study. The merchandise buyers, planners, managers, and supply chain analysts affiliated with Massbuild are the target population of this study. The organogram shared in chapter one depicts the relationships amongst the selection and how they correlate with each other. The researcher currently works at Massbuild as a national buyer and was ideally positioned to identify other key participants required for this study. The sample included a selection of twelve professional individuals from middle to top level of the organisation. The researcher arrived at this sample with a selection of buyers, planners, supply chain analysts, and managers in both supply chain and merchandise who clearly defined the target population. These individuals are knowledgeable and have worked in many retail businesses; hence their experience was valuable and insightful as they were capable of answering the research questions.

These individuals have also worked in other South African retail businesses and constitute a large knowledge base related to the objectives of this study. The knowledge and insights of the participants assisted in answering the research questions. Massmart is a mass operating retailer with four retail chains: Masswarehouses, Massdiscounters, Masscash, and Massbuild. The first

three chains are FMCG entities. In contrast, Massbuild is a DIY hardware retailer whose product mix is much more complicated in terms of distribution processes. The study was based in Sunninghill at Massbuild head offices in Johannesburg.

A non-probability sampling technique was used for this study, and the researcher selected samples based on the subjective judgment of the researcher rather than random selection. A mixed-method of purposive and judgement sampling was used. Purposive sampling undertakes to classify and select participants who are well educated and experienced in a phenomenon of interest (Bryman & Bell, 2016, p. 418). The selection criteria for the participants in this study were based on availability and willingness to participate. The participants used in this study are well-experienced individuals with a wealth of expertise, holding different management roles, and are key decision-makers in the process of transition and change. These participants were chosen based on their knowledge within the scope of study and the contribution they could make to the study with the information they would provide through the interview process. Judgement sampling aims at identifying individuals who have a wealth of experience and knowledge about the topic studied (Creswell & Creswell, 2018, p. 307). The design was deemed appropriate since it targets one retail chain (Massbuild) out of the four retail chains (Massbuild, Masswarehouse, Masscash, Massdiscounters).

3.9.2 Justification for selecting Massbuild

The research study focused on Massbuild, which is one of the four chains within the Massmart Group. Massbuild was selected due to its uniqueness and its retail driven business, comprising of general merchandise and DIY. The business has evolved over the years through the implementation of technology, particularly in the merchandise and distribution functions of the retailer. As stated in chapter one of the research study, the researcher currently works within the merchandise department of the business and has been exposed to a number of technology developments, which led to the development of this research. The researcher was able to obtain interviews with senior and middle management at Massbuild. This led to the use of the qualitative research method, with a significant sample representing the middle and top management of Massbuild. The sample selected provided relevant information for the research study.

3.9.3 Data saturation in a qualitative study

Data saturation refers to the condition whereby a researcher is fairly confident that further data collection will produce similar results and serve to validate existing trends and conclusions (Creswell & Creswell, 2018, p. 308). The idea of saturation stems from 'grounded theory'. Researchers are required to stop collecting data when categories or patterns are established. A sufficient sample is calculated when new data no longer produces new ideas or shows unique features (Saunders, Sim, Kingstone, Baker, Waterfield & Jinks, 2018). The selected sample of participants in this study have been impacted by the influences of emerging technologies almost daily, one of the key factors when the selection criteria were drawn up by the researcher. Since the researcher works alongside the participants, saturation was used as a criterion for determining when to stop sampling the different participants relevant to theoretical saturation of the category. Saturation was reached when no new additional data was found.

3.9.4 Sampling method

For this study, a non-probability sampling method was used as the research element did not have any probabilities attached to the data collection as sample subjects. The results of the analysis of the sample cannot be confidently applied to the population. The researcher used a non-probability sampling method to obtain data, which was cost effective and time effective (Sekaran & Bougie, 2016, p. 237). Purposive sampling helped to select the most knowledgeable candidates. The study aimed to understand the influence technology has on merchandise and distribution processes, and the benefits and risks associated with retail. The sampling method applied was confined to specific types of individuals who could provide the desired information on criteria specified by the researcher. Judgement sampling is a type of purposive sampling the researcher made use of in the selection of individuals for the sample.

Judgement sampling involves the choice of a subject who would likely provide the most information required. The sample selection included managers with direct reports, with the exception of three analysts. Judgement sampling may restrict the generalisability of the findings as it uses a sample of experts who are conveniently available (Sekaran & Bougie, 2016, p. 240). The advantage of purposive sampling is the question of convenience and cost-effectiveness. Hence, the researcher drew from experience to select the sample from among members of management within Massbuild who could provide knowledgeable responses to questions.

3.9.5 Sampling size

Cooper (2020, p. 273) defines sample size as a 'function' consisting of three features: significant level, effect size, and power. A sample size makes suggestions about a population from the sample, and should be as large as possible for generalisability. In this study, the sample selection size included twelve individuals across the merchandise and supply chain department, comprising managers and supply chain engineers. An adequate number of twelve is based on similar studies conducted. The researcher believed that the information from twelve individuals would yield extensive information and enable the researcher to answer the research questions outlined.

3.9.6 Interviews with the Massbuild employees

The selected participants for the interview process were based on a specific criterion. A total of twelve employees from management were selected across the merchandise and supply chain department. These individuals possessed experience of more than three years and were highly skilled to provide insight into the technological trends and the influence technology has on merchandise's processes. Massbuild is the largest DIY and home improvement retailer in Southern Africa, with an expanded footprint in Africa. Massbuild plays a fundamental role in the South African economy in providing products that cater to the building and construction industries. The purpose of the interviews was to understand the influence technology has on merchandise and distribution processes. The interviews identified resolutions to overcome the current challenges that Massbuild faces when implementing newer technology. Chapter three emphasised the interview guide that was drawn up and attached as Appendix B.

The guide consisted of mostly open-ended questions, which allowed the interviewees to respond honestly and to act with freedom of speech. The below table provides the context surrounding the participant profiles and their job profiles. More than five years was concluded as long term in the company.

Table 3.1: Participant profiles

Participants	Designation	Short-term/Long-term	Age Group
Participant 001	Merchandise Controller	Short-Term	25 – 30
Participant 006	Merchandise Controller	Short-Term	22 – 25
Participant 002	Data Analyst	Long-Term	22 – 25
Participant 003	Supply Chain Analyst	Long-Term	25 – 30
Participant 004	Planner	Long-Term	30 – 35
Participant 005	Buyer	Long-Term	35 – 40
Participant 007	Buyer	Long-Term	35 – 40
Participant 008	Planner	Long-Term	30 – 35
Participant 009	Senior Buyer	Long-Term	50 – 55
Participant 010	Supply Chain Manager	Long-Term	35 – 40
Participant 011	Planning Manager	Long-Term	35 – 40
Participant 012	Merchandise Manager	Long-Term	45 – 50

Source: Author's own construct

The questions presented to participants were semi-structured, open-ended, and aligned to their job roles within the merchandise and supply chain. The researcher sought permission to utilise a recording device during the interview process. The interviews lasted between 35-45 minutes, and participants had advised that if the researcher required additional information, she could email or contact the participant directly. This method allowed the researcher to provide clarity on points that were not clear, thereby ensuring findings were accurate and reliable, which therefore indicated that the participant knew what they meant. The interview guide consisted of six sections, namely:

- Section 1: Company background.
- Section 2: Current role of technology in Massbuild merchandise and distribution.
- Section 3: Procedures followed when adopting/implementing technology.
- Section 4: Benefits of technological advancements.
- Section 5: Challenges that arise when implementing newer technology.

3.10 Data collection method

Data collection is described as the process for ‘collecting and measuring information’ on variables of interest, i.e. technology in this study. This is carried out in a systematic way that allows the researcher to answer queries, state research questions, test hypotheses and evaluate results (Kabir, 2016). In order to develop an understanding surrounding the case, the case study approach involves the collection of multiple sources of findings using qualitative techniques such as focus groups, interviews and observations. According to Robert Yin (2018) a hallmark of case study research is the use of multiple data sources, a strategy that also enhances data credibility. The researcher selected interviews as a data collection tool, which has three formats: structured, unstructured and semi-structured (Denzin, 2018, p. 15). In addition to tools, data sources must be considered. There are two types of data sources, primary and secondary data, described below.

3.10.1 Primary data

Sekaran and Bougie (2016, p. 111) state that information can be gathered via observation of events, people and objects, or through the administration of interviews with individuals of relevance. This type of data is known as primary data. According to Creswell and Creswell (2018, p. 332) in qualitative research, the role of the researcher as the primary data collection tool requires the identification of personal values, assumptions and biases at the start of the study. The contribution of primary data to the research study can be useful and positive rather than harmful. The researcher used private meeting rooms for engagement, yielding positive results, as opposed to meeting at a different location which could be disruptive.

3.10.2 Secondary data

Martins, Cunha and Serra (2018, p. 2) define secondary data as a tool to understand the research problem by identifying useful information that exists in the literature. Data that already exists and does not have to be collected and analysed further by the researcher is considered secondary data. Sekaran and Bougie (2016, p. 111) further state that secondary data sources include internet journals, websites, case studies, and the internet. The researcher made use of academic journals, websites and case studies in the literature review, which assisted in answering the research questions.

The above section presents definitions and explanations regarding the two main types of data sources. The researcher made use of both primary data and secondary data for the purpose of the intended study, as information was obtained through the interviews and literature review. Data obtained through the research instrument using semi-structured interviews was supported by findings in the literature review to gain insight into participants' responses (Denzin & Lincoln, 2018, p. 274). The techniques used provided insightful cross-checking, confirmation and completeness, the result of balancing two or more different types of research. The aim was to obtain approval of the findings by means of a convergence of different opinions gathered from the interviews.

Table 3.2 illustrates how the data collection techniques applied in the study were useful in obtaining primary data to assist the researcher to achieve research objectives.

Table 3.2: Matching objectives and data collection techniques for primary data

Research objective	Technique addressing the objective
To examine the current role of technology in merchandise and distribution processes within Massbuild, South Africa.	This objective will be achieved through a qualitative investigation that consists of semi-structured interviews.
To understand the influence of the different technologies available to Massbuild's distribution and merchandise processes.	This objective will be achieved through a qualitative investigation which consists of semi-structured interviews.
To determine the potential benefits that Massbuild can acquire when incorporating the emerging technologies into merchandise and distribution processes.	This objective will be achieved through a qualitative investigation using semi-structured interviews, which interviewed twelve participants.

Source: Author's own construct

- **Interview method**

An unstructured interview allows respondents to answer questions in their own way. This is considered to be an informal way of conducting an interview. Saunders, Thornhill and Lewis (2019, p. 25) and Bhattacherjee (2020, p. 83) state that the advantage of an unstructured interview is that the interviewer is not limited to a list of questions, but rather to an idea that

they would like to explore. In addition, a semi-structured interview uses a non-standardised approach where the researcher has a list of questions to ask but is flexible to ask follow-up questions or omit items to gain an in-depth understanding of the themes. The focus group method has been used in a variety of settings over the years. This method can be traced back to the early 1900s (Nyumba, Wilson, Derrick & Mukherjee, 2018). Focus groups are used by many retailers to gather insights on opinions regarding processes or products; this is an approach that is often used in case study approaches.

For this exploratory research, semi-structured interviews served as the data collection method. The researcher used this approach to ascertain the direction and thought processes of the participants. Participants were asked to elaborate further on questions so the researcher was able to obtain data rich responses that would feed into the research problem. The advantage of the researcher being present at the interviews was that the participants could seek clarity on any question that was not clearly understood. The main aim of using semi-structured interviews as a data collection tool is to gather information from participants who have had personal interactions, behaviours, expectations and opinions about a phenomenon (DeJonckheere, Grantz, Toraman, Haddad & Vaughn, 2019). In the case of this study, interviews were used to find out the impact of emerging technologies on retail processes.

The focus group approach was not practical due to time constraints and the availability of all participants; thus the researcher opted for face-to-face interviews. Creswell and Creswell (2018, p. 312) stated that interview protocol is a must. Therefore the researcher planned and developed an interview guide to ask questions, and recorded answers during the qualitative interview. The researcher also made handwritten notes during the interviews. Interviews can be tape-recorded (or now, digitally-recorded) such that the accuracy of the data can be measured, but this poses concerns related to data security and confidentiality, therefore this practice must be handled with caution (Bryman & Bell, 2016, p. 214). The researcher made use of digital recordings in this instance, and was able to store the recordings on the cloud and back them up on a USB to minimise the risk of loss.

3.10.3 Advantages of conducting face-to-face interviews

The advantage of conducting face-to-face interviews was that it allowed the researcher to gather in-depth data. This technique allowed for the focus to be directly on the research

phenomenon. Participants were able to provide insight, causal inferences and explanations. As the methodology addressed how emerging technologies influence a task or process, the approach to collect evidence through face-to-face interviews created a level of trustworthiness and accuracy of information. The body language and facial expressions were clear and understood as participants were relaxed and open. The level of human interaction created a sense of trust between the researcher and participant. If at any time the participant was unsure of a question, the researcher was able to provide clarity and context for the participant to engage tactfully and responsively.

The interview length was unlimited, and the respondent could provide as much information as possible, not limited by time constraints. If a participant went off-topic, the researcher was able to navigate the conversation back to the topic and align the participant to the questions asked. There was minimal room for vagueness and confusion as the participant was able to go back and ask for clarity on a particular question.

3.10.4 Disadvantages of conducting face-to-face interviews

As much as face-to-face interviews have advantages, they also have disadvantages, one of which is that they are time-consuming. Generally, in a nine-hour shift with the demands of the day-to-day business, it is not easy to schedule time with managers. Whilst interviewing top management, the participant can be side-tracked with other agendas that are important. This can result in the researcher not obtaining the optimum outcomes as desired. Many executives may find this time-consuming and unproductive in the work place. Therefore, selecting the incorrect time of day can result in tiresome answers resulting in a tick-box exercise. A pilot test is fundamental before conducting interviews to ascertain whether the questions asked are at a level that participants can engage in and answer (Armato, 2017).

3.11 Interview guide and guidelines

Baaken, Friederike, Orazbayeva and Riemenschneider (2016) explain that interviews are a form of data collection which involve discussions or verbal questioning between an individual or groups of people to ascertain useful information about their perspectives and thoughts surrounding the topic. An interview guide was developed and used for the empirical field study, included in Appendix A. The guide consisted of mostly semi-structured questions which allowed the interviewee to respond honestly and to act with freedom of speech (Pawlikowski,

Rico & Van Sell, 2018). The questions tailored for this study were prepared after a pilot study was conducted with a supply chain manager to ensure that questions were clear and unambiguous. All twelve participants were interviewed face-to-face with an approximate period ranging from thirty-five minutes to sixty minutes. The researcher, who happened to be the moderator during this process, took notes during the interviews.

The researcher gained permission to record the sessions using a recording device. The process of recording the interviews assisted in reducing errors in memorising and deducing answers. Participants were told that the entire interview would remain confidential and would not be made available without the permission of either individual. The recorded interviews were transcribed and summarised to form the basis for the data to be analysed, and the transcription of their particular interview was sent to each respondents to verify the validity of the information. In conclusion, some information was derived directly from the interviewee's conversation, while other was inferred from the interview. Below is a brief outline of the interview guidelines created to assist the researcher in choosing discussion areas during the interview. Please refer to Appendix B. The interview guide consisted of the following sections.

- ***Section one: Company background***

This section provided general information related to the participants' backgrounds, such as working experience in the retail environment. The general questions also led participants to express their opinions and feelings regarding how Massmart had progressed technologically since 2012 when Walmart bought fifty-two percent shares in Massmart. Section one briefly shared participants' personal experience in overall retail and their current job portfolio.

- ***Section two: Current role of technology in Massbuild: Merchandise***

The aim of this section was to highlight the knowledge and awareness surrounding emerging technologies in retail and what is available to the Massbuild SA group. This section also allowed participants to share their experience with the current technology deployed by Massbuild. This section contained questions on the current role of technologies and their adding to retail experience, and how Massbuild was at the forefront of creating an amphitheatrical experience for customers through artificial intelligence, live bots and space planning. Participants were also questioned in this area on how merchandise (purchasing) can improve the distribution processes. This addressed the first research objective of understanding

the role of technology and what it means to the business and the individuals personally. This also touched on the influence of technology on participants' current responsibilities at Massbuild.

- ***Section three: Process of implementation***

This section aimed to provide an understanding of the process that the business needs to adhere to. The process of implementation includes the people, process and systems. This area also highlighted what steps management needed to follow before adopting a newer and improved process, and how technology could bridge the gap between merchandise and distribution.

- ***Section four: Benefits of emerging technologies***

The purpose of this section was to provide insight into the potential benefits of technology and how it would add value, save time and reduce costs. Questions under this section were based on best retail practice and how Massbuild can become market leaders in South Africa, leveraging on emerging technologies that other retailers might find useful. Participants also detailed future projects that Massbuild was undertaking, which would reduce the administrative function as well as allow vendors the ability to pull their own reports using a special SAP portal. These types of ERP systems would make their current roles more meaningful.

- ***Section five: Challenges***

Section five aimed at providing awareness surrounding the potential risks associated with technology. A few of the highlighted challenges were identified, such as cyber risks and labour loss. Retailers are constantly striving to ensure data integrity, confidentiality, and privacy of data. Massmart currently utilises Walmart technology-approved tools that minimise this risk. Another ongoing challenge is that as technology improves processes, lower-tier employees no longer serve the functions that technology fulfil. For example, fork-lift drivers are assisted through an automated voice, thereby decreasing the labour headcount at a warehousing facility. Respondents provided actions that the business should consider when engaging in a new technology implementation project.

In order to be prepared for data collection, the researcher created interview guidelines from a list of general themes that were intended to be covered in detailed lists of semi-structured questions (Leavy, 2017, p. 140). These questions were constructed in such a way that

participants found no ambiguity and were clear about what the researcher was asking. It is advisable for a novice researcher to create a detailed interview guide; thus one was created to address interviews with specific individuals who have a role in the adoption and use of technology within merchandise and supply chain processes. The interview questions were not specific to a retailer but rather spoke to a broader retail environment regarding emerging technologies to gain expert opinions on the topic. Hence, during the data collection process, effort was made to ensure that a safe environment was created where participants felt free to express their opinions.

3.12 Data quality

Data quality is referred to as the validity, trustworthiness, reliability, and credibility of the information retrieved through primary and secondary data (Creswell & Creswell 2018, p. 35). Results that are credible, valid, trustworthy, and reliable are analysed and applicable to the entire population. According to Bryman and Bell (2016, p. 390), the theory of Guba and Lincoln suggested that it is important to determine ways of establishing and evaluating the quality of qualitative research in terms of reliability and validity. The two key criteria for assessing quality are reliability and authenticity.

3.12.1 Validity and reliability

Data validity refers to the research design and methods applied in the research study so that they yield results that are consistent, robust, and fruitful. The validity of the research instrument determines the degree to which the instrument tests what it is intended to measure. It is the degree to which the findings are real. It also needs a test instrument to calculate the concepts in the analysis correctly (Sekaran & Bougie, 2016, p. 292). The degree to which researchers perform observations in a lab or field, or observe and analyse data to produce similar predictions and results is referred to as reliability. Design reliability in qualitative research correlates with the trustworthiness and dependability of the data generated (Saunders *et al.*, 2019, p. 25). In quantitative research, the traditional criteria are authenticity, reliability and objectivity, while qualitative criteria are assessed by transferability, integrity, reliability and confirmability (Trochim & Donnelly, 2020). Yin explains construct, internal and external validity and reliability in the traditional sense at the outset of his text prior to describing the procedures of case study design, and deems them as the criteria to judge the quality of the

research. He repeatedly reminds the readers of the paramount importance of these criteria which ‘are common to all social science methods’ (Yin, 2018, p. 34)

3.12.2 Transferability

Transferability relates to the extent to which the findings of qualitative studies may be extended or applied to other contexts or settings. Lincoln and Guba's theory claimed that whether the results ‘hold in some other context, or even in the same context at some other time, is an empiric question’. Qualitative researchers are therefore encouraged to use the word 'thick definition', derived from Geertz's thesis in 1973. This means rich detailed accounts of a subject or culture, which become a database for making decisions on the potential transferability of findings (Bryman & Bell, 2016, p. 392). The research study ensured that the samples selected were a true representation of the population to ensure the transferability of research findings (Trochim & Donnelly, 2020). The findings derived can be generalised and be of use to other retailers regarding the emergence of technologies and the approaches that retailers can follow.

3.12.3 Credibility

The aim of qualitative research is to explain or understand the phenomenon of interest through the eyes of the participants (Trochim & Donnelly, 2020). Yin (2018) emphasizes the power of high-quality case study research that focuses on rigour, validity, and reliability. Clearly a proponent for case study research, Yin’s (2018, p. 52) approach on case studies openly addresses its enduring criticisms as a methodology and urges the researcher to carefully consider whether a case study is the most appropriate method of inquiry. His theory supported the researcher in obtaining credibility from secondary and primary data. The research ensured that participants were in middle management and at the top in the merchandise and supply chain departments of Massbuild and worked with projects involving technology improvements. In order to obtain reliable answers, the researcher pursued greater clarification of responses to ensure that they were compatible with the study objectives.

3.12.4 Dependability

The concept of reliability underlines the need for a researcher to account for the ever-changing context in which research is taking place. The researcher is responsible for explaining the changes that occur in the environment and how these changes have influenced the researcher's approach to the analysis. Dependability may also be defined as the degree to which two separate

researchers studying the same phenomenon can draw the same conclusion or the extent to which the same researcher can study the same phenomenon in a different timeframe and reach the same conclusion (Catherine, Cassell & Cunfliffe, 2017, p. 517). The researcher ensured that the research instrument could be reused, was consistent and durable to ensure reliable and efficient performance. There has been related research conducted which highlights some of the findings discussed in this study. An example is a study conducted by Dlamini (2017) titled "The Potential Use of the Internet of Things (IoT) in South African Retail Businesses."

3.12.5 Confirmability

Confirmability refers to the degree to which the findings may be verified or confirmed by others (Bryman & Bell, 2016, p. 389). Qualitative analysis appears to presume that each researcher can bring individuality to the sample. The researcher should take note of the process for testing and re-checking data in the data analysis. The findings of the research were presented to the business, and critique of the research work was received and incorporated into the study.

3.13 Data analysis

Creswell and Creswell (2018, p. 260) define data analysis as the process of interpreting text and image data for the researcher to analyse, to gain a deeper understanding of the data collected. The process allows data to be structured, summarised and reduced by classification. Patterns and themes become prominent and identified in the data, and strong correlations are formulated. Data analysis can be further described as involving the collection of data by open-ended means by asking general questions and developing an analysis of the information provided by the respondent (Catherine *et al.*, 2017, p. 518). Data analysis may vary in style, from the focus on coding used in both grounded theory and basic operations that are widely used by researchers, and secondary analysis of qualitative data (Bryman and Bell, 2016, p. 392).

The interpretive process involves the researcher interpreting and making sense of the data to draw meaningful discoveries in order to draw conclusions from the analysis (Johnson, 2018, p. 40). In this study, the data obtained was collected, then proofread for grammar, spelling errors, and sentence correction before the data analysis was conducted. The data were then transcribed from verbal to written form and formatted onto a document. The participants were assigned a number as a method to protect the identities of the participants. This is in line with the ethics

of the University of KwaZulu-Natal (UKZN). Furthermore, this aided the researcher in referencing the participants' opinions during the data analysis. This is discussed in detail in chapter five of this study.

Narrative analysis is an approach used by researchers to elicit and examine stories that participants tell about themselves and their impact on their lives (Sekaran & Bougie, 2016, p. 382). According to Bryman and Bell (2016, p. 382), the answers given by individuals in qualitative interviews can be seen as stories that relate not only to life span, but also to the accounts of episodes and the interconnections between them. Content analysis is a commonly used qualitative research methodology that includes counting and comparing, usually keywords or content, accompanied by an explanation of the underlying background (Creswell & Creswell, 2018). The authors outlined analytical procedures specific to each approach and techniques addressing trustworthiness with hypothetical examples drawn from the area of end-of-life care, which were adapted to this study on the basis of the research approach.

Thematic analysis was the appropriate framework to guide the literature review and research questions. Thematic analysis has been much appreciated by previous researchers and it is widely used in qualitative research (Nowell, Norris, White & Moules, 2017). The authors state that thematic analysis is a basic method of qualitative analysis, since it provides core skills for the production of many other forms of qualitative data. Braun and Clarke (2019, p. 590) maintain that thematic analysis is a process used by many qualitative methods to assist researchers in their analysis, and they consider it a unique analysis method. Thematic analysis was used throughout this study, seeing that it is a popular method for analysing qualitative data in several disciplines and can be applied in various ways to different data sets that address a variety of research questions (Bryman & Bell, 2016). Thematic analysis is a clustering method that focuses on the identification of strong patterns across a data set. A rigorous thematic analysis produces reliable and insightful findings; however there is no clear indication of how researchers can apply the method (Braun & Clarke, 2019, p. 204). In the present study, once all the interviews were transcribed, the researcher was able to initiate a data analysis approach by reviewing the volume of words per transcript in the qualitative data analysis process.

The intended outcome was to reduce data inductively as opposed to a deductive approach. The importance of inductive data assisted the researcher in the pre-frame context of what was

desired to match the data; therefore, by inductively approaching the data analysis, the researcher was able to review the data open-mindedly. A case study approach assisted to carefully formulate research questions informed by existing literature and the pilot study for a prior appreciation of the theoretical setting in appropriately defining the case. The use of thematic analysis assisted in formulating the stages of data analysis supported by the data collection tool. The data collected was collected through in-depth, semi-structured interviews with Massbuild employees. Recurring themes and patterns were documented, enabling the last phase of the qualitative data analysis to be carried out, the phase of conclusion drawing.

The final stage of the data analysis consisted of putting together the information to answer the research objectives and questions, and to test credibility and worthiness to justify the study.

3.13 Ethical considerations

Ethical values and rules form a guideline as to what is morally correct and beneficial to the research, and these values and rules should be adhered to and upheld. Ethics is defined as a set of widely accepted moral doctrines recommended by an individual or entity. These principles suggest rules and behaviour expectations regarding the correct conduct in undertaking experimental research involving respondents (Sekrana & Bougie, 2016, p. 160). Bryman and Bell (2016, p. 128) define applied research as a view of ethical ideologies in codes and frameworks that should be sustained; and deviance is not tolerated. Participation in this research was indeed voluntary and respondents could withdraw from the study at any time without any consequences.

Upon acceptance of the research proposal, the researcher obtained a gatekeeper's letter from the HR Department of Massbuild, specifying that the study would be conducted at Massmart's head office in Sunninghill. An ethical clearance letter was issued to the researcher through the University research faculty. The process for ethical clearance began with the submission of the research proposal, including the research methods and documentation relevant to the intended study.

3.14 Limitations of the study

The limitations of this study are outlined below:

- Only one chain out of Massmart was included in this study focusing only on the supply chain and merchandise department. The findings cannot be generalised to all the other chains in Massmart or even be compared to FMCG industries based on the product mix Massbuild carries.
- Technology challenges were identified through a literature review and semi-structured interviews with Massbuild employees in the goods and supply chain.
- Time constraints of managers were an issue and interviews were subject to a time frame.

3.15 Conclusion

Chapter three provided an overview of the research methodology undertaken in this study. The crux of this chapter was to elaborate on the research design and methodology implemented in this study. Data collection techniques were used to gather information through primary and secondary sources. A purposive sampling method was selected by virtue of its capacity to provide richly textured information relevant to the phenomenon under investigation. The study utilised a case study research design to understand the influence of emerging technologies on merchandise. The potential benefits and challenges were identified through the semi-structured interviews consisting of twelve participants. A pilot study was also conducted to help determine a suitable set of questions in order to achieve the research objectives. After a pilot test was conducted, the researcher decided that a case study inductive research approach was appropriate based on the research objectives of the study.

The empirical field research focused on data collection and understanding data that fit the standards of credibility, transferability, confirmability, and dependability outlined by Getzel, Guba and Lincoln (Trochim & Donnelly, 2020). Empirical data was gathered through twelve semi-structured face-to-face interviews to ascertain the current role of technology with Massmart SA and how participants responded to emerging technologies within their roles. The design of the interview guide was based on a functional paradigm supported by the TOE theory in the study. The questions were semi-structured to gain insight into the thought processes of participants and for participants to provide in-depth answers for data analysis. The results obtained from the empirical field research are aligned with the objectives of this study and are presented in the next chapter.

Chapter Four:

Findings and Data Analysis

4.1 Introduction

The previous chapters in this research study introduced the research questions and research objectives. A comprehensive literature review was undertaken to identify the influence of technology on a retailer's distribution processes in merchandise, and the benefits and challenges were further explored comparing various retailers. The research methodology chapter guided the study by selecting the appropriate research methods and design for this study. Chapter four is composed of the empirical data collected using a qualitative approach, from the research sample of senior and middle management. The findings on the influence of technology are presented, analysed and discussed to draw conclusions on the impact of technology on merchandise and distribution within Massbuild. The empirical research consisted of semi-structured face-to-face interviews with twelve participants who are employees at Massbuild. The study aims to: (1) assess the role of technology in merchandise; (2) determine the different emerging technologies available to Massbuild; (3) reveal the potential benefits acquired when Massbuild implements technology in merchandise processes; and (4) describe the challenges that arise when Massbuild adopts emerging technologies.

This chapter presents the findings from the data obtained at Massbuild's head office in Sunninghill Johannesburg, South Africa. As highlighted in the literature review, technology presents both benefits and challenges. This was identified through semi-structured interviews with the participants at Massbuild. The research focused on one of the primary objectives, to identify the influence of technology in merchandise and distribution within Massbuild. The research further identified how the retailer overcame present challenges. Therefore, the objective is covered in both aspects of the study. This chapter reiterates the secondary objectives stated in chapter one, so the reader recalls the objectives achieved in the previous chapters. The data analysis in this chapter covers themes unpacked during the interview process with buyers, planners, managers, and supply analysts that are important and relevant to the study.

The data is then presented in the form of a thematic map. The influence of technology emerges from the data, which is elaborated on in this chapter. The data is themed into main categories and subcategories, with specific codes discussed individually, to provide the reader with a comprehensive understanding of each theme, category and code. Furthermore, the benefits that Massbuild has derived are identified from the data collected through face-to-face semi-structured interviews. Chapter four further elaborates on the data findings derived from participants and concludes with a summary of subjects that were fundamentally important during the data analysis process.

4.2 Revisiting the research objectives and research questions

It is imperative to revisit the research questions and objectives to determine the focus of this chapter before discussing the findings and data analysis. The main research questions are provided in the table below.

Table 4.1: Study research objectives

RESEARCH OBJECTIVES	SECTION
To examine the current role of technology in merchandise and distribution processes within Massbuild, South Africa.	Chapter four, Section 4.5
To understand the influence of the different technologies available to Massbuild's distribution and merchandise processes in South Africa.	Chapter four, Section 4.6
To determine the potential benefits that Massbuild South Africa can acquire when incorporating the emerging technologies into merchandise and distribution processes.	Chapter four, Section 4.7
To examine the challenges associated with Massbuild adopting new technological progressions into merchandise and distribution processes.	Chapter four, Section 4.8

Source: Author's own construct

According to Table 4.1, the reader can infer that some objectives have been addressed in previous chapters; for example, the benefits of cloud technology and big data. The remaining objectives need to be addressed as they were achieved through empirical research. The primary

and secondary objectives are discussed in the next consecutive sections of this chapter. The proceeding paragraphs represent data obtained by the research, and the data is analysed in order to draw conclusions with regard to its context.

4.3 Analysis of data: Section 1

The company profile of Massbuild merchandise and supply chain division

It is imperative that the company profile of Massbuild's merchandise department is discussed before presenting the thematic map and data. The sample size was discussed in chapter three, however specific information pertaining to the department's size, company's business strategy, and vision were not presented as they form part of the data. The next section outlines important information provided by the supply chain and planning manager during the interviews. Massbuild's first distribution centre was opened in 2011, located in Midrand Gauteng. The distribution centre is the largest warehousing facility that Massbuild currently owns. Consecutively, in the next two years, Western Cape and KwaZulu-Natal distribution centres were opened. It was then decided that merchandise and supply chain should operate as two separate functions ideally correlating as one. A case study approach enabled the researcher to gain a deeper understanding of Massbuild's company profile as well as how merchandise is an integral part of the business and how the decisions made in this department directly affect the distribution process.

4.3.1 Organisational structure

The organisational hierarchy within the merchandise departments consists of four levels. The top tier level is executive management, which is the supply chain and merchandise directors. The second level belongs to managers at Massbuild, which consists of the following representatives: merchandise managers, planning managers, and supply chain managers. The third tier is middle management which consists of buyers, planners and supply chain analysts. Lastly, the bottom tier represents SAP data analysts and merchandise controllers.

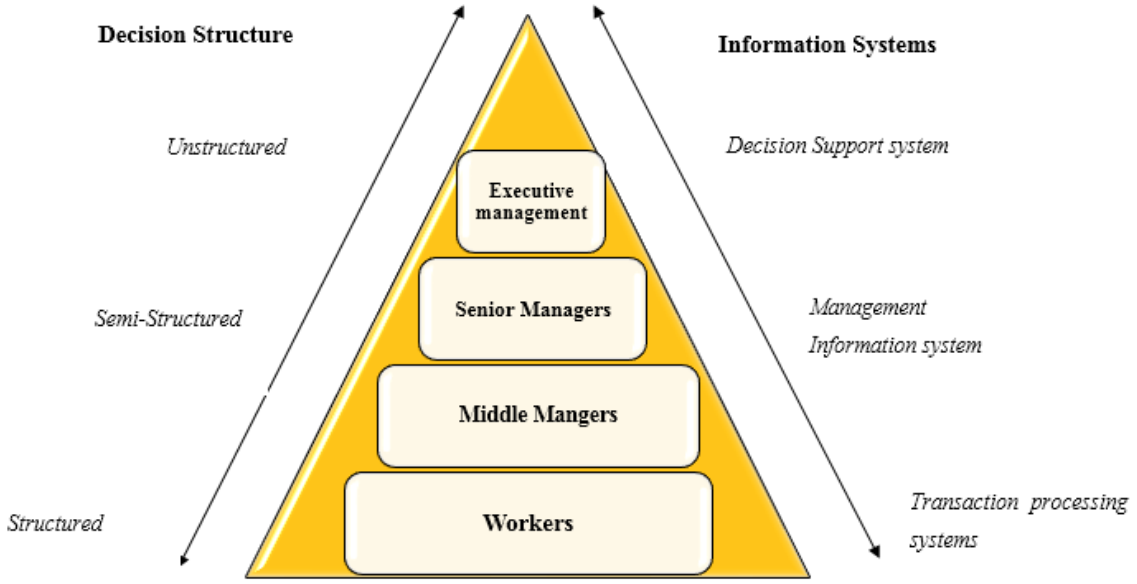

Figure 4.1: Management levels at Massbuild

Source: Author's own construct

The figure above indicates the four levels present in the merchandise department. It further illustrates the decision-making and interaction from the top to the bottom tier. Executive management make decisions in an unstructured manner and utilise decision support systems, usually a specialised panel. Massbuild is influenced by the Walmart process, which as a result has a panel of highly skilled individuals that assist in highlighting the gaps, and provide executive management with information in order to make decisions. Senior and middle managers often take the semi-structured approach by testing and exploring systems before finalising the project. The bottom tier of employees follows a structured approach as this has been trialled and tested by management, therefore the implementation phase can begin. The TOE theory framework supports the above hierarchy and is discussed in later sections.

4.3.2 Decision-making flow

At Massbuild there is one supply chain director and one merchandise director; both report directly to the managing director at Massbuild. The merchandise managers and planning managers' report to the merchandise director. The supply chain engineers and analysts report to the supply chain manager who works closely with the planning managers. Buyers report directly to the merchandise managers to oversee the category ranges. Planners report to

planning managers with the responsibility of supervising stock protection, forecasts, and budget of stock holdings. Merchandise controllers and data analysts report into the buying and overall merchandise function. There are currently six merchandise managers and four planning managers. The figure below shows the reporting structure at Massbuild, whereby middle and senior management staff hold experience of three and more years in their current roles.

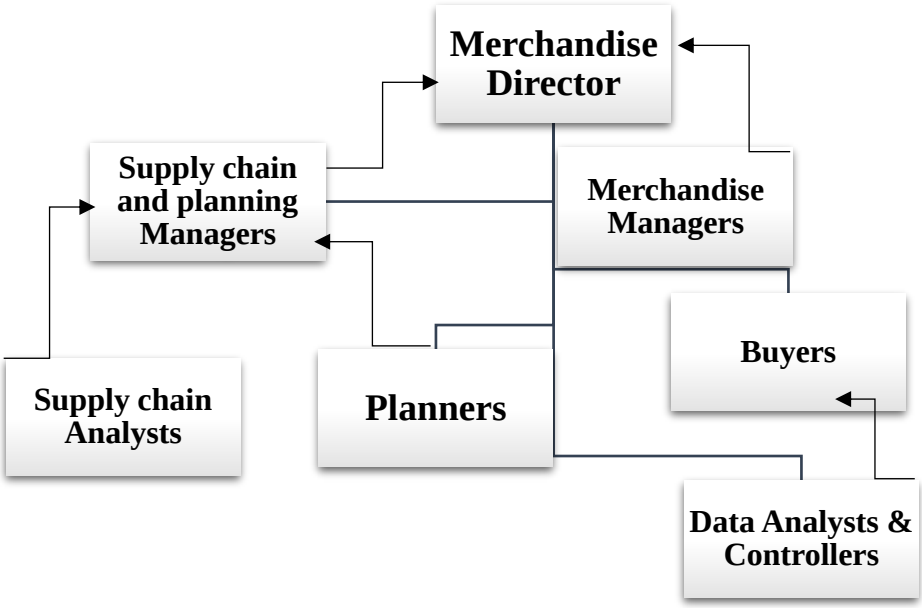

Figure 4.2: Massbuild merchandise organogram

Source: Author's own construct

4.3.3 Vision at Massbuild

The vision for the merchandise department, as stated by the Merchandise Director in October 2019 for the year 2020, was to focus on automating all merchandise processes to reduce the overall workload of the team. This included the electronic ATOF, the automation of vendor reports, automation of report packs that each buying team receive weekly, workflow management, and the operation shop out process. There were plans for a developed framework for how space planning would be implemented and integrated into the merchandising process. This would ensure that all stores are space planned, including managing the store plans and communications from the merchandise team on what the planogram is. This should include a framework of how AO flows into F&R. Secondly, the vision was also to develop a revised

framework on how the business reviews category performance and provides feedback into the productivity loop; this would partially overlap with the reporting project.

4.3.4 Demographics on the profile of participants

The table below provides the participants' profiles at Massbuild, and the period they have worked at Massbuild. For example, Participants 001 and 006 have worked at the retailer for less than three years. The long-term individuals have worked in retail for more than five years, which is the reason for the participation selection. Approximately 83% of the participants have more than three years' worth of experience. As mentioned in section 3.6 of the research methodology, these individuals are experts in their field and carry a wealth of knowledge not confined to just Massbuild, but from various other retailers. They were able to share with the researcher the different technological progressions over time and how it differentiates across retailers.

4.4 Analysis of data: Section 2

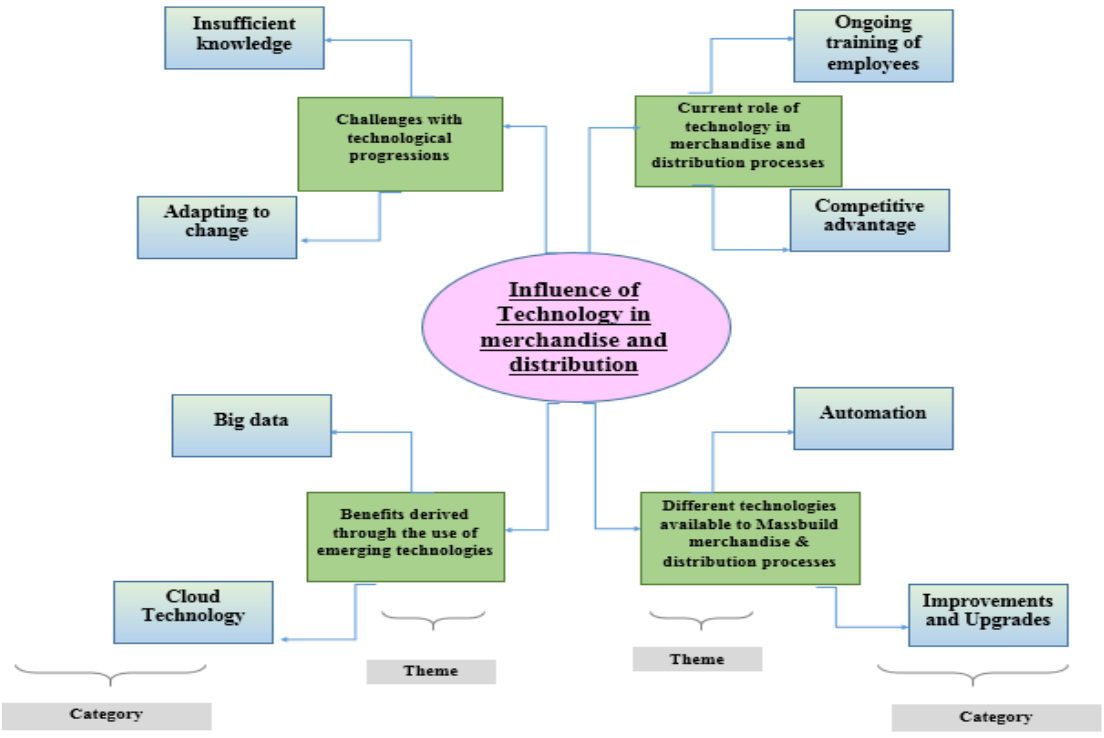

Figure 4.3: The thematic map

Source: Author's own construct

This section presents the perceptions of participants in respect to the influences of technology on their specific functions and the broader business of Massbuild. Furthermore, this section describes the benefits and challenges that Massbuild faces, and what remedial action the business can take to overcome the current challenges at hand in order to make newer technological implementations more meaningful. The data from the face-to-face semi-structured interviews were used to determine the current challenges that Massbuild faces. The subjects that were common amongst participants were coded, categorised, and grouped in a logical manner. The challenges that surrounded merchandise as a result of the distribution process included insufficient knowledge of technologies and systems, hacking and viruses, loss of capital, and job loss, to highlight a few. Thematic analysis was used to analyse the data. The outcomes using the thematic analysis were used to examine themes within the data. The researcher formulated a 'thematic map' through data analysis. Figure 4.3 presents the thematic map demonstrating the findings of the data analysis.

4.5 Analysis of data: Section 3

Theme 1: Current influence of technology

The literature review conducted in chapter two supported the themes and sub-themes identified through the data analysis, relating back to the research objectives. The literature review highlighted the theoretical framework of the influence of technology, identified through the use of the Technology Organisation Environment theory. The framework was utilised to inform the open-ended questions in the interview guide used during the study. The categories relating to this theme could be separated into two different categories: advanced improvements, and competitive advantage. The categories and codes relating to this theme are extensively discussed in the following paragraphs.

4.5.1 Ongoing training of employees

The training of employees was first identified in the literature review, which articulates the importance of technology implementation. This starts with the correct selection of technology and the training of employees. Ruch (2017) highlighted that employees require training in technology emergences as they move away from the use of manual approaches. If there is no approach to change, new systems and technology shall not work. Participant 006 shared that technology has been growing rapidly and vastly improving, and that if a retailer like Massbuild

chooses not to progress with the times, then it could essentially face questions about how efficiently the business can get things done and the importance of information flow from one party to the other. Therefore, it affects employees to the extent that the participant feels that it is important and compulsory.

The subheading 'training of employees' was identified by four participants in the study. Participant 006 holds a senior management position at Massbuild and insisted that for technological projects going forward, employees must be well briefed and educated from the onset. Participant 005 further highlighted that there is much training to be done as the approaches taken are very much traditional as opposed to progressing towards a less manual process. However, Participant 010 had an opposing view to 005 and 006 stating:

"…, the training is not necessarily at the right level, or the trainer is not the right trainer to train…"

Participant 010 believed that the correct trainers need to be selected to train staff on areas concerned. These trainers need to be well-versed in the technology being implemented in order to give the correct training and information. Collectively, participants were of the view that training is essential when the business decides to progress with technological developments, such as with optimisation software that assists both buyers and planners to perform their job functions.

- **Slow leverage of advanced technology**

The literature highlighted a few South African retailers and how they have leveraged their business with advanced technology, for example, Dischem and Takealot. Participant 005 stated that it is important that businesses reduce the level of manual intervention that many still utilise. Participant 005 stated the following:

"I don't want to sound too negative, but we still do have challenges with our systems. I think that we still have too many manual interventions, but there is a reason for manual interventions, which means that there is a loop in the system that's still not quite connecting correctly. Otherwise, there wouldn't be a need for any manual intervention."

Participant 011, a former Makro employee, felt optimistic but realistic on the approach taken by Massbuild towards newer technology and stated the following:

"Massmart as a whole has got very advanced systems but Massbuild is not leveraging on those advanced systems that Massmart has got. So for me, I think that is a shortcoming of the current systems and processes that we have."

Participants 001 and 007 shared that Massbuild has been evolving in terms of the product mix they carry. Traditionally it was seen as a hardware store, but currently it is a retail and hardware store combined. The store platforms have been segmented into big box stores and urban stores that cater to the different LSM's. However, in respect to the analysis of the data gathered from participants, it is clear that Massbuild has been slow in adopting technology to assist its centralised staff functions.

- **Disconnect between users**

According to Participants 009 and 008, today's technology adoptions are too diverse; as investors of technology, top management appear to make processes complicated and not put them into perspective. Participants reported that current systems in place were currently not working, such as JDA Assortment optimisation. The system currently has to read into three different systems – SAP ERP, the main system, which then reads into SAP Forecasting and Replenishment, followed by SAP Warehouse Management System. There are way too many data feeds, and information passed along the channel risks been distorted, thereby increasing the administration needed to resolve the issue. Participant 009 said:

"It's quite literally made it more work"..."So you should take all those different streams and say okay, margin, what is the best way to reflect it, and to track it and to influence it. Turnover, what's the best way to do that. Advertising, what's the best way to do that? Marketing, what's the best way to do that? I think nobody's ever really sat down and done that. All we've done is say okay margin we should do this for margin, whether it's the correct system or not, whether it suits the business or not"..."But if we take it as far as the links between ourselves and DC, we have one SAP system then we have another SAP."

It is evident from the above response that there is a strong disconnect with the current technologies Massbuild is currently utilising. This was highlighted by four participants who use these systems daily.

- **Product and delivery**

According to Participant 011, the advancement of technology leads to efficient product delivery, as technology can be used to gain a competitive edge in the marketplace, thus enabling Massbuild to be bench-marked against in the global world. As processes become more automated, they become more desirable because they deliver good service and better products. Three participants, who are buyers, explained that there are numerous administrative functions performed by staff, and it would be of interest for the business to automate these processes. Staff would then be able to focus on core tasks, enabling better service on product and delivery. The importance of product and delivery in merchandise was highlighted in the literature review. Okeke (2018), mentioned in section 2.5 above, explained the profound effects of efficiency and effectiveness on product models that fulfil a business's needs, simply by investing in the right technologies that fit the business model and are aligned with the merchandise strategy. However, participants shared that it is also difficult to manage customer perceptions when the product reaches its end user.

4.5.2 Competitive advantage

- Speed to market

A retailer like Massmart needs to act swiftly, with speed to market on technology improvements. Participant 008 stated that since French giant ADECO penetrated the market by opening three Leroy Merlin stores in suburbs around Gauteng, namely, Greenstone, Strubens Valley, and Boksburg, the traditional merchandise approach to retail was no longer taken by Massbuild. This led to Massbuild's digital approach, which consists of virtual reality and artificial intelligence. Virtual reality has now been incorporated into stores, with more directory hubs visible in stores for customers to interact with. Participants 006 and 012 shared similar views on the slow approach taken by Massmart, as each chain operates independently and not collectively as one. The speed to market and leveraging of the same technology as sister companies Makro and Game has been slow, according to four participants. To achieve a competitive stance, Massbuild needs to allow for projects to be implemented quickly in order to differentiate themselves from the market, therefore becoming innovative and unique. The

inability to act promptly will inevitably lead to market share loss and customers moving over to competitors. Participant 003 said:

"We've got one of the best systems in the world, but because of our master data, the basics, they did not get those right, that's why everything is messed up. I think technology and the systems we use and have in place are one of the best ones if used properly."

The above statement by Participant 003, who is a supply chain analyst, strongly states that Massbuild has a competitive advantage, seeing that they have the best in-house technology available. However, Participant 003 believes that there is poor maintenance of master data, which Participant 001 confirmed to be problematic.

- **Innovation**

The literature review highlighted important aspects such as innovation and technology, which directly interlink with each other. Participant 012 indicated there is great leadership from the Massbuild managing director in terms of improving technology and being quick adopters of this. Cash flow and project lead time have often led to the backlog of innovation, but the business changed this over quarter four of 2020, and much innovation has been seen. Participant 003 stated that the launch of the online portal has led to personalised shopping experiences where customers can create a room in their home, and this has been a successful project that marketing, IT and merchandise have been involved with. Massbuild has taken its new store look and feel to a customer engagement level with the aid of interactive bots, mobile apps, and a seamless e-commerce experience. Operations have utilised advanced in-store analytics by IoT (Internet of things) enabled devices to deliver targeted offerings. Three participants felt that an enhanced work collaboration approach utilising modern software that fits the business strategy would improve productivity and customer service.

- **Uniformity**

The transition from traditional to modern technology has resulted in a dominant role for technology. Participant 002 believes this has caused growing uniformity, standardization, and cultural levelling in Massmart. Participant 002 stated the following:

"I mean we have a lot of staff members, and in a way, technology guides uniformity, being uniform in business towards a strategy."

Participants 004 and 007 advised that there is a strong need for uniformity in their technological processes, which can be achieved through frequent communication. This is critical in a relationship between project leaders and end-users. The literature review identified that businesses should be undertaking a huge change of this magnitude without anxiety and few unexpected setbacks. If done correctly, a business can minimise surprises and take advantage of technology benefits quickly and efficiently, to achieve uniformity.

4.6 Analysis of data: Section 4

Theme 2: Different technological emergences applied at Massbuild

The points discussed below were highlighted through the literature review and are supported by the data findings. The two main categories found were Automation and 'The Cloud'. The different technological emergences used by Massmart together with Massbuild's merchandise team being used daily. These include:

- Enterprise Retail Planning, SAP system
- Assortment Optimisation Software, JDA. - Automation
- Omni-Point of Sale System (POS)
- Voice Picking, distribution
- Trackmatic
- 'SAP_BOBJ', Reporting tool
- Zoom
- Online

The most costly initial investments in technology identified by five participants were the new emerging technologies arising in Massbuild, which are ongoing. The remaining seven participants shared projects in progress that have not been implemented as yet. The first four sections highlighted the different projects that are important to merchandise and its merchandise processes; all four are directly linked and impact each other. The remaining three

subjects are in progress and were estimated to launch in 2020. The categories and codes relating to this theme are extensively discussed in the section below.

4.6.1 Automation

The findings below are applicable to the category of Automation.

- **ERP (Enterprise Resource Planning)**

Enterprise Resource Planning is the main system at Massbuild which reads into other systems such as SAP Forecasting and Replenishment, and SAP Warehousing management. Participant 011 stated that ERP is a forgiving system, which means errors can be easily rectified and data manipulated, whereas SAP EWM is rather unforgiving and irreversible. SAP ERP is being used across all Massmart chains; for example, Makro and Massbuild have been utilising the system for the past ten years, whereas Massdiscounters and Masscash have recently just started using SAP. The current system at these two chains is POM. POM is an outdated system with no real-time data and is not user-friendly. The ERP system has proven to be quite costly. However, this is the most important system that Massbuild uses and without this system, the business would not be able to function. Participant 010 stated that ten to twelve years ago the business underwent an SAP upgrade and the current version was outdated. Participant 004 shared that Massbuild is not at the highest level right now, as the current version does not allow for real stock movement and precision of reports, and the business is not investing in an upgraded version.

Massbuild is leveraging on the SAP ERP which has assisted in investing in newer technologies that transform the retail operations to support the digital promises made from top management. With the support of Walmart, the foundation of SAP ERP and new technology will be decoupled and ‘future-ready’, and Massmart will be able to unlock their potential strength to add value to their business. According to Participant 012, ERP is an automated system which provides a holistic solution to secure key initiatives that bring Massbuild’s goal closer, which is to reach a customer touch-point that is interrelated with ERP.

- **Assortment optimisation (JDA)**

As mentioned in section 2.17.3 of the literature review, the JDA software is an optimisation software created in America and deployed by Walmart. The software was first introduced to

the Massmart Group in late 2019, with Massbuild being the first for a trial and implementation. According to Participant 004, the journey of this software has not been pleasant, but the long-term benefits are there. The buyers stated that AO is an automated process that allows for buyers to range their products across the 109 stores. Both buyers and planners can assess their product categories and how well they perform. It also assists with the decision-making to rationalise ranges and remove duplication. Participant 004 stated:

"Apparently it's here to make our lives easier, the buyer's lives easier"..."It influences in a good way, because if the technology is there to help us and store things for us, why are we not using the efficiency that can use, to help us to be productive."

However, Participant 002 had an opposing view and felt that the system was creating system bottlenecks rather than being efficient. The participant further stated that this became a cumbersome and purely administrative task, as time was constantly spent rechecking if the information inputted on AO reflected on SAP. The current system turnaround time was much quicker as opposed to the waiting period on the AO application.

"*In a way for analysing purpose it is okay, the reality it is creating a backlog on the systems on the waiting time for buyers. There are just one buyer and a lot of stores. It's 50/50, if you want to see your performance check AO; currently if you are not working on AO then you have a pile on of stores awaiting feedback."*

The inventory optimisation manager stated that the assortment optimisation project defined JDA as a category knowledge base that allows merchandisers to manage products, performance data, assortments, planograms, and floor plans. This integrates them with other Massbuild systems to centralise, share, analyse, and publish category and space management information. Participant 006 shared that monitoring the range and prices is not enough to understand the category management success. To which Participant 006 further stated that category displays are essential, therefore in-store display collection software allows the user to fully export shelf data to a planogram format file, with a single tap of their stylus. The merchandise manager, Participant 012, stated the system was implemented by the Massbuild group to help improve ranging and limit the manual interference from stores so that buyers are in control of their ranges.

Nevertheless, a retailer like Massbuild is unique in terms of the product mix of hardware and retail, making it very difficult to range products as Walmart does. The distribution of goods is also complex, based on the chemical compound of products such as cement, paint and pool chemicals. Optimistically, in the long run, this system promises to deliver on ranges, planograms and assist supply chain with distribution. As shared by many participants, a proper phase-in approach should have been followed before paying for the complete JDA license. The first four points discussed some of the completed ongoing projects at Massbuild, which is a focal point. The next points discuss current technology developments that are in the progressive phase.

- **Omni-POS**

As described by the master data analyst, Omni-POS is a part of the ERP system. She described POS as a modern and efficient method of recording sales and keeping track of the monetary value that has been received for sales done in the business. The planning manager described POS as an easy-to-use system, which assists in providing an overall image of the product, stock availability, and finding the stock in the business using bin locations. The buyers shared that Omni-POS would ultimately assist with pricing using preselects or specials such as buy-one-get-one free on four products for a hundred rand. Planners stated that reporting becomes more meaningful and data accuracy ensures profitability. Omni-POS is a part of the automation process according to Participant 005, who shared positive insight with regards to Omni-POS integration.

"Like for instance, when you push volume, you know you can make a smaller margin and push more volume by doing those bundle deals and then catch up on your rebates. But, we can't take advantage of those kinds of deals at the moment without the Omni-POS. It's quite frustrating. We're waiting for it, and its coming. I mean at first, it was going to be launched this year in 2019, and then it was like no, the second half of 2019, no October 2019 and then it was Jan 2020 and from what I've heard it's like been pushed further out in 2020, I don't even know where we are at the moment."

According to the merchandise and planning manager, Omni-POS is meant to be effective as of February 2020, however due to the setbacks of COVID 19 and staff limitations, this project will have to be pushed out further. So far, Gauteng, Limpopo, and Western Cape staff have

been trained on the new system. The merchandise controller shared that a phased approach is taken with Omni-POS as opposed to diving into the project and experiencing teething issues. Information systems is involved and is owning the in-house component of software development. The next part of the theme discusses the in-progress technological progressions undertaken by Massbuild.

- **Voice picking**

Participant 010 described voice picking as a warehouse picking system that employs Radio Frequency Identification or Wi-Fi to relay and understand verbal instructions throughout the warehouse. This initiative was headed by the Massmart supply chain executive. Participant 003 stated that this was necessary as it minimised confusion in the warehousing, with algorithms being built and detailed flow-through procedures. Participant 002 and 006 disagreed with this and faulted the order process, suggesting there is a system communication breakdown, which is why voice picking is not best suited at this point. As the data feeds into SAP ERP, SAP F & R and SAP EWM, the data is corrupted, resulting in inaccuracy and misplaced stock, only to be found in the flow-through grid. Participant 004 said that this is a good system as it is a paperless, hands-free and eyes-free system that employs easy-to-understand voice prompts available in many different languages that instructs them where to pick the stock.

Additionally, employees are happier and the training time is shorter, which boosts accuracy, therefore eliminating the risk of injury caused by distraction. The answers provided by the participants indicated that voice picking has assisted the warehouse tremendously, and distribution processes are greatly relying on stronger technological advancements. There is a strong presence of automation growth, and soon there will be less manual intervention with robotics and artificial intelligence in warehousing and distribution. The second theme of chapter four deals with the current technological trends that Massbuild and Massmart are currently making use of and how these technological advancements have added value to the daily functions of the participants interviewed. There are also suggestions made by the participants on various aspects that the business can improve on.

4.6.2 Improvements and upgrades

The below findings were derived from Improvements and upgrades, correlating to theme two.

- **Trackmatic**

Trackmatic is an EDI software utilised by the Massmart Group. It is software outsourced at Massbuild for usage within the distribution and warehousing facility. Currently, only the supply chain managers and outbound logistics managers have visibility of the software. Participants 004, 008 and 011 support the planning function within merchandise but do not have visibility into the system due to privacy of information by the supply chain department. The only users with access were participants 010 and 003. Participant 003 claimed that Trackmatic is a system that has great features that have assisted in optimising the way the business moves stock. The less manual interference in the system processes allows for high levels of accuracy and productivity. There is a better understanding of what is expected of them and they can perform in line with expectations. The individuals with access have visibility to get real-time information on the status of their request, which is done via outbound SMS and email notifications informing the individual in advance, during, and on completion of an order to store. The reports are accessed by managers via the portal that enables them to make key decisions and improvements.

- **SAP BOBJ (Data integrity and quality)**

The newer version of SAP BOBJ leverages the business intelligence technologies and a broad array of data sources using flexible and scalable platforms to ensure decision-making has real-time BI access. Participant 008 stated that the newer version of what was SAP BI allows for time-saving, which is much more advanced than the older version. The business did not have to pay for this version, which was a win-win situation for Massbuild. Participants recorded that it is easier to navigate, it is user friendly, and it can be manipulated easily to obtain accurate data.

Participants 005 and 012 shared their thoughts on BOBJ, which is vital to their everyday role in terms of reporting and providing feedback to top management. Every participant interviewed utilises BOBJ for some analysis daily or simply to track company and department sales. Participant 002 stated that BOBJ is important for the business to track margins, stock levels, and service levels. This assists merchandise to manage expectations, forecast, and manage their sales and margins. SAP BOBJ is currently used at Massbuild and Makro, and with the launch

of Omni-POS, Massbuild will be able to see real-time data such as sales and stock. The current use of BOBJ allows for tracking critical processes and reduces costs significantly.

In addition to the statement made by Participant 002, Participant 010 indicated that a vendor portal of SAP was coming in 2020, where suppliers will be able to access all their reports without requesting them from the merchandise controllers. This will be a time-saving initiative, and the merchandise team will have less of an administrative function, holding vendors accountable for their data.

- **Zoom**

According to Participant 011, Zoom is a cloud-based video conferencing service where the participant can virtually meet others either by video and audio or audio-only. Zoom has made it possible to reach individuals easily and affordably. Participant 005 stated that money can be saved on flight tickets, as one remains in the comfort of their own homes for meetings. In addition, Participant 011 stated the following:

"*We usually have Zoom meetings where we discuss progress in terms of the progress of the project, and also there's a new system call Fluid which then we can manage meetings without being in the same room. Again, that's leveraging on technology because that saves time and also everybody can go on in real-time because it's Cloud-based and we can measure the developments around the project."*

The reply provided by Participant 011 indicates that technology is moving at a rapid pace and it is clear that Massbuild is taking advantage of this to give them a competitive edge. Participant 002 agreed with this by saying that this is an inexpensive method of communication, and Builders even has the Walmart version, as the software is developed in the USA.

- **Online**

Regarding the online presence in Massbuild, section 2.14 of the literature review indicated the journey that it has been through. All participants agreed that online is a growing platform, and it gives visibility to categories that customers were not aware of such as Décor and Patio. According to Participant 004, the online portal was launched in 2017 and has since improved drastically. There are over a 100 000 Sku's listed online, including extended ranges. Builders

have expanded on its online space by incorporating chatbots and personalised shopping experiences. Participant 005 stated that Massbuild was making great strides when it comes to e-commerce, especially through online shopping, which has grown significantly in a short space of time.

Participant 007 said it is imperative for Massbuild to grow online as many businesses are also taking advantage of social media platforms such as Facebook, Twitter, and Instagram. Many are doing away with physical stores and just have successful online stores, such as Takealot and Yuppiechef. The merchandise manager stated that these online shops have an advantage over brick-and-mortar stores in the sense that vendors do not have to pay rebates that make them uncompetitive in pricing. Participant 006 mentioned the frequent use of Parcel Ninja as a distributor for their online shop and further suggested that they can learn from Makro and Takealot to implement pick-up points that they are clearly not leveraging.

The merchandise manager, Participant 012, had a different view to that of Participant 006 on rebates for online retailer Takealot. As Participant 012 stated, Takealot is now charging supplier's rebates, which means that Massbuild can compete on price, but the challenge lies in their growing need for more warehousing space. The merchandise controller shared that there is a downside with current online processes, such as the delisting of a product from the online shop which costs the business R300 a product. The difficulty was that ranges are constantly changing, especially with seasonal items or products that no longer exist in the business, but they are still indicated to be available online. The supply chain analyst supported this statement by saying that the master data in Massbuild is a mess, and they should not be uploading products online unless they are certain the product is part of the range.

The next section of this research is theme three, which extensively discusses the further benefits that can be derived with the implementation or adoption of successful technology within the merchandise and distribution process.

4.7 Analysis of data: Section 5

Theme 3: The advantages of technology across Massbuild supporting the merchandise and distribution functions of retail

This theme covers the benefits that Massbuild has derived through the usage of technology. The participants highlighted two great factors: acceptance of change and knowledge sharing. Section 2.19 of the literature review identified the potential benefits that Massbuild can encounter if technology is implemented well. Open-ended questions in the interview guide addressed this theme, which informed participants of the possible benefits identified in the literature review and the common concepts appearing in the empirical data. This theme highlights the following points of discussion in big data and cloud technology under theme three:

- Solutions linked to SAP
- Planning and research
- Category Ranging
- Data Modelling
- Live Data
- Vendor Portal
- Automatic ATOF

4.7.1 Big data and Cloud technology

As per the definition of big data put forth by Participant 003, it can be referred to as a large volume of data that can be available at your fingertips. A great deal of data, both structured and unstructured, inundates a business on a day-to-day basis. Participant 002 elaborated on how the data obtained can be analysed by Massmart and lead to better decisions and strategic business moves. Many participants shared their views on Makro and their card system, and how they missed an important detail for years. For example, a customer is unable to make a purchase at Makro without a card. The data is stored onto the cloud database which allows the business insights into customer shopping patterns and preferences. Such access provides store sale managers with the ability to predict what the customer is mostly likely to be interested in. As shared by three ex-Makro employees, Makro is probably one of the oldest retailers that had access to this sort of data early, and with only 21 stores, each store knows their top ten customers already.

Online shopping has incentivised big data that gets stored to the cloud, making sure that the next time a customer shops online, a basket tailored to their preferences pops up. Participant 002 stated that Massbuild does not know how to utilise big data, stating the following:

"The communication is not there yet as to where we can find it, how we can use it, how to read it because sometimes it's just a lot of information confused…"

This statement clearly highlights the lack of information from some of the participants on big data. According to Participant 005, Massbuild salvages immense amounts of data gathered over the years and has no clue of how to utilise this information. In the past two years, there has been an improvement with the online team as it started off with two individuals, and now there are more than six employees. The shopping experience has become more personalised based on past purchases. The Braai and Leisure buyer shared views on big data, indicating that customers want personalisation and a seamless experience between online channels and brick-and-mortar stores. It simply means that if a customer cannot easily make a purchase on the website, they will purchase from another retailer like Takealot; therefore big data can help change these challenges that retail is facing. The advantage of big data is that it allows the company to predict spending and forecast demand in retail, taking the company mean 'through a through the analytics of a customer's online journey.

The usage of big data assists SAP with forecasting and demand based on sales and stock history. Big data is a benefit that can be seen in SAP and other major applications that Massbuild utilises.

- **Solutions linked to SAP**

Participant 003 described the positive impact of big data when it came to a solution linked to SAP.

"Big Data speaks, hey. Like Big Data, you are having data, core data at your fingertips. It's the best thing ever because you can tell a story. You can give a story, and you can come up with solutions"..."Our data's not 100%. You find a fridge that's 30cm taller. How can people list products like that? That's where SAP starts. SAP looks at that data and makes conclusions. So if your base data or your big data is not correct, the system's going to be inefficient."

Participant 005 thought of big data as a currency when it comes to customers, as everyone is collecting digital information on customers. The participant went on to say that the company is building their data on customer identities, and they can read frequencies. The buyer further indicated that the digital departments are in the progress of collecting data, now using the IP addresses, but are uncertain on how the company has progressed as a business using SAP and big data. Massbuild recently launched a builder's card for store departments to keep track of the data, however Participant 005 stated that Massbuild has been historically segregated from the likes of Makro and Massdiscounters. It was further added that certain chains like Masscash and Massdiscounters are currently not using SAP and this is on the cards for 2020 due to Capex budgets. In the Massmart chain, it appears that Makro is leading in terms of technology and capitalising on big data integrations in SAP. Massbuild is not too far behind as the projects aligned for 2020 are first-world worthy.

A previous Pick n Pay food category manager, now the DIY buyer at Builders, shared his view of how Pick n Pay operates with big data, using the Smart Shopper card, and how it assisted the merchandise department in terms of who shops for what and where. Instead of hiring a third party to provide insights on the business, an employee in the department can actually access the data by retrieving it off the system. The participant firmly believes that Massbuild can essentially be at the level of Woolworths in its operations, where discounts are personalised to the customer, and SAP has the capability of processing these discounts.

- **Research and planning**

According to the participant above, and as repeated in the paragraph above, Massbuild can save by studying their own customer data rather than outsourcing a third party to advise them on how to read and run their own business, which most companies spend a great deal on. Participant 009 shared their view:

"I come to my point earlier, there's too much data available, and I think one of the challenges is that, for any retailer or any company for that matter, is actually breaking it down to data you can actually use. And I think it can be broken down into a handful of things. You don't need all that; it's just too much information. Information is only useful if you can do something with it and if you can't use it, then it shouldn't even be there."

The senior buyer for DIY in Massbuild has stated that the Executive Director has been doing a great deal of research and planning surrounding the correct system for Massbuild. There is confidence and hope that processes will begin to get automated. The planning manager stated the following:

"The benefits are a lot. We can then have one system. I have been privileged to engage with some of the planning managers from our sister companies; their processes are very seamless. Also, we can leverage from not been subjected to limitations in terms of our inventory because the impact is high. It has not been fulfilling, as a truckload needs to be fully capacitated when sent to a store and at times the store does not have the capacity for the stock sent through…So if we've got a Makro store and a Game store within the same area our DCs will be using the same system and will be centralised, trucks can do milk runs."

It is evident that Massmart has done an in-depth analysis of the distribution centres running independently as opposed to functioning as one unit. The future systems will be one, a Massmart system that will be able to track and trace each retail chains' orders. Participant 010 however, believes that much training is still required as many planners still do not know how to maximise F & R to its full potential. Individuals should expect results based on what is put in. Research and planning in technological investments will result in slower but quicker results. The technology that Massbuild seeks to invest through research and development will be a successful one as opposed to rapid implementations.

- **Category ranging**

Category ranging as described by Participant 012 mainly concerns buyers who are responsible for products ranging across the 109 stores. Ideally, ranging used to be managed through an article master who would change ranges in stores according to buyers and stores. This since changed when Massbuild bought the JDA license for Assortment Optimisation. According to Participant 006, there are various benefits associated with the tool, such as buyers knowing their ranges and their products from good, better, to best. This tool also assists planners in managing aged stock and service levels. Many managers that participated in this interview shared positive views around the system and how Walmart has seen tremendous results in their ranges. An ex-employee of Game indicated that Game was using the same tool, but it was cut

short back in 2018 due to budget constraints and the non-existent SAP system at the time. Participant 005 stated that her clusters were built on the following: store formats, sales, and store size. Participant 005 went on to state:

"At first, the data was overwhelming, and it had to be simplified to make sure each and every variable was accounted for. I have gotten to 31 clusters to manage the 109 stores; however, that was an extremely painful process as nobody could really explain how the system operates. You learn as you go. AO is seen as a tool that will cut down lots of admin work, especially when it comes to quick fixes, listing articles, maintaining online ranges, and DC maintenance."

The positioning of technology will help assist category ranging in Massbuild which will further improve engagement and improve knowledge retention. This also encourages individual learning and encourages collaboration, which is apparent through the investments made on Omni-POS and SAP BOBJ. Functional experts from areas such as IT, merchandise, supply chain, customer interaction, and operations can all work together in an agile sandbox environment to design the changes around a set of coordinated specifications. This will ensure Massbuild has world-class category ranging which will be unique to only Massbuild.

- **Data modelling**

Through the interviews conducted, it was found that data modelling is fundamentally important in retail, especially with merchandise and distribution processes. Data modelling brings disparate business units together, such as IT, operations, merchandise, supply chain and finance. The developments at Massbuild can be seen through the acceleration of Business Intelligence (BI) with a structured model being built and enhanced into the retailer. As described by Participant 004, data modelling allows for a framework that consolidates data assets and reporting. The main benefits can be derived through time-to-value for analytical projects and increased return on investment through time and effort saving. Warehousing and distribution incentivise on data modelling through schematics that include atomic and dimensional models that serve different needs, such as supporting near real-time data loading. The table below is an indication of exactly how data is modelled at Builders. This table was developed using the assistance of the supply chain engineer.

Table 4.2: Consumer attributes

CONSUMER ATTRIBUTES	
1. DEMOGRAPHICS	*Income levels, Gender, Race*
2. LOCATION	*Postal Code, City, Province*
3. BUYING HISTORY	*Items, Brands, Price Range*
4. BEHAVIOUR	*Browsed Items, No. of pages, No. of products viewed, Categories.*
5. SOCIAL	*Brands pinned, product review ratings.*
6. NETWORK	*Other stores visited or purchased, groups they belong to.*

Source: Joseph, 2016

The points above are developed based on customer requirements. Massbuild is often compared to Leroy Merlin and Chamberlains, especially with the online shopping experience. Data-driven decisions made by retailers depend on the relevance and accuracy of the underlying collated consumer data. Managers 010 and 013 stated that a retail giant like Massmart relies on advanced analytics services to cut down the time required to create sales, from a few months to just a week. This boosts the effectiveness. Target-oriented, data-driven decisions have improved overall at Massmart, thus improving customer service.

- **Live data**

According to Massbuild interview participants, real-time technologies will save the business time by focusing more on the strategy that the merchandise and online teams present to the business every February. There is less manipulation on bulk sheets, and intra-bidding and dynamic campaign development not only save time but also provide a certain aspect of coverage and detailed optimisation. Other retailers like Makro save two hours per week on reporting and five hours per week on data checks. With reference to Participant 002, the phasing of Omni-POS allows the merchandise team to view real-time sales data; for example, to check Black Friday sales or a new store's opening sales, by the hour. The business does not have to wait for their sales and margin data the following day – this will be immediate. When the sales are inputted on CKS-POS, the feed will show directly onto SAP BI.

- **Vendor portal**

There have been a significant number of added responsibilities reported by participants during the interview process. These include sending vendors their required reports, such as disposition reports, sales and margin reports, aged stock and service level reports, and vendor reliability reports. This is time-consuming, and the focus of what is required is often shifted onto more admin-related queries. As mentioned by the managers, a special task team was put together in 2019 consisting of buyers, planners, merchandise controllers, managers, and master data analysts. The team was set up by the merchandise director to help identify key areas of development that would assist all roles to function efficiently and effectively, in order for staff to perform at their best.

Participant 001 stated that this portal will be SAP-based and a vendor will be able to log on at any time and only access their company time. This essentially means that vendors will have more time to prepare for meetings and take accountability for their sales, as this is not something that merchandising should be driving. The view shared by Participant 013 is that vendors are accountable for their own sales, and if the product has an R (Discontinued) or C (Catalogue stock) status it is their job to ensure that their ranges are correct with the buyers. Subsequently, the vendor portal will benefit both vendor and merchandise as a great deal of admin work will be reduced and vendors can focus more on the detail of how their products sell at the Massbuild stores.

- **Automatic ATOF**

According to Participant 002, an automatic ATOF is in progress that will be integrated at a Massmart level. There are plans to centralise the master data function so that one barcode and one product article exists on the system across all the chains. This program started back in 2018 and is still in progress. Participant 004 further shared that the ATOF will be electronic with buyers, whereby planners and managers will approve this electronically and it would be very much simplified. Participant 008 begged to differ, saying that current process is much too complicated for vendors to understand as the information required by Massbuild was tedious and a lengthy process as opposed to sister company Masswarehouse (Makro). The participant added that the difficulty lies with the stores in Africa that they export to. Exporting to these stores requires certain standards to be met, such as certifications, and in some cases like

Mozambique, Portuguese labelling and descriptions are required before the product crosses the South African border.

The above benefits were identified through the interview process. The next section elaborates on the findings regarding the challenges faced when implementing or adopting newer technology.

4.8 Analysis of data: Section 6

Theme 4: The challenges that arise when Massbuild adopts emerging technologies

This theme identifies the challenges experienced at Massbuild. Participants identified two prominent categories of challenges: insufficient knowledge (related to cyber threats and lack of knowledge on system based technologies) and inability to keep up with and adapt to change.

4.8.1 Insufficient Knowledge

- **Hacking and suspicious malware**

Participant 001 indicated that hacking and viruses pose a threat to the company. This is the worst situation any IT department has to face, especially when it comes to funds and confidential company information. Both brick-and-mortar and online businesses experience some sort of hacking. Participant 001 stated the following:

"…If someone corrupts our data, then we have the wrong information and potential job losses as well because now if the technology is doing the work for us then why we still here?"

The above also stated that potential viruses can inevitably lead to job losses. Though Participant 004 stated that IT is on alert when it comes to scams and hacking, and the response time around hacking and scams is quick, and these are usually promptly attended too. Participant 004 said:

"…we do get a mail to say, please don't open that email, it's a scam. There have been many stores that have contacted us in the past due to scam orders that IT & Legal were able to verify and react quickly."

However, the views shared by Participant 005 contrast with those of Participant 004. Participant 005 views hacking as a challenge based on how customer banking information is collected, as cyber security comes with a hefty price. These are costs that the business cannot avoid. He further described web skimming and how web skimmers sneak malware into website codes to glean personal information from customers. The highest peak in any retail business for scammers is during Black Friday sales.

- **Lack of knowledge on system based technologies**

According to Participant 003, the biggest risk at Massbuild is 'people'. This is so because employees do not completely understand the systems and technologies purchased by the company. Participant 003 further elaborated that the company fails to test them extensively before implementation, and that is where the business leadership lacks information. Participant 004 agreed to this, stating:

"…the thing is you will not just implement, and one will implement things that are in line with your strategy. But if you decide you will, competitor ABC has this so I will launch, it simply is not going to work…"

It is evident from both of the participants' statements above that tactical decisions have not been made and there has been a lack of information at the top level. Participant 007 stated the following:

"So the risk is that we might end up using the systems that are not effective for your kind of business. Sometimes yes, there are systems that are there, like SAP. At the time I think SAP was designed, it wasn't designed for fresh stuff"..."It's important to do your research and make sure that it works out properly across different areas of the business. Sometimes you find that this is where they have to let go of the system because it didn't serve the purpose and systems don't come cheap. So research is important. We feel that whatever the products you're buying, it will benefit and have a long term return on investment."

In contrast to the above statements on management decision levels having insufficient knowledge, Participant 012 had an opposing view, stating that:

"*It is how educated the people are that are going to use it. You have to have buy-in, the people need to be willing, and you need to literally destroy the system before you get it right. To implement, there's got to be a lot of background work on it, and I think if that hasn't been done, there will be a huge risk.*

From the findings derived from participants, it is clear that management are responsible for shepherding technical innovation into a routine. They are better equipped with education and experience to guide the innovation development than to manage its implementation.

4.8.2 Inability to keep up with change

The findings derived from four participants echoed similar sentiments related to the significant change in customer experience. This has been elevated through Massbuild's adoption of digital touch points and integrated retail experience across in-store processes, merchandising, marketing, and promotions. Participant 004 shared that the digital journey encompasses the complete lifecycle, from discovery to loyalty. It is increasingly becoming complex, and employees are becoming resistant to change. The participant further shared that Massbuild continually strives to invest in apps for stores, merchandise and distribution, which are deployed on mobile devices provided to the associates of the respective departments. Technology of this capability would create a customised experience that aims to provide information on the customer's device at the touch of a finger; this is now currently available to Massbuild. Participant 005 shared the following view on the company's slow approach to change:

"*I think the biggest risk with technology is if you're not fast enough, you will still be investing and implementing in old technology...Which is why I was saying we should be leveraging on our relationship and our association to Walmart, and we can be way ahead of the South African market. With technology that's the thing, it moves so fast. So if you're not acting fast enough, whatever sounded like an amazing program at the time when you started looking at it and thinking about it, by the time you implement it, it could be like two technologies older, so we need speed and we need to tap into Walmart knowledge."*

Participant 010 stated that as Massbuild, they want it quicker and faster, but our people are incapable of change; for example, buyers and planners constantly complain of the how stores

are tampering with their product ranges but are not tolerant of the new systems implemented to help them control their ranges. There is no equilibrium or a trade-off anymore, as individuals want it too easy. Participant 002 stated:

"Be the change in order to see the change."

There are currently individuals who do not want to embrace the technological change and still prefer the traditional methods, for example, order processes instead of allowing F & R to order. Some planners still prefer to do them manually on a weekly basis. From the findings, responses from participants show a number of them embrace change and some are resistant to change.

- **Adapting to change**

Participant 003, the supply chain engineer, stated that advancements in technology have been a real game-changer for both merchandise and supply chain. The traditional methods of ordering stocks have been taken over by modern processes as new industry trends, such as SAP, Hanna, and Trackmatic have pushed the business to leverage AI and deploy other software tools to maintain a solid stance in the dynamic retail market structure. He further suggested that in the upcoming years, emerging technologies will transform the retail in Massbuild from different angles such that each chain operates independently from the other. Soon it will become Massmart supply chain, a centralised function, and it will no longer be called Masswarehouse or Massbuild DC. This allows the business to save on costs and distribution costs, thereby lowering the rebates to vendors. For the business to progress, the participant went on to state:

"Change management is key because previously we've all sort of worked in silos and I think there is more collaboration now that's been forged across the different functional areas."

However, Participant 011 had an opposing view, indicating that technology is unable to adapt to business strategies:

"*The only risk would be that you implement this technology, and it's not received the way you intended it to be because sometimes you know how we are when it comes to adapting to change. Staff are reluctant to use it because they feel that the previous system was better."*

Four participants in this study identified people being reluctant to change. Participant 006 felt that the biggest adaptation comes from customers; the question is, will they be prepared for robotics in-store, as it has been done in the new stores, as opposed to having many staff members bombard them in an aisle. Participant 006 said:

"…when the systems are updated some components are taken out, and new ones are added, but you find that the new ones that are added aren't really customer-friendly. So when you do such things you also have to bear in mind if the customer… will the systems be friendly? Will the customer be able to engage with it, will they understand it and stuff like that? So I feel those are the two components that might be the risks."

- **System anomalies**

Three participants agreed that system glitches were a common challenge with systems at Massbuild, which they deemed a risk. Participants 002 and 006, who both hold merchandising controller positions, have access to SAP, ERP, PMR, AO, and master data. These participants shared their views surrounding the system glitches. These were anomalies experienced on a day-to-day basis that have been increasing over a number of years. The more systems are introduced, the more glitches are experienced. There has not been a seamless system to date that either one of them can remember. Participant 004 stated:

"If the system implemented doesn't fit our business function, and it is implemented and does not work, we're not going to be able to perform our functions for days or a certain time frame as people might be able to access our information. Therefore, they might exploit our company data which can weaken our stance in the market."

Participant 003 shared that the common denominator for system glitches is master data, which is the root of all problems. However, master data can never be 100% accurate at all times given the number of systems Massbuild has, and the daily data feed that passes through the system regularly risks data distortion. Besides, the implementation of Assortment Optimisation and projects that go live onto SAP also have to go through in different batches, as too much information can cause the server to crash. Three participants also shared their frustrations on how slow their processing units were in processing data, and often it was due to applications

being large and RAM space being too little, causing important projects to be lost. Participant 007 stated that shoppers have very little patience for non-functioning Wi-Fi and other in-store technologies that fail to deliver as promised.

These findings confirm that the digital transformation of customer experience is fully underway and a retailer like Massbuild needs to invest in technology that fits the business strategy. Furthermore, a project team should be designated for each implementation, to pilot test it, find challenges, and make the best decisions that suit all employee's needs. Participants identified a strong preference for technologies that were user-friendly, intuitive, reliable, and saved them time, to make their roles in their categories add more meaning. Furthermore, Participant 009 shared that to mitigate risk, business leaders need to put systems in place with parameters and access controls to make sure that the system is a success.

- **Job losses**

Six participants from the interview process shared similar thoughts: that rather than fighting technology, it should be embraced. This feeds into the above subheading 'adapting to change'. They believe that Massbuild should prepare employees to understand forthcoming technologies as every human deserves the opportunity to acquire new skills that will assist him/her in the future. The lack of support from top management can lead to disadvantaging some individuals from progressing further due to the lack of leadership in ongoing projects. Both government and leaders in a retailer can do better than look towards retrenchments. Participant 003 shared that AI and automation are tools that hold promise for Massbuild and can assist it to usher in a new era of effortless personalisation and freedom from tedium. However, technological innovation brings about economic disenfranchisement that threatens to sweep the workforce in the purchasing and distribution function of a retailer. The supply chain optimisation manager shared that in good and bad macroeconomic periods, a country like South Africa needs robust and effective economic adjustment to help workers affiliate themselves with technology and to minimise job loss. According to Participant 001:

In terms of job losses, Massmart has a no recession policy, so they don't want to retrench people unnecessarily. So for them, I think that's why they're a bit slow in using some of this technology, but eventually, we'll need the technology. So what I think for them is that they're still trying to figure out, so if we're going to replace an MC with an artificial system, where

can I place the MC? Rather get something for them to do as opposed to just letting them go. Letting go is the last resort for them."

Participant 007 said that apart from automation being good, there comes a trade-off, stating:

"As much as Automation is good, I think a whole lot of South Africans are concerned about what will happen to the jobs because it's important to have robots doing everything for you, but you still need that human intervention, and at the same time we need to think what's going to happen to the jobs."

In conclusion, on job losses, the participants interviewed hold senior positions and possess skills that have developed over time that technology cannot replace. However, there were fears shared by many from the bottom line management that technology will create job losses in the future. An American-owned investor such as Walmart is driven by world-class technologies and would ideally like Massmart to move in the same direction, which is why Mitch Slape was placed as CEO of Walmart Africa; to help save on costs and develop the same in-house practices as Walmart, minimising staff count in the process.

- **Loss of capital**

Participant 012 shared the following opinion surrounding the loss of capital and how it appears to be a risk:

"So there is a risk; firstly the cost of the system is expensive, and now you have something that can happen, so you're going to have stock inaccuracy, you're going to have customers that are unhappy because they can't get the stock to them, although it's there on the system, it's not showing correctly etc. Financially it's a massive risk."

Participant 007 elaborated further by stating that there are risks that exist as money is involved, and return on investment is imperative because Massbuild cannot continually buy a product and realise that it's not serving its purpose. Participants 005 and 009 shared how the system PMR was bought for merchandise and advertising, as the IT director at the time stated that it was a good investment for the business and current retailers such as Woolworths were using it.

The high technology investment in this program was not necessarily the right fit for users as the system had the following disadvantages:

- Not user friendly
- Difficult to use
- Overrides data easily resulting in a loss in previously saved versions
- Training did not help ease the difficulties surrounding the system
- Time-consuming

Based on the above challenges, eventually a decision was taken at the beginning of 2020 to write off five million Rands on the software. Therefore, the example shows that the wrong fit or deployment of software can result in hefty losses in capital that companies cannot afford. Participant 006 shared similar thoughts about the JDA Assortment optimisation software, as the product mix is different and might not necessarily fit the business. However, participants shared that they have to continuously strive to make it work in order for them to get improved versions and approved capital from Massmart.

- **Stakeholder engagement**

Participant 011 stated that stakeholder engagement is critical and if it is not done from the onset, Massbuild would be at risk. Participant 011 stated:

"I deem it as a risk and as well as an advantage. If you implement any new system or you're part of any project, change management is when you engage all the relevant people and get them aligned in terms of what is the objective."

Participant 003 agreed with the sentiments of Participant 011 by suggesting the following:

"*I think in the beginning, there needs to be a full Q and A, flip this thing upside down and just by not what the risks are, the challenges are. If we don't look at everything, then something's going to mess up on, honestly speaking"..."We need to have the best team of the best people to check these things."*

However, Participant 006 felt differently on the subject as the participant felt that in order to make provision for employees who do not wish to adapt to change, management should engage before actually gaining financial information on a system. Participant 006 said that the loss of capital is incurred as management does not get sufficient information from staff before seeking to engage with software developers or project teams. Participant 002 sensed that management should talk to the employees using these systems and ensure the pilot phase is adequately tested before they roll the system out. As the strategies are aligned to what the business wishes to achieve, the people who will use it must be well equipped and informed with what has been put in place. The software should be accessible and user friendly.

From the above responses, it is clear that stakeholder engagement is a risk if leadership does not engage with middle and bottom level staff. This will create a loss of capital, and employees will be unsatisfied, therefore altering job performance.

- **IT team**

Participants 001 and 004 shared that Massbuild has an Information Technology team that is highly efficient and they handle hacking spam emails promptly. They are quick to inform staff on viruses and threats, and the firewall developed is quite good. The IT team accounts for the risk, but many participants shared that Massbuild is sitting with a team that is under-resourced. The question that Participant 002 shared was, "why do we outsource components to develop our systems when we have a designated team that understands our business and requirements to create our own in-house systems?" Participant 004 shared that it was expensive and time-consuming for IT to develop their systems, as systems are usually outdated fairly quickly and the budget was quite tight on new projects. Its biggest project for the year was Omni-POS, which was set to go live in July 2020. Based on the responses from the participants, a set of questions need to be established before Massbuild considers in-house technologies:

- How can we incorporate technology into our existing strategy?
- Who should own adoption and development?
- What should the specs be?
- How much expertise is needed internally?
- How much will it cost financially and culturally to develop and adopt?
- How long will it take to see ROI?

- How can risk be minimised?

The answers provided by the participants surrounding Information Technology provided guidelines to minimise risks and developed a set of questions project leaders can use. Project team leaders should use the above questions as a starting point to decide whether it would be financially viable to develop in-house or outsource certain technology systems or software.

- **Research**

Participant 007 shared the following opinion regarding research:

"I think research is key, and just learn from other retailers. I sometimes think like everyone is going SAP and you're quick to roll out. SAP is one of the best in the world, but surely there are certain retailers that are not on SAP for whatever reasons. So research is important, and I think sitting with the developer and asking the benefits of the system."

Participants who had worked in other retailers shared a great deal of research regarding the technologies used. For example, Participant 006 stated that Builders is different and they know how to be competitive and take charge, but sometimes employees drag their feet. Competitors such as Chamberlains exploit Massbuild by identifying the gaps in the business, just like when Leroy Merlin noticed Massbuild did not have a drive-through and they incorporated it into their business, which was not simple to start.

- **Plan ahead**

Participant 009 stated that to plan ahead, Massbuild can mitigate the risk. As Massbuild, they need to be clear on what they want the end product to be. Once that has been identified, a system can be built based on the business requirements, and then the final phase is to test it. There have to be systems in place, but one needs to plan ahead. Participant 012, the merchandise manager, stated the following:

"You've got to do a dry run. You've got to do test runs on it. I'm also nervous about AO, and I'll be honest. I've been in retail long and I've worked with space planning, and I've done all this kind of thing before. I think we're rushing it; everybody's going on this thing, I think they should have done a department, test it a bit, and let it go live…"

Participant 004 stated:

"*Before rolling it out, I would obviously detail it down and put it to the test and see if it's going to work before actually rolling it out then testing it. This plays a critical part as opposed to just rolling it out; researching will obviously have all the necessary information to consider before we can actually implement."*

From the above responses, clearly a plan will mitigate the challenges that currently exist in Massbuild, and it will also help management plan for future technological progressions.

- **Access**

Participant 009 stated that the biggest risk is ensuring employees have basic access to systems, especially remotely. There should be a clear distinction as to who has access to which systems. A prime example is where products that had an article status were opened up to order on the system, which should never be allowed. That does not make it a system fault but rather a management fault, and measures should be in place to prevent them. Participants 006, 004 and 002 stated that internal threats were from individuals who have legitimate access, such as Massbuild employees. Insiders can be extremely difficult to detect or to protect against because they have legitimate access to the system, know what to look for, and most likely know how to circumvent intrusion detection systems. They can also misuse the company's IT resources to conduct malicious activities. However, they shared that Massmart has controlled this fairly well, with the best security systems that prevent misuse.

4.9 Conclusion

Chapter four comprised the data analysis chapter of this study. The chapter reiterated the research objectives and questions of the study, and included the thematic map, organisation hierarchy and how decisions are made at Massbuild. The hierarchy showed the role of participants and the period of time they have worked at Massbuild. Participants were from supply chain and merchandise, and 80% held senior roles in the business. The selection of the participants and the criteria was further detailed to indicate why they formed a part of this study. This was followed by the data analysis, where each research objective was examined, and consideration was given to responses obtained from the participants during the interviews.

Four themes were acknowledged as per the thematic map, in Figure 4.3. Different categories and codes were developed for each theme, to position the data in a meaningful order.

The findings derived through the data analysis link to previous research by Dlamini (2017, p. 4), which stated that retailers see benefits in areas such as quick response to problems, trend analysis, and efficiency, to create a conducive environment. In addition, Lehtisalo (2018, p. 18) suggested the main reason behind technology gaps is management. The study further suggested that technology gaps occur when advances and improvement factors vanish quickly after implementing them. The chapter provided the company background and the current influence technology has on Massbuild. Current technology trends and benefits were identified by participants through the data analysis as well as the current challenges associated when technology is adopted or implemented. The following chapter concludes this dissertation by summarising the main findings. Each objective is considered individually, revisiting both the literature and the empirical data of findings of each objective to arrive at a conclusion and make agreeable recommendations.

The analysis in this chapter revealed that there is a great need for research and development. Further, the involvement of employees is needed when implementing newer technology into merchandise processes. The findings in the data support previous research studies and are directly in line with the research objectives and questions of the study at hand.

Chapter Five:

Conclusions and Recommendations

The previous chapters addressed the problem statement, research priorities and concerns, literature review, research methods, and data analysis. Chapter five focuses on the overview of the research as a whole by presenting guidelines and suggestions for future studies. This chapter provides an overview of this dissertation. Each research goal is discussed separately by summarising the results of the literature and empirical findings and thereafter presenting suggestions in light of the research questions. The research made use of a qualitative research method using semi-structured interviews to gather data. This chapter answers each objective and ends by addressing the shortcomings of the analysis. The chapter provides useful insight into possible studies conducted on a similar subject. Further, this chapter summarises the key topics and conclusions of the study.

5.1 Introduction

The literature review in chapter two and the data analysis of chapter four highlighted the fundamental importance of technology in the retail industry, using Massbuild as the central focus of interest. Through the findings and as indicated in the literature review, technology is seen to be enhancing many other retailers as they attempt to keep up with newer technology and stay up-to-date. The data findings suggested that while the traditional retail shop is a high priority, it is essential that a retailer such as Massbuild continually innovates and differentiates through technological advancements. The impact of the fourth industrial revolution in business, especially retail, has led to the need to investigate and understand the impact technology has had on merchandise processes and how employees react towards change. Retailers are approaching a smarter way of working and streamlining operations as they strive to meet the needs and demands of an evolving customer. The significance of this study is its highlighting the awareness of technology in retailers and how management streamlines technology to fit its business model. New trends were identified that could assist in improving the bottom line and increasing profitability.

5.2 A conclusion to the study's research objectives and questions

The research study was conceived by recognising the need for technology in product and distribution, and this contributed to the creation of the research questions and objectives. The literature review, along with the data analysis, showed how each of the study's objectives offered guidance on the challenges faced by retailers. Table 5.1 illustrates the main research questions and research objectives of this research study as per the themes depicted in the thematic map of the previous chapter.

Table 5.1: **Reflecting on the main research questions and objectives**

Theme	Research Questions	Research Objectives
1	What is the current role of technology in merchandise and distribution processes within Massbuild, South Africa?	To examine the current role of technology in merchandise and distribution processes within Massbuild, South Africa.
2	How does the availability of different technologies influence Massbuild's merchandise and distribution processes within South Africa?	To understand the influence of the different technologies available to Massbuild's distribution and merchandise processes in South Africa.
3.	What are the benefits that Massbuild can acquire when incorporating newer technologies into its merchandise and distribution processes in South Africa?	To determine the potential benefits that Massbuild South Africa can acquire when incorporating the emerging technologies into merchandise and distribution processes.
4.	What are the challenges associated with Massbuild adopting technological progressions into its merchandise and distribution processes in South Africa?	To examine the challenges associated with Massbuild adopting new technological progressions into merchandise and distribution processes.

Source: Author's own construct

The study aimed to address the influence that technology has on a retailer's merchandise and distribution functions. The literature affirmed that retailers who adopt new technology should ultimately derive profit and reduce costs. A lack of system tools implies that an organisation is not globally inclined within the market to gain a competitive edge. Fundamentally, research is required before the adoption of new software or ERP systems, to determine if they are a right fit in terms of the business model. The findings in chapter two supported the empirical findings in chapter four on the merchandise department's vision and the need for planning, research and development as identified by the participants. An overview from the literature review stated that there are multiple initiatives underway to improve performance by several businesses; this was supported by the findings with participants in terms of big data, automation, and projects such as Omni-POS. The qualitative research method using a purposive sampling technique was advantageous in this research study, as participants shared vital points, highlighting the findings derived from the literature review. These were aligned to the empirical results. A prominent theme identified was the need for education amongst employees and employers, and development to embrace technological change.

The next portion of this chapter offers a detailed overview of the results in chapter four relating to how each objective has produced a result and how it has contributed to solving the key research issue raised in the study. A descriptive research approach using semi-structured interviews was assisted by an interview guide to interview participants and gather data. A sample size of twelve people from middle to top management was selected for this process.

5.2.1 Objective 1: The current role of technology in merchandise and distribution processes.

The first primary objective of this dissertation was to investigate the current role of technology in merchandising and distribution processes. This objective was accomplished by empirical research conducted at Massbuild headquarters. The empirical research consisted of semi-structured in-depth interviews directed by an interview guide. The interview guide was drawn up on the basis of the theoretical framework derived from the results of the literature review with respect to the research objectives of this study. The interview guide drafted for this study, and used in field research is included in Appendix B. The findings from the data derived in the data analysis indicate that the role of technology in merchandise can be categorised into four themes interpreted from the applied theoretical framework throughout this study. The

following factors were highlighted in theme one, which participants identified as the current influence of technology.

Table 5.2: The factors highlighted as the current role of technology in merchandise

Current role of technology	Main trends	Secondary trends
Ongoing training of employees	√	
Current leverage of available software	√	
Disconnect between Users	√	
Speed to market: competitive advantage		√
Innovation		√
Product & Service Delivery		√

Source: Author's own construct

Table 5.2 above highlights six factors that participants identified as the current role of technology within Massbuild. The first three of these factors were identified from the literature review and the answers received from Massbuild employees. The above current technology factors have been coded as either principle or secondary, and are aligned to the research objectives. The above factors are present in the business and need some configuration to be more competitive and efficient. The researcher found that the current role of technology with Massbuild was that management sought it yearly to continuously train employees via e-learning on matters such as compliance, ethics and sourcing. The participants made use of the software available to them but could not maximise the most out of it due to maintenance and upgrades that required funding.

The strong disconnect between users and systems indicated that employees are required to do more with less. The reduction of resources, layoffs and demand for more productivity creates a strenuous workload for employees. The findings from Participant 008 suggest that employees are rather frustrated with the current presence of technology. Product and service delivery has advanced in the Massmart business, specifically Makro. The findings highlighted that the current presence of automation has allowed for an increase in online services. Makro has had

the advantage of gathering customer data and using it to better meet customer needs, which they have been getting better at over the past three years.

The speed to market of products online has always been a fundamental aspect of the business and has given them a competitive edge. The current technology presence at Makro and Massbuild has always given them a competitive advantage, ensuring that products always appear first on the Google search engine. From analysis of participant's answers, there is no formula for success, particularly when it comes to innovation. Indicators of the current role of technology at Massbuild strongly suggests the existence of a causal relationship between the attributes that respondents reported and the innovations of Makro that were described; the responses described here can only prove correlation.

Conclusion: The themes derived from the data findings suggest the Massbuild has been engaging in ongoing training of employees regularly, but at the same time, training should be conducted in a way that is not disruptive to the work force. Leveraging of software is critical when decision-making, as the software needs to meet key criteria of the business such as business needs, short and long term goals, and the benefits that the retailer can derive from the software, with minimal disruptions. The technology implemented needs to ensure that product delivery and service is improved and does not deteriorate along the process. A group such as Massmart requires a communication solution that provides them with the same scope and quality of service in each of their office locations. From the data findings, Massbuild has had to rely on agreements with multiple external parties to facilitate their merchandise and distribution processes; now it is possible to use a single global cloud-based service. Cloud-based technology offers uniformity and is easier to implement, alleviates expensive implementation costs and removes the need for an on-site communication server, making it simpler. This will help Massmart to overcome numerous challenges in the near future.

5.2.2 Objective 2: The influence of the different technologies available to Massbuild's distribution and merchandise processes.

The second primary objective of this research study was to determine the different technologies that were available to Massbuild and how the business went about adopting technological advancements. This objective was achieved through semi-structured in-depth interviews

conducted at Massbuild. The following emerging technologies were highlighted by the participants in conjunction with the literature review.

Table 5.3: **Emerging technologies identified at Massbuild to improve merchandise and distribution processes**

Technology trends highlighted at Massbuild
1) Trackmatic
2) ERP
3) SAP
4) Assortment Optimisation Software
5) Omni-POS
6) Zoom
7) Online, E-commerce

Source: Author's own construct

The answers provided in Table 5.3 were retrieved through the interview process with the Massbuild employees. The participants identified the top seven factors that were prominent within the business and the execution from a top to bottom level. The envisioned projects for 2020 highlighted by the merchandise director emphasised the first five indicated in the above table. An extensive discussion was detailed in section 4.7 of chapter four and section 2.17 of the literature review in chapter two. These projects are significant for the business to improve their distribution processes and to satisfy the customer promptly.

Conclusion: Trackmatic enables the retailer to track its drivers and provide real-time information, whereas SAP ERP is the central system that other systems rely heavily upon. Advancements to SAP have resulted in greater efficiency for Massbuild, but in some instances, it has been slow.

The above identified technologies can improve pricing consistency within Massbuild and offer a seamless global cloud service. SAP ERP and Trackmatic allow the retailer to easily have transactional data with digital receipts and retail analytics, and enable RFID stock transfer for store managers. Trackmatic offers a network for partner collaboration, scheduling and visibility across the supply chain for both supplier and retailer. Massbuild does not yet use Omni POS;

it will improve the retailer's order fulfilment with a distributed network. E-commerce has drastically improved at Massbuild over the year 2020, however the business will have to improve its delivery lead time in light of other retailers' online ecommerce platforms.

5.2.3 Objective 3: To determine the potential benefits that Massbuild can acquire when incorporating the emerging technologies into merchandise and distribution processes.

The third objective of the research study was to identify the benefits that Massbuild can acquire through the incorporation of the latest technology into their merchandise and distribution processes. The answers formulated from the participants' interviews were identified, and a list was created. This is represented in Table 5.4, listing the top eight benefits derived through the successful implementation of technology.

Table 5.4: The top 8 benefits derived through successful technology implementations

Benefits highlighted by participants
1. Big data, leveraging on customer data.
2. SAP linked solutions using various systems.
3. Planning and research achieved through focus groups and training.
4. Category ranging, data optimisation tools.
5. Data modelling, access to real-time information and sales.
6. Live data, ability to track sales live by the minute.
7. Vendor portal, reducing the administrative function.
8. Automatic ATOF, reducing the administrative function.

Source: Author's own construct

Table 5.4 above highlights the main benefits that top and middle management deemed as essential and beneficial in merchandise, and as a result, to distribution processes. These benefits will enable employees to focus more on their capabilities, thereby reducing the administrative function; as a result, their roles become more meaningful. These points were discussed in sections 4.7.1 to 4.7.7.

Conclusion: Big data, SAP linked solutions and live data are equally strategic for making Massbuild sustainable and competitive. These technologies enable efficient management,

which is imperative to improve Massbuild's performance and improve customer experience. Massbuild is currently utilising big data and SAP linked solutions to improve its overall business functions. Massbuild monitors the entry and exit of goods and adds it with the sales trends of certain periods through the Internet of things (IoT). In this way, Massbuild can better control its stock and prepare the supply chain so that it can cope with peaks in demand without leaving empty shelves at less opportune times. In addition, big data also makes it possible to make strategic decisions that go beyond the management of the individual store. If properly collected and arranged, this information even provides the possibility to hypothesize the financial impact that opening a new store could have on an existing one. The vendor portal and automatic ATOF document saves the retailer time and speeds up analysis and implementation of projects.

5.2.4 Objective 4: The challenges associated when Massbuild adopts new technological progressions into merchandise and distribution processes.

The findings of the empirical study indicate that the challenges incurred at Massbuild are categorised into high and low risk. The last objective of this study was to investigate the difficulties that Massbuild faced when incorporating newer technology into their business processes. This was achieved through an empirical study conducted at the Massbuild head office premises. Based on the twelve critical points highlighted by participants, these are broken down into high risk and low risk.

Table 5.5: Challenges faced when implementing new technology and the level of risk associated

Challenges	High Risk	Low Risk
Hacking & viruses		√
Insufficient knowledge on technologies/systems	√	
Inability to keep up with change		√
Adapting to change	√	

System glitches	√	
Job losses	√	
Loss of capital	√	
Stakeholder engagement	√	
IT & research		√
Plan ahead	√	
Access	√	

Source: Author's own construct

Table 5.5 depicts the challenges that participants identified in merchandise and distribution. The participants further rated them into being a high-level or low-level risk, based on the problems they identified and the detrimental effects they may have on the business. The following sections discuss the recommendations to overcome the identified problems, the limitations of the study, and areas for further research.

Conclusion: The emerging technologies found in the research study are cutting edge and exciting but it is vital for Massbuild to implement the right technology for its business needs and customers. Massbuild can strengthen its stance by maximising technologies associated with its primary infrastructure to support its Omnichannel. The most forward-looking retailers gather and evaluate customer data to help drive key decisions related to inventory, customer service, and marketing. This also reduces the costs by planning ahead and selecting a phased-in approach rather that full-on implementation. The data also found that retail is one of the industries with the highest employee turnover rates. Retaining staff is one of the toughest challenges in Massmart and replacing employees requires a great deal of energy and cost. The solution to this challenge is to increase employee engagement within Massbuild and provide regular training to optimise their competencies and reduce the risks of insufficient knowledge and training.

5.3 Recommendations

The recommendations provided in the next section of this chapter discuss how Massbuild could implement technology successfully, as well as how other South African retailers can benefit from the recommendations provided. Massmart has the support of Walmart and can leverage its Omnichannel through mobile app upgrades and robotics in-store through the strong presence of artificial intelligence (AI). Retailers can successfully achieve speed, agility, and efficiency through investing in an electronic inventory control system, which is a central database. The recommendations made are based on data derived from interviews, supported by the literature review. These recommendations are made separately for each study objective.

5.3.1 Recommendation to research objective one

The current role of technology in merchandise and distribution is looked at first, followed by the recommendations put forward concerning the part of technology.

5.3.1.1 The current influence of technology within Massbuild

It is fundamental to understand the role of technology in Massbuild's merchandise department, and how merchandise supports the distribution function. There is no recommendation for objective one as this examined the current role of technology in merchandise and distribution processes.

5.3.1.2 The influence of technology on Massbuild's processes

The effect that technology has had on Massbuild's product and delivery processes was established through the literature review, and was reinforced by the responses collected through semi-structured interviews. The interviews were precise and accurate as the responses provided by the participants were informative and knowledgeable. Participants possessed more than five years' experience in retail and have encountered numerous changes in technology. Table 5.2 serves as a blueprint to the current role of technology in merchandise. Section 2.8 of the literature review highlighted the current position of technology and outlined the traditional vs. technology-driven approach on the supply chain. Also, participants provided insight on decisions made by executive management which could either improve the planning and decision-making or be the incorrect choices for the business. Advanced improvement in technology such as data mining software innovations improves stocking, pricing, and the

distribution of products to stores. Competitive advantage influences the adoption of technology as it drives change within the retailer.

The retailer is currently in the process of developing better technologies to incorporate into its merchandise and distribution processes. The second research objective is addressed below.

5.3.2 Recommendation to research objective two

Research objective two addresses the different technology trends available to Massbuild, looking at improvements and upgrades which would give the company a competitive advantage.

5.3.2.1 The various technology trends: Improvements and upgrades

The most common responses from participants indicated the strong need for system improvements and upgrades of existing policies. Participants also pointed out that the systems are effective and productive, however there is a lack of creativity and innovation to help execute tasks effectively and ensure that the processes run smoothly. It was suggested that the improvements and upgrades to systems such as SAP, AO, and Online would achieve time and place utility. This means services to customer will be fulfilled faster, and the lead times will be improved drastically. Regarding section 4.7.2, Participant 004 shared that Massbuild was not at the highest level of system usage of SAP, like many other retailers and businesses that also do not seek to invest in an upgraded version. A further participant added that SAP BOBJ is an intelligent business reporting tool that functions well, and did not need an upgrade – instead the newer version is worse than the current version.

It is recommended that updates or improvements to the current systems be adopted to improve productivity, which in turn will increase profitability for Massbuild in several ways. For example, it will assist Massbuild by increasing their potential market share and enable them to reach customers at any time, with limited costs incurred. Massbuild should continuously improve its systems, such as using solutions applicable to its entire supply chain network, especially cloud computing. The cloud will track inventory and demand changes, allowing Massbuild to respond to the latest demand signals in near real time. By doing this, Massbuild would be able to adapt to seasonal trends and other fluctuations in demand ‘on the fly’.

5.3.2.2 Automation

Massbuild has recommended that automation in merchandise, in the form of software, be built to convert tasks, processes, or campaigns within the business. It will automate and intelligently execute what is required when needed. The automation described by participants will free up teams from spending their time doing inefficient tasks that can be easily handled by technology, thereby unleashing them to invest in high value work instead, especially within the harsh economic climate. Automation in retail will assist in retraining employees in new fulfilment processes, enhance communications, strengthen negotiations, and improve sales and product iteration. As indicated in Table 5.3, these are the top picks that the business now believes will be automated or are currently in the process of being automated. As stated by Participant 009:

"The benefits are a lot. We can then have one system. I have engaged with some of the planning managers from our sister companies, and their processes are very seamless. Also, leveraging of a scale previously, we were limited in terms of our inventory. The high impact has been fulfilling a truckload, as a full truck is sent to a store that doesn't necessarily need the stock. So if we've got a Makro store and a Game store within the same area, our DCs will be using the same system and will be centralised, trucks can do milk runs."

The time that the retailer spends on tedious tasks can be better spent through the use of automation, which is built into the Point of Sale system. Automation will allow the retailer to track and trace inventory, payroll and warehousing functions better. Massbuild can improve the efficiency, reduce errors and save costs by integrating and fully automating merchandise and distribution processes, a point highlighted in the data findings.

The above recommendations refer to research objective two. This leads to the third objective.

5.3.3 Recommendation to research objective three

The third research objective of this study was to identify the benefits derived through the adoption of technology into its processes. Participants provided a list of advantages in the interview process that were identified as being aligned with the literature review.

5.3.3.1 Big Data

As mentioned by participants, big data was limited in the past, and retailers were not able to track what a customer purchased and when. Through the aid of big data, Massbuild now leverages a wealth of data about its customers, such as their age, geographical location, gender and favourite departments. The benefits of Omni-POS and SAP allow for optimised pricing, where Massbuild can get the most value out of upcoming trends. From this, they can also determine how much to decrease off-trend products. In the distribution process, the retailer can maintain the ideal stock levels throughout the year by gathering data from registered products in real-time. Simultaneously, Massbuild has to be mindful of its operations, budget and price optimisation. It is vital to develop products that are trending and to be prepared for events such as Black Friday. Big data allows retailers to comprehensively understand product categories and customer trends, and this will assist retailers to price products appropriately. Participant 003 described the positive impact of big data when it came to solutions linked to SAP.

Massbuild can clearly leverage big data. This would improve staffing by increasing efficiency, and improve customer service by taking advantage of its predictive capabilities, thus getting the most out of the data insights. The retailer would have improved their capacity to make short, medium or long term decisions to improve sustainability, by the information the retailer derives from big data through websites, point of sale systems and social media platforms. Big data analytics is the best way for Massbuild to gain insights into the customer's mysterious mind.

5.3.3.2 Cloud technology

The next significant benefit mentioned in the interview process was cloud technology. It was deemed necessary, as SAP reporting, operations and live data are linked to the cloud. The benefit of the cloud, as summarised by participants, is that cloud computing is enabling Massbuild to be more efficient in managing its essential assets, for example, merchandise. It was noted that the number of online users has increased rapidly, especially with mobile applications and the availability of smartphones. The penetration with the smart phone mobile application has enhanced the flow of communication. Participants described Omni-POS as the system that is benefiting the retailer most. Participant 002 mentioned that the cloud supports the POS (point of sale) system as it offers centralised customer sales and inventory information on a central cloud database.

Participants 010 and 013 stated: "*A retail giant like Massmart relies on advanced analytics services to cut down the time required to create sales from a few months to just a week. The challenge lies in implementation time and training of staff."*

The above is a bold statement made by both Participants 10 and 13. It is beneficial that advanced analytics will provide real time transactional information which can be made accessible at any time or place through the cloud. The challenge lies as to when this dramatic change will occur and how much time it would take to implement and train staff. Management also fail to be transparent in disclosing the monetary value spent on system developments and whether the retailer owns the system software or it is outsourced. Nevertheless, from the summary of responses, the participants positively recommended that the retailer and employees would gain from leveraging big data and cloud technologies. This therefore strengthens the buying power of the merchandise department and creates a stronger robust supply chain.

There is no doubt that the cloud offers a magnitude of different data integration options to enable real time and batched data processing and provide a unified view of customers across trading channels. This will assist the merchandise and distribution department to solve significant technological difficulties that a retailer may encounter, for example, locating stock in a warehouse. The merchandise team can take advantage of cloud-based capabilities to engage customers through personalised digital promotions based on real time analytics.

5.3.4 Recommendation to research objective four

The fourth objective examined the difficulties associated with the adoption of new technology developments. The literature review, in conjunction with the interviews, provided remedial action on how to mitigate the challenges experienced. The two themes highlighted were insufficient knowledge and adapting to change. The recommendations provided were covered in section 4.9 of chapter four. However, for businesses to adopt newer technology to achieve competitive advantage, a conducive environment is needed. According to Moloney (2015), in South Africa, some of the challenges businesses face in the adoption of technology are high connectivity costs, lack of legal and policy frameworks, lack of payment facilities for non-credit card holders, and lack of investment. These factors can harm the adoption of technology for SA retailers.

5.3.4.1 Insufficient knowledge remains a challenge

It is recommended that Massbuild be careful in its decision-making when it comes to technology adoptions into its business processes. The decision-making hierarchy of critical decision-makers was shared in section 4.1. It was stated that the executive level consults a panel of experts before expediting technological progressions for the business. Participants highlighted the main areas for concern through the research interview. Participant 003 stated that the most significant risk was 'people' – those who did not have the willingness to accept change. However, Participant 007 had a different opinion on this, stating: "*So the risk is that we might end up using the systems that are not effective for your kind of business…"*

The insights of the participants underline the idea that leaders require more than just familiarity with the technical skills needed to do their tasks. The executive committee needs to identify competencies in those carrying out duties and how technology will be of assistance. Without these projects, there is a reduced rate of success, such as with the implementation of PMR. Participant 003 mentioned that technological competence needs to be specific and not generalised, and executive management needs to take accountability for the projects, particularly the direct impact of project outcomes. The individuals in charge of the development and implementation of technology need to have experience and knowledge.

5.3.4.2 Adapting to change

Often adapting to change is a cumbersome task, yet exciting at the same time. Not all employees are eager to embrace change. The data provided from the interviews indicated that while some employees are willing to accept change, some are not. It is evident from the data that adopting the use of new technology can have a detrimental effect on a business and its place in the industry. Change is inevitable, and IT and senior management have a duty to educate staff on what is happening, and ensure processes are in place to enable the highest opportunity to thrive and succeed. The merchandise department, together with the IT executives at Massbuild, need to use technologies that are user-friendly and easy to adopt.

Participant 005 mentioned that: "*I think the biggest risk with technology is if you're not fast enough you will still be investing and implementing in old technology…"*

On the other hand, Participant 010 stated: *"As Massbuild we require tools quicker and implemented now but do not want to take the long road to success as we are fixated on results now."*

Retailers have been forced to change almost daily, and are enabled to do so with the support of technological innovation. Senior management and project leaders need to understand the new technological tools deployed to optimise performance, communication, and workflow within an employee's daily routine, irrespective of the department. The involvement of employees in technology developments, as indicated by the study participants, is key to the success rate of Massbuild. If Massbuild fails to engage and encourage staff, this will lead to job loss and financial loss, and the retailer may suffer a loss of profit and reputation. Massbuild wants to seek healthy relationships with its staff, therefore employees must be involved from the onset when investing in new technology. The key to success is to embrace change by accepting an industry-wide shift in Omnichannel strategies, together with utilising an abundance of digital data. The year 2020 saw the best-performing digital sales, forcing supply chains to adjust their strategies and improve their logistics, which Massbuild has to keep developing.

5.4 Critical thinking and application of the TOE theory

This section addresses the theoretical framework used in this study. This study focuses on the Technology Organisation Environment theory.

The Technology Organisation Environment theory discussed in chapter two described the process by which an organisation adopts technology innovation, influenced by the technological, organisational and environmental contexts. The TOE theory is vital when a business decides to adopt technology, as it addresses how the technology affects the internal organisation of the business as well as the customers. Participants 001 and 006 shared how Massbuild's advanced or improved technology has resulted in efficiency and productivity by adopting the right fit of technology for the merchandise department. Participants 008 and 009 stated that training of employees was fundamental in the deployment of new technology. Participant 002 further stated that research and advanced planning was required before initiating a project. Innovations at Massbuild, the successful implementation of technologies, and how management arrived at decisions to adopt and implement these technologies are

supported by TOE theory. As a result, the answers received from the study are aligned to the TOE framework.

5.5 Limitations of the study

The limitations of this study are as follows:

- Massmart has four retail chain divisions, and only Massbuild was selected for this study. Due to the complexities of location and getting interviews from senior employees in these chains, other retailers did not participate in this study. Hence, the findings of this research cannot be generalised to all retailers in the DIY and general merchandise sectors in South Africa.

- The research accomplished a range of objectives that included recognising the current role of technology in identifying the various trends available to retailers. Once the researcher was able to understand the first two objectives, she further examined the benefits associated with technology adoptions and the challenges that arose with implementing newer technologies. The literature review, together with the data analysis, provided remedies to mitigate each risk identified. The categories shown in the thematic map cannot be viewed as an exhaustive list, because not all the relevant variables have been identified.

- Massbuild's initiation of Omni-POS has currently been halted due to the Covid-19 pandemic, and the business has had to reassess projects and release dates as the company was not able to trade for six weeks. Thus, the strategies for 2020 have been impacted negatively, and the study was unable to determine the success rates of these implementations and to refer back to research objective three on this.

5.6 For further research

This research study has identified a number of opportunities for further research. Should Massbuild embark on additional technology implementations other than the emergences that have been discussed? The interest will turn to the manner in which the systems are implemented and rolled out. Technology adoptions' usability for supply chain performance and information sharing could be tested by a future study. The following points are also recommended:

- Research should be carried out on the effects of implementing emerging technologies at Massbuild (or other retailers) using a quantitative approach, to gather responses using a positivist view of reality.

- The qualitative research can be conducted in a different market other than retail, as different markets possess different dynamics and their responses to technology are different.

- South African retailers are quite behind in their implementation of emerging technologies compared to the European and American markets, so looking specifically at online retailers would be a better alternative. Their dynamics differ from the brick-and-mortar retailers and their usage of technology is much more extensive.

- If the researcher chooses to select an interpretive study, he/she can opt for a single case study as a data collection method.

- Future research can be done on the potential of technology advancements in retail in general, not specifically to merchandise and distribution. It can be focused on other roles of the business, for example, store operations, online, and IT.

- Furthermore, a similar study could be conducted on all four Massmart operating formats. With several system implementations across Masscash and Massdiscounters merchandise and distribution divisions, it is expected that the four operating formats will be consolidated in the near future, which would make an interesting study for future research.

5.7 Contribution of the research study

The research study contributes to understanding the influence of technology in merchandise and distribution processes. The research examined how the role of technology has evolved and has helped to improve the efficiency and effectiveness of merchandise and distribution. The different trends available to retailers were examined, and the literature review compared what other South African retailers were executing compared to Massmart as an entity. The benefits of technological progressions were uncovered and extensively detailed through the literature

review and data analysis. Also, the challenges associated with technology adoption were discussed, supported by recommendations provided in the literature review and the responses from participants. The points mentioned in the study have had a significant impact on the capabilities and innovation of newer technology in retail, specifically to merchandise. Merchandise has a vital role in the retail sector of the South African economy.

In section 5.3 of chapter five, recommendations were put forward on the adoption of technology in merchandise, and these are relevant to all retailers. These recommendations can further be developed into future research studies, as the influence of technology is dynamic in the retail sector. The findings of this empirical field research add value to the body of knowledge and provide insight into this research subject.

5.8 Conclusion and future research

The findings of this research study are consistent with previous research conducted, for example, Johnson (2018) and Dlamini (2017). Backed by the empirical findings in the data, the study supports the argument for a change in how management approaches the implementation of technology. The purpose of this research was to examine the influence of emerging technology in merchandise and distribution processes. With South Africa being a developing country, digital efforts taken by retailers continue to be hampered by the high costs of data and ever-increasing data connectivity issues. The trends identified in this study are highly focused on improving existing retail operations rather than overhauling retail through innovation. The research highlighted three significant points that retailers can find useful for the future:

- Increase the ability to respond to the evolving marketplace through the use of newer technologies.
- Collect and analyse customer data through AI and big data.
- Work effectively using one system across all stores, which ensures the most effective use of stock and improves merchandise and distribution processes.

Chapter five dealt with the primary research objectives and questions of the study that formed the basis of the research. It can be said that the success of technology can be measured by the rate at which employees respond to it. The adoption/implementation of emerging technologies

will undoubtedly allow for Massbuild to improve its engagement with stakeholders and employees to ensure that there is minimal communication breakdown and more integration, thereby reducing future costs and improving the overall function of merchandise and distribution to be as efficient and effective as possible. The evolution of technology has made many aspects of day-to-day activities within Massbuild obsolete such as manual orders and filing paperwork. Massbuild is paving its way to success with the projects they have initiated.

The research found that Massbuild is shifting to digital technologies in order to drive foot traffic, boost consumer interaction in-store, transfer products quicker, and enhance overall customer experience rather than disrupt it. Through the practical application of the recommendations, developed in terms of the theoretical framework of this study, retailers can make informed decisions on how to adopt and use newer technologies for their processes.

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Appendix A: Interview Guide

Proposed Interview Time: _____

Date: _____

Company: _____

Position: _____

I. Introduction

The following conversation is related to the research instrument which will be adopted for the purpose of this study, the interview. It will compromise of seventeen questions which will be conducted face-to-face with respondents working within the merchandise and supply chain departments of Massbuild. As stated previously in section three of the research proposal, there will be no questions pertaining to age, gender, ethnicity, or religion in order to eliminate bias. In addition, participation in this study is entirely voluntary as participants can choose to withdraw from it at any given time without any repercussions attached.

The next consecutive sections of this interview guide compromise of section A, which compromises of an individual's profile of the participation, and section B which primarily deals with the nature of the interview questions that are in relation to the objectives highlighted in this study.

II. Section A

The below questions are asked to the participants in order to derive if they are the correct respondents to be involved in the study and whether the information will be substantial and accurate in terms of the research objectives. The first two questions of the interview accomplish this.

1. How long have you been working within Distribution or Merchandise:

a. Your company?

b. Overall throughout your career?

2. What is your current job function or responsibility within your respective department?

The next section of this interview guide apprehends individuals to specifically answer questions that will assist with the research objectives.

III. Section B

The questions asked in this section will be asked in order to ascertain pertaining information that will assist with the answering of the research objective outlined in Chapters 1, 1.4 of this study. There are specific questions which I will ask participants relating to each research objective. This is reiterated in the ensuing paragraphs.

- **Research objective one: Current role of technology in merchandise and distribution**

3. What is your view of technology currently?
4. How would you differentiate between technologies in merchandise/distribution ten years ago vs. today?
5. In your opinion, how have merchandise and distribution processes been influenced as a result of newer technology?
6. What are the inefficiencies surrounding technology at Massbuild?
7. What steps are put in place when implementing new technology into merchandise/ distribution processes?

The above questions are concerned with the first research objectives by providing rationale surrounding the influence technology has on merchandise and distribution. The questions are in line with the research objectives dealing with the influencing factors of technology surrounding merchandise and distribution efficiencies. The information garnered from the above questions can assist companies in implementing successfully adopting technology as the business evolves.

- **Research objective two: Different emerging technologies available in the retail market**

8. Are you aware of the current market trends surrounding technology, and how would you describe it?
9. What is your understanding of 'Big data'?
10. How does Massbuild's adopt technology differently from other retailer's i.e. Dischem, Shoprite?
11. What are the forthcoming technology trends that Massbuild are going to initiate in the future, is there a five-year plan in place?

The questions relating to the second research objective are directly in line with the different technology trends available to Massbuild and how the company has taken steps towards implementation of newer enhancements. The answers provided by the respondents will allow for the researcher to understand the different technology in the market that will help improve Massbuild's performance and deliver on the SCOR model.

- **Research Objective three: Benefits acquired from technology**

12. Can you name me three successful benefits of technology influences in merchandise processes; kindly elaborate why?
13. In order for you to perform your daily functions, what would be the ideal technological support to manage your portfolio efficiently and effectively as possible?
14. With my definition of cloud technology, in your own words how has the cloud benefited the processes in merchandise?

The questions pertaining to research objective three, the benefits of technology. Information gathered from the above questions will exhibit precisely what benefits can be derived from the influence of technology on merchandise and distribution processes. This will gauge the efficiency and effectiveness of technology in an overall supply chain. Subsequently, participants will be required to rank the different technology trends obtained from the literature review.

- **Research Objective four: Risks of technological implementations/adoptions**

15. What are the potential risks surrounding the implementation of technology in merchandise? Please can you list these risks?

16. The list of risks provided in reference to the above question, kindly explain as to why you deem them potential risks?
17. What remedial actions are put in place to mitigate these risks?

The questions for research objective four refer to the risks associated with implementing new technology and when not to. The participants are asked about the potential risks associated and the outcomes that Massbuild will be ordained with. Afterwards, the respondents are required to provide solutions and remedial actions to counteract the risks affiliated with technology whilst staying ahead in the market on competiveness and innovation.

The end; I humbly thank you for your participation. All questions outlined in this interview will allow for the research objectives of this study to be addressed in the best way possible. It is solely this reason that a qualitative research approach will be adopted and that the research instrument will be of the interview which in turn will be face-to-face administered. Thank you for your time and participation in my study.

Appendix B: Informed Consent Document

UKZN Humanities and Social Sciences Research Ethics Committee

Greetings,

My name is Amelia Rajkumar from the School of Management, IT & Governance. I work at Massbuild, a division of Massmart holdings, which is where my primary data will be sourced. My contact number is 0760675741, primary email address is amelia.rajkumar24@gmail.com. You are being invited to consider participating in a study that involves the following topic; the influence of technological emerging trends within the distribution processes of retail: A study of Massbuild. The aim and purpose of this research: the aim is to understand the influence that technological developments have in retail and how it has altered or contributed to merchandise and distribution processes. The study is expected to include twelve participants all of whom are located in Sunninghill at the company under investigation. It will involve the following procedures: a one-on-one interview with selected participants. The duration of your participation, if you choose to participate and remain in the study, is expected to be thirty to forty-five minutes long. The study is being conducted by the researcher. The study carries no risk and will ensure confidentiality and anonymity of interviewees.

The hope is that the study will create the following benefits: knowledge in retail surrounding the influence of technology, an understanding of the different relationships in retail and how a business can successfully implement technology that is user friendly and relevant. There are no scientific benefits in this study to participants. Any research procedures will be disclosed in full. There are no risks or discomforts associated with this study. This study will not provide any direct benefits to participants. This study has been ethically reviewed and approved by the UKZN Humanities and Social Sciences Research Ethics Committee.

In the event of any problems or concerns/questions you may contact the researcher at 0760675741, or the UKZN Humanities & Social Sciences Research Ethics Committee, contact details as follows:

HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS ADMINISTRATION

Research Office, Westville Campus

Govan Mbeki Building

Private Bag X 54001
Durban 4000 KwaZulu-Natal, SOUTH AFRICA
Tel: 27 31 2604557- Fax: 27 31 2604609
Email: HSSREC@ukzn.ac.za

Your participation in the study is voluntary and by participating, you are granting the researcher permission to use your responses. You may refuse to participate or withdraw from the study at any time with no negative consequence. There will be no monetary gain from participating in the study. Your anonymity will be maintained by the researcher and the School of Management, I.T. & Governance and your responses will not be used for any purposes outside of this study.

All data, both electronic and hard copy, will be securely stored during the study and archived for five years. After this time, all data will be destroyed.
If you have any questions or concerns about participating in the study, please contact me or my research supervisor at the numbers listed above.

Sincerely
Researcher
Ms Amelia Rajkumar
0760675741
amelia.rajkumar24@gmail.com

Research Supervisor
Mrs. Jayrusha Ramasamy-Gurayah
Lecturer - Discipline of Supply Chain Management
School of Management, IT and Governance (MIG)
M1-112
031-2608713

Appendix C: Ethical Clearance

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

15 December 2021

Amelia Rajkumar (211529887)
School of Management, IT & Governance
Westville Campus

Dear A Rajkumar,

Protocol reference number: HSSREC/00000057/2019
Project title: The Influence of Technological Emerging Trends within the Distribution Processes of Retail: A case of Massbuild
Amended title: Emerging technology influences on the merchandise practices of a retailer: A study of Massbuild South Africa

Approval Notification – Amendment Application

This letter serves to notify you that your application and request for an amendment received on 16 August 2021 has now been approved as follows:

- Change in title

Any alterations to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form; Title of the Project, Location of the Study must be reviewed and approved through an 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.

All research conducted during the COVID-19 period must adhere to the national and UKZN guidelines.

Best wishes for the successful completion of your research protocol.

Yours faithfully

[redacted]

.....
Professor Dipane Hlalele (Chair)

/ms

Humanities & Social Sciences Research Ethics Committee
UKZN Research Ethics Office Westville Campus, Govan Mbeki Building
Postal Address: Private Bag X54001, Durban 4000
Tel: +27 31 260 8350 / 4557 / 3587
Website: http://research.ukzn.ac.za/Research-Ethics/

Appendix D: Gatekeeper's Letter

The Registrar

Biological and Science Building

University Road

Westville

3629

TO WHOM IT MAY CONCERN

RE: Permission to conduct Research

University of KwaZulu Natal Student:	A Rajkumar
Student Number:	211529887
Faculty:	School of Accounting, Economics and Finance

This letter serves to confirm that Massbuild gives permission to A. Rajkumar to conduct her research in her working environment in order to complete the research proposal with the topic:

"Emerging technology influences on the merchandise and distribution processes of a retailer: A study of Massbuild."

Best Regards,

[redacted]

Mr Darrin Mail

Merchandise Manager

27.01.2021

MASSBUILD (PTY) LTD
HUMAN RESOURCES DEPARTMENT
PRIVATE BAG X88, SUNNINGHILL, 2157
TEL: 010 594 8000
REG NR: 2004/035206/07

Appendix E: Editor's Letter

19 January 2021

Re: Editing of Master's thesis

This letter confirms that the following Master's thesis was edited: **Emerging technology influences on the merchandise and distribution processes of a retailer: A study of Massbuild South Africa** by Amelia Rajkumar.

Cordially

[redacted]

Dr Karen Buckenham (PhD)

kbuckenham@mweb.co.za