University of KwaZulu-Natal

FROM A MANUAL TO A SYSTEM-GUIDED PROCESS: IMPLEMENTING CHANGE IN A FAST-MOVING CONSUMER GOODS COMPANY IN KWAZULU-NATAL, SOUTH AFRICA

By

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Give thanks to the Lord, for he is good. His love endures forever (Psalm 136:1).

"Great is Your mercy towards me, Your loving kindness towards me,

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GLOSSARY OF TERMS

4IR	Fourth Industrial Revolution
AI	Artificial intelligence
AM	Additive manufacturing
AMT	Arm-mounted terminal
APR	Adjustable pallet racking
AS1	Applicability Statement 1
AV	Autonomous vehicle
BI	Business intelligence
CC	Cloud computing
CPS	Cyber-physical systems
DJE	Development job experience
EI	Emotional intelligence
ES01	Expired stock in location 01
EWM	Extended warehouse management
F2	Stock type (stock with more than 60 days shelf-life expiry date)
F3	Stock type (short-dated stock)
FO	Functional outsourcing
FoF	Factories of the future
FW01	Finished warehouse in location 01
HMI	Human-machine interaction
HHT	Handheld terminals
HU	Handling unit

i4.0	Industry 4.0
ICT	Information and Communication Technology
IoS	Internet of Services
IoT	Internet of Things
IIoT	Industrial Internet of Things
JDE	J.D. Edwards
KPI	Key performance indicator
KZN	KwaZulu-Natal
RDC	Regional distribution centre
SAP	Systems Applications and Products in Data Processing
SME’s	Small and medium enterprises
SOP	Standard operating procedure
SACO	South African Computer Organisation.

ABSTRACT

The purpose of this study was to develop a change management framework in transitioning from a manual process to an automated system-guided process using digital technology for managing short-dated inventory in the logistics operations environment. The manual process at the logistics study site entailed the operational staff physically going through all bin locations of inventory in the warehouse and manually checking the shelf-life expiry date (SLED) of the inventory, and as recorded on manually created documents. A qualitative methodology was applied due to the exploratory nature of this study. The data collection strategies utilised were semi-structured interviews and focus groups. The participants were from a purposefully selected sample which constituted all levels of the operational staff. They were managers; despatch/receiving co-ordinators; inventory counters; clerical stock controllers; administration clerks; forklift drivers; reach truck drivers; and supervisors. There were fourteen interviews and three focus group interviews. The data were analysed thematically and subsequently the change management framework was imposed, which was the theoretical underpinning in support of the transition from a manual process to an automated system-guided process utilising digital technology. An understanding of the theoretical underpinning of the change management framework and the unified theory of acceptance and use of technology (UTAUT) emerged as the discussion developed. The application of the UTAUT model indicated user intention to embrace new technology. The thematic concepts that emerged from the data generated were technology exposure and awareness; skills and competencies; challenges and recommendations; and system implementation: manual-to-automated. The contributions and findings of this study included that the integration of technology and the workforce at the study site did not result in job losses, which is positive for the people, the company, and the economy. Policy contributes to, and informs, job security, skills development, ways of working, and technology adoption frameworks. The contribution from the leadership and management team, with their practical approach, supported the workforce in transitioning from a manual to an automated system-guided approach. One of the inherent fears that the participants cited was that of job losses. Effective communication; training; and management support and presence, contributed to the change in behaviour required to adopt the technology and embrace change. The study ultimately proposed the *Logistics Change Management Model*, which was adapted to the South African context and is applicable when transitioning from a manual to a system-guided process at the focal company. It is recommended that further studies are conducted to strengthen the theoretical framework.

Key words: change management, logistics, manual process, system-guided, technological change

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CHAPTER ONE: INTRODUCTION

1.1 Introduction

Transforming processes within a company is always a challenge (Banerjee, Tuffnell & Alkhadragy, 2019). The key challenge for a company, irrespective of its size or sector, and whether it is capitalist- or community-driven, is change management (Wentworth, Behson & Kelley, 2018). There is generally negativity and adversity, from a human perspective to anything related to change (Wentworth et al., 2018). Previous research conducted indicates that corporate change has a success rate of less than 30% (Beer & Nohria, 2000; Burke, 2011; Jacobs, van Witteloostuijn & Christe-Zeyse, 2013; Michel, By & Burnes, 2013; Rouse, 2011; Wentworth et al., 2018).

In both one's own life, and in corporate life, changes are constant (Galli, 2018). Growth necessitates changes, more especially in companies. It is difficult to adapt to change because people and companies are usually habitual in nature. Organisational change is complex to effectuate for the person spear-heading change management. A change management leader is accountable for assisting the team, as well as the workforce, to maximise their abilities to effectively achieve the desired change objectives. This is by no means an easy task, due to the differences in people. Hence, a change management model assists the process (Galli, 2018).

Change emanates from a company, a project management team, or a person, who identifies that change is needed. The intent is to transform the business, processes, and systems. 'Processes' implies repetition once effectively implemented; and competencies implies that the outputs are effective. Change management is transitioning from a present practice to a future state (Galli, 2018). The appropriate choice of a change management framework is crucial in reinforcing the changes, for the implementation to be effective and sustainable (Holloway, 2015).

Change management is one of the key challenges for any company, notwithstanding its magnitude, social, or economic orientation (Wentworth et al., 2018). In developing countries like South Africa, this is a key challenge. Due to social and economic challenges, people feel that there will be a loss of something valuable, in moving from something that is familiar to the unknown; with a lack of and understanding of the changes and the benefits (EL-Dirani, Hussein & Hejase, 2019). Managing change is underpinned by transforming the organisation and driving efficiencies (Chappell, Pescud, Waterworth, Shilton, Roche, Ledger, Slevin & Rosenberg, 2016).

The aim of the study was to explore how to integrate technology and the human dimension in transitioning from a manual process to a system-guided process in a fast-moving consumer goods company in KwaZulu-Natal, South Africa. A further aim was to ascertain the impact on the workforce of change management, in transitioning from the manual process of managing the short-dated inventory, to an automated system-guided process embracing technological changes within the logistics study site, by embracing the digital technology of the 4IR age.

Former Trade and Industry Minister, Rob Davies (2017), stated that there would be radical or disruptive changes in South Africa and globally because of profound technological changes due to the digital technological age. The implication was that the workforce needed to stay abreast of the technological changes to remain competitive and relevant. This would require the facilitation of education and training for the workforce to be proficient in digital technology (Omarjee, 2017).

In this chapter, the background and context of change management; the workforce at the logistics study site; the manual process at the study site; and the logistics company, which is in Durban, KwaZulu-Natal, South Africa, are discussed. Thereafter, the technological changes in transitioning from a manual to an automated system-guided process influenced by the 4IR are discussed. Thereafter, the problem statement of this study will be discussed followed by the aim of the study, the key research questions, and the key research objectives. The limitations, as well as the assumptions, of this study, and the significance of this research, will be discussed. Thereafter, the overview of the structure of the research in respect of the chapters that follow is presented. Finally, the conclusion of this chapter is presented.

1.2 Study background

The Doctor of Business Administration (DBA) degree should be a substantial thesis that is premised on dealing with the solving of a business problem (Carr, 2021). It prepares a person in the field to be a practitioner, having gained a more practical professional preparation (MacLennan, Piña & Gibbons, 2018).

Although there are a vast number of publications on change management (Chappell et al., 2016; Kuo & Chen, 2019; Teixeira, Gregory & Austin, 2017; Wentworth et al., 2018), research on the logistics sector, and particularly transitioning from manual to automated operational processes, is not available in a change management context (van Hoek, Johnson, Godsell & Birtwistle, 2010).

The manual process at the logistics study site in managing short-dated inventory was tedious and prone to human errors, which ultimately resulted in inventory write-offs, which had an impact on the company's profitability (Richards, 2017). The company incurred inventory write-offs of just over R1.4m in the 2019 financial year (Appendix E). This manual process was time-consuming and labour intensive (Bortolini et al., 2021; Fast-Berglund, Fässberg, Hellman, Davidsson & Stahre, 2013; Fletcher, Johnson, Adlon, Larreina, Casla, Parigot & del Mar Otero, 2020).

Achieving efficient and effective performance outputs in productivity and flexibility was dependent on increasing technological automation. There also needed to be an increased level of skills and capabilities from the workforce. These were fundamental requirements to migrating to advanced technology with increased adaptability, as well as collaboration between the workforce and digital technology automation (Bortolini et al., 2021).

The focus of this study was the logistics operational site in Durban, KwaZulu-Natal, South Africa, which had a manually driven operational process for managing short-dated inventory using the Systems Applications and Products in Data Processing (SAP), enterprise resource planning system. The literature has asserted that manually operated systems lack productivity in comparison to automated ones (Borisoglebskaya, Provotorova, Sergeev & Khudyakov, 2019; Bortolini et al., 2021; Fast-Berglund et al., 2013; Fletcher et al., 2020; Richards, 2017). The manual process entailed the workforce going through all 'bin locations' (where inventory was placed for ease of location) of inventory in the entire warehouse and physically checking the shelf-life expiry date (SLED) of the inventory and recording this manually in documents (Bortolini, Faccio, Galizia, Gamberi & Pilati, 2020; Fletcher et al., 2020; Richards, 2017). Thereafter, the data was captured on Microsoft Excel for dissemination. Subsequently, the data which was compiled was emailed to management and all relevant stakeholders to take business decisions, which included discounting inventory to trade; donating inventory to charitable organisations; selling to animal feedlots if inventory had expired but was acceptable for animal feed; or safely disposing it through an accredited waste management service provider if not acceptable for consumption (Richards, 2017).

High levels of accuracy, consistency and sustainability in performance are low in manually-driven processes due to their susceptibility to quality variations and inconsistencies in productivity (Faccio, Bottin & Rosati, 2019). Manual processes are prone to human errors which impact negatively on the accuracy of data, which technology improves (Bortolini et al., 2021; Myklebust & Smidt, 2021).

Developing the skills of the workforce through up-skilling and reskilling is a requirement for successful change management (Leopold, Zahidi & Ratcheva, 2016; Younus, 2017). Transitioning from a manual to an automated system-guided approach to manage short-dated inventory required the workforce at the study site to adapt to the technological implementation. Hence, the change management process is critical in effective transitioning (Banerjee et al., 2019).

The key challenge is change management (Wentworth et al., 2018). The logistics study site had no formal change management framework, which posed a challenge when transitioning from a manual to an automated system-guided process. The workforce can be generally negative regarding, and averse to, the change from a manual process (Wentworth et al., 2018), to which they had been accustomed in their daily execution of duties. The suggested reasons for this are: the feeling of losing something valuable; not understanding the need for change and outcomes; being of the view that it is not necessary and does not make sense for the company; and having little interest in change (Kotter & Schlesinger, 2008).

It was evident that there was an urgent need to expedite training of the workforce, as well as to determine the digital technological requirements to transform the manual processes for the future, and to design and make available to the rest of the industry the procedure necessary to achieve this objective (Bortolini et al., 2021). The key gap was that the organisation had not adopted any model of change management to move from a manual process to an automated system-guided process. It was imperative that the company should plan the implementation of the changes using appropriate change management planning (Banerjee et al., 2019). Hence, the logistics study site needed to implement an effective change management framework to mitigate the risk of radical or disruptive changes as a result of profound technological changes in warehousing and logistics, and office and administrative support. The change management process in implementing technology and the Internet of Things must be managed effectively to up-skill and to reskill (Leopold et al., 2016) the workforce to cope with this radical/disruptive change, to ensure customer service levels are adhered to, thereby securing jobs.

It was reported by the WEF (2017) that broad-scale investment in upskilling of the workforce will, potentially, have a significant impact on the global economy by 2030; as well as potentially creating approximately 5.3 million new jobs worldwide by 2030. It was further predicted that the reskilling and upskilling of the workforce has the potential to transform the economy, where the labour force becomes complemented and augmented, instead of being replaced by digital technology; hence impacting on the overall quality of jobs (Myklebust & Smidt, 2021).

In this section, the background to the logistics environment of the study site; the workforce at the study site; the manual process of managing short-dated inventory; the change management strategy; the change to digital technology leveraged because of COVID-19; and technological changes underpinned by the 4IR, will be discussed. Conceptually, technological change underpinned by the 4IR is aligned to exceptional growth and digital technology (Bortolini et al., 2021). The researcher attempted to preserve the anonymity of the organisation as far as practically possible, due to the strategic nature of the research, and in order to prevent the competitors gaining insight into strategic decisions within the organisation.

1.2.1 Logistics study site

The study context was a logistics service provider in Durban, KwaZulu-Natal, South Africa that has been in existence since 1997 and it is among the leading fast-moving consumer goods (FMCG) companies listed in the country and in sub-Saharan Africa. It manufactures and delivers a variety of essential staple foods and beverages nationally. The company became a listed company on the Johannesburg Stock Exchange (JSE) in 2008. Largely in South Africa, the company provides wholesale, retail, and informal trade customers with wholesome, high-quality products, as well as exporting goods to more than 60 countries around the globe (Pioneer, 2017a).

Their range of products has grown to include some of the brands in the categories of cereals; juices; wheat flour; snacks and treats; baking aids; rice; legumes; pasta and maize meal. This company has three significant manufacturing operations: flour and super maize meal; pasta, rice and legumes; plus, a large bread manufacturing operation. Foods and cereal products include morning meals; dessert and treat ranges; fruit ranges; savoury pastes; pre-made slaws; concentrated mixes; and other products (Pioneer, 2017a). The global division puts the focus on exporting products to the African continent and globally. The company’s fruit business also operates internationally, including in the United Kingdom (Pioneer, 2017a).

The functionally outsourced service providers were utilised by the logistics division for non-core functions. According to the General Manager of a functional outsourced-solutions company, functional outsourced service providers have developed an innovative labour management model that has provided companies with a productivity-driven solution that includes fine/bulk picking, loading, and bagging processes for a predetermined fixed cost per ton, container, or truck load, irrespective of any potential productivity delays (Comins, 2018). The study site utilised the services of a functionally outsourced service provider for non-core functions in achieving economies of scale.

1.2.2 Workforce at the logistics study site

The various categories of logistics workforce that participated in this study were as follows.

Warehouse Manager – overall accountability for all inbound processes and inventory management (Richards, 2017).

Distribution Manager – overall accountability for all outbound processes and customer service levels (Dobroszek, Mourao & Grzesiak, 2019).

Administration Manager – oversight of the holistic administration of inventory, financials, assets, and audits (Richards, 2017).

Administration Clerk – all administration with reference to inventory movement, which includes billing and credit notes (Richards, 2017).

Dispatch and Receiving Co-ordinator – co-ordinates all inbound and outbound functions as well as systems processes (Richards, 2017).

Clerk Stock Control – receives and dispatches inventory according to purchase orders or sales orders. Controls the picking and inventory put-away functions (Richards, 2017).

Physical Inventory Counter – accounts for inventory within each inventory location within the warehouse (Richards, 2017).

Reach Truck Driver - stacks all inbound products in the allocated locations in the warehouse. Receives confirmation of quantities of products to be picked up from the racking inventory location for each customer's order and placed in the allocated staging area for final post-pick audit and outbound distribution (Richards, 2017).

Forklift Driver – off-loads all inbound products, stacks all inbound products in the allocated locations in the warehouse, receives confirmation of quantities of products to be picked up from the bulk inventory location for each customer's order, and places in the allocated staging area for final post-pick audit and outbound distribution (Richards, 2017).

Supervisor – co-ordinates the staff allocated to the reverse logistics process and the processing of products that were uplifted from the customers and placed into good stock that should be allocated to the warehouse. Non-saleable products should be sold to animal feedlots or sent to waste management service providers (Richards, 2017).

Order pickers – receive confirmation of quantities of products to be picked up from the inventory location for each customer's order. They consolidate each order on a pallet, label the pallet with the customer's details and shipment number, and thereafter place it in the allocated staging area for final post pick-up audit and outbound distribution (Richards, 2017).

1.2.3 Manual process of managing short-dated inventory

The manual process at the logistics study site entailed the operational staff physically going through all bin locations (Refer to Figure 1.1, a photograph of several bulk bin locations; and Figure 1.2, a photograph of several racking locations) of inventory in the entire warehouse and manually checking the shelf-life expiry date (SLED) (Borisoglebskaya et al., 2019) of the inventory and recording this manually in documents. Subsequently, they compiled the details on Microsoft Excel for dissemination to the relevant internal and external stakeholders. Thereafter, the compiled data was emailed to management and to all relevant stakeholders who were mandated to take business decisions. These decisions included discounting inventory to trade; donating inventory to charitable organisations; trading to animal feedlots if inventory had expired but was acceptable for animal feed; or organising safe disposal through an accredited waste management service provider if not acceptable for animal consumption.

Figure 1.1. Bulk bins storage of inventory

Source: Author's photograph.

Food products in FMCG are scrapped due to being unsaleable when they have reached their expiry date. These are products manufactured for human consumption that are wasted (Unuofin, Aladekoyi & Odeniyi, 2021). This impacts the company's profitability and incurs additional costs of safe disposal of the scrapped products.

Developing countries account for 780 million humans who suffer from serious malnutrition, as reported by the United Nations Organisation for Food and Agriculture (FAO, 2015; Unuofin et al., 2021). Notwithstanding the existence of malnutrition, food wastage is very high (Kings, 2018), and is a significant part of municipal waste, thereby leading to environmental issues and concerns globally (Ren, Yu, Wu, Wang, Gao, Huang & Liu, 2017).

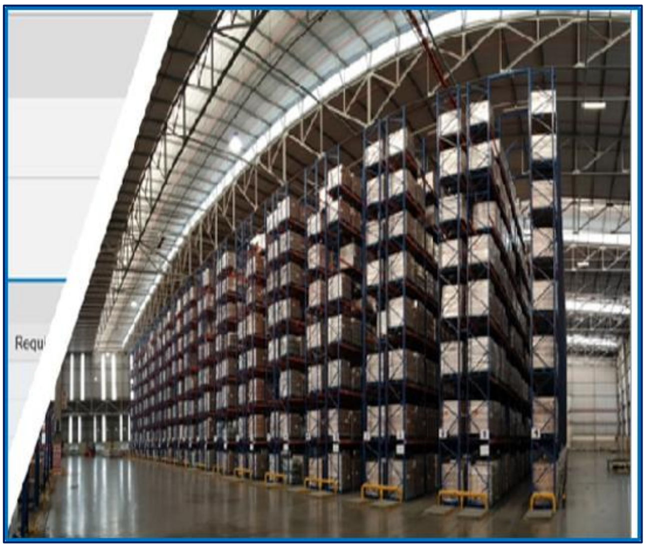


Figure 1.2. Storage of inventory on racking

Source: Author's photograph.

High levels of accuracy, consistency and sustainability in performance are low in manually-driven processes, due to their susceptibility to quality variations and inconsistencies in productivity, and due to the vagaries of human nature (Rosati, Faccio, Carli & Rossi, 2013; Rosati, Faccio, Finetto & Carli, 2013). Hence, transitioning from a manual process to a system-guided automated process, underpinned by 4IR digital technology change, would improve the efficiency of short-dated inventory management.

1.2.4 Change management strategy

Evidence in the literature seems to suggest that the issues included insufficient interaction and availability of information, as well as upskilling and reskilling of the workforce regarding the changes to be implemented (Rüßmann, Lorenz, Gerbert, Waldner, Justus, Engel & Harnisch, 2015; Younus, 2017). Not enough was done to identify the important elements, such as the willingness and eagerness of staff and team members to change, that would impact on the change-management process (Galli, 2018); and there was no relevant change-management model for the organisation (Holloway, 2015). It was vital and necessary to ascertain the views of the workforce on how they perceived the transformational changes impacting on them (Galli, 2018).

Organisations need to remain competitive in the marketplace. Competitiveness impacts the company's market position and sustainability (Apolonio & Norona, 2021; Atnafu & Balda, 2018; El-Dirani et al., 2019). To maintain competitiveness, the organisation should ascertain what the existing skills, strategies, culture and skill sets are that propel innovative ideas and technological capabilities aimed at meeting consumer demands. In initiating the transformational venture, change management is necessary to align the company, as well as in designing a correct intervention that would produce the capabilities to deliver innovative products and services (Loyola, 2018). A change management process is very important in order to be engaged with, and to realign, the organisation in the change management journey (Loyola, 2018).

There were several change management models considered in this study: Lewin's Change Management Framework (Lewin, 1947); McKinsey 7 S Framework (Belyh, 2019); Nudge Theory (Sunstein & Thaler, 2003); ADKAR Framework (Stouten et al., 2018); Bridges' Transition Framework (Bridges, 1991); and Kotter's model (Kotter, 1996). Change management researchers have considered Kotter's model as a framework to implement changes effectively in an organisation (Kotter, 2007). The emphasis is on attracting the interest of the workforce to buy-in to the changes, which is critical for effective implementation (Kotter, 2007). It was claimed by Appelbaum et al. (2012) that the implementation of Kotter's eight-step framework was effective, but it was crucial that it was supported by change management agents. It was one of the main frameworks referred to in managing change (Appelbaum, Habashy, Malo & Shafiq, 2012). After reviewing completed research on the appropriateness of Kotter's eight-step change management framework, this researcher concluded that the model was inherently significant and had not been disproved in the literature in subsequent years (Appelbaum et al., 2012). John Kotter expanded and reiterated his blueprint in his subsequent literature published after his work on *Leading Change* (Kotter, 2008; Kotter, 2014; Kotter & Cohen, 2002).

According to Hackman (2017), Kotter's change management framework was a pragmatic user-friendly simplified guide to effect transformation. The researcher of the study must obtain buy-in; form a team to guide the process of change; and inform the people of the objectives of the changes and the processes to follow, which should come naturally from the team leader's approach to management (Hackman, 2017). This prepares and develops the workforce's expectations and equips them to action the changes so that their efforts are considered valuable. The issue of trust is key to whether this approach is going to be workable (Hackman, 2017). In previous studies in other sectors, Kotter's model for leading change was recommended for implementation in a step-by-step approach (Mørk, Krupp, Hankwitz & Malec, 2018).

1.2.5 Change to digital technology leveraged because of COVID-19

The COVID-19 pandemic spread from China. In response to this pandemic, China and the world instituted lockdowns which restricted activities, nationally as well as internationally, and which impacted economies (Capri & Lehmacher, 2021; Tardivo, Zanuy & Martín, 2021). South Africans were in an enforced lock down from 26 March 2020 (Zuma, 2020), which was finally lifted from 5 April 2022 (Zuma, 2022). From the inception of the pandemic, African companies faced challenging times adapting to virtual collaboration utilising digital technology. There were several factors that caused these challenges, such as limited technological infrastructure, capacity, and connectivity. These contributed to difficulties in transitioning (Zeleza & Okanda, 2021).

The studied company was also affected by COVID-19 protocols. Administration staff worked remotely, all operational staff were restricted to their departments on their shifts, and there was no overlapping of shifts. Delivery crews were reduced on vehicles to adhere to social distancing protocols as prescribed by the law enforcement authorities. No visitors, clients, service providers or anyone that did not work in that operation was allowed on site unless it was crucial for business. All meetings were conducted virtually, even with managers and staff, and between departments. The researcher published an opinion article relevant to the pandemic entitled: 'COVID-19: The New Normal for the Workplace', on UKZNDABA website (Appendix J).

1.2.6 Technological change - Fourth Industrial Revolution (4IR)

Technological change saw the emergence of i4.0 (Industry 4.0) during the past decade, commonly known as the 4IR, aiming for significantly higher productivity, changes to digital technology, and greater efficiency in operations (Bortolini, Faccio, Galizia, Gamberi & Pilati, 2021). There was a global struggle to deal with the disruption from the Coronavirus, which also presented opportunities to embrace digital transformation in an inclusive, human-centric, globalised economy (WEF, 2020). The workforce needs to be reskilled and up-skilled (Leopold et al., 2016) to operate and to develop new technologies to compete for available jobs relevant to the 4IR. For example, scanners have replaced manual order picking instruction. The products and quantities of each product that the customer has ordered are communicated to the order picker through the scanner. If the affected workforce is not adequately prepared and upskilled, the risk is that they will become unemployed (Younus, 2017). In the study context, the change management process was critical in reskilling and upskilling the logistics workforce in transitioning from a manual to an automated system-guided process in managing short-date inventory underpinned by digital technology.

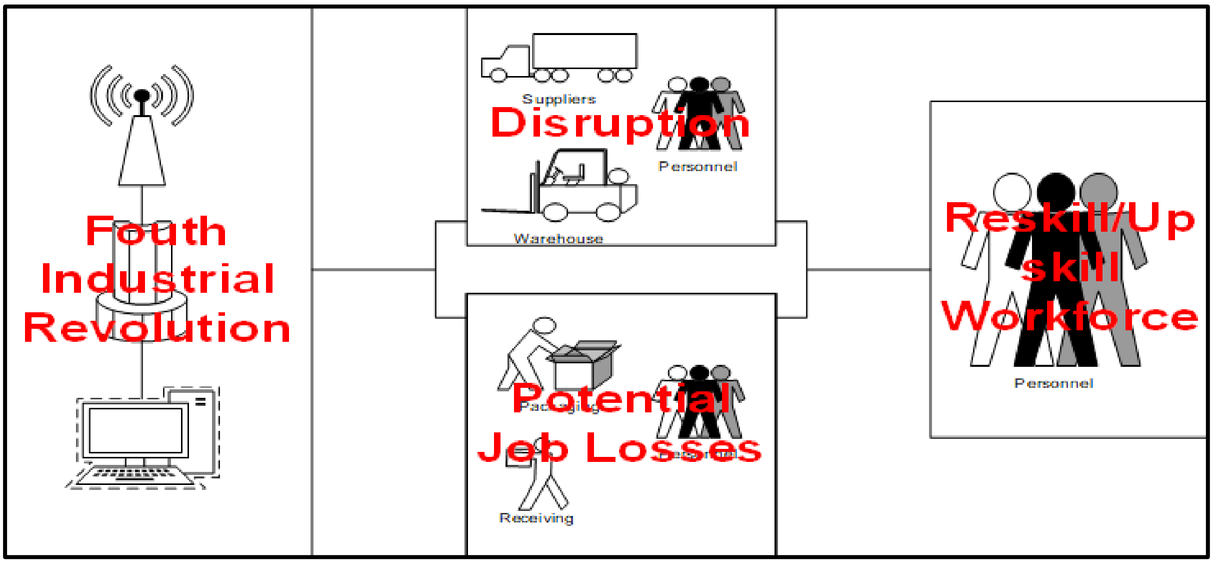


Figure 1.3. The disruption of the digital age technological transformation on the workforce

Source: Author

Figure 1.3 illustrates that the digital technological transformation based on the Internet of Things (IoT) is disruptive, which could lead to job losses if the workforce is not reskilled and upskilled to adapt to new digital technologies. Various supply-chains utilise the IoT's capabilities which were leveraged from these applications as their methods and algorithms enhance the accessibility of the supply chain (Song, Zhong, Chen, Lan, Fong & Tang, 2021). Schwab (2016) asserted that knowing oneself and regulating oneself; as well as encouragement, compassion and human skills, are key to thriving during the age of the digital technological transformation (Schwab, 2016). It is probable that, in the advanced cyber-physical transformed work environment in the next ten years, the current workforce between the ages of 20 and 30 will not be able to adopt the technology of the future, although they are within the parameters of being a part of the workforce for a further two decades or more before retirement (Butler, 2018).

The Minister of Economic Development, Ebrahim Patel (2017), stated that the impact of technology on economies and society was incisive in a fundamental way. He further stated that digitalisation should fundamentally transform economies in this digital technological age (Omarjee, 2018). Education will have to be reshaped for this new generation, over and above the need to build new skills and capacities in the current workforce to avoid the negative impacts in this digital technological age (Butler, 2018). To attain satisfactory levels of performance in productivity and flexibility, there needs to be increased automation, as well as an increased level of skills and capabilities from the workforce. This is necessary to develop newly designed, next-generation, systems with increased adaptability, as well as collaboration between the workforce and digital automation technology (Bortolini et al., 2021).

1.3 Context of the problem

The problem is the manually operated inventory control system of short-dated inventory. Once the inventory reaches its shelf-life expiry date, the expired inventory is scrapped thereby contributing to wastage. The value of the scrapped inventory reduces the profitability of the company and has further environmental impact of food wastage. Manual processes are labour intensive, prone to human errors such as incorrect recording of inventory quantities and shelf-life expiry dates, inventory placed in incorrect bin locations, inaccurate picking, and inaccurate checking. The impact of these errors leads to sales orders not being fulfilled due to out of stock of products, incorrect stock being delivered and rejected by customers, and products being scrapped due to being expired which is the key problem that this study focuses on. Implementing change from a manual to a system-guided process in managing short-dated inventory.

1.4 Aim of the study, research questions and objectives of the research

This section covers the aim of this research, the key research questions, and the main research objectives of this study.

1.4.1 Aim of the study

The aim of the study was firstly to explore how to integrate technology in transitioning from a manual process to a system-guided process and secondly to ascertain the impact on the workforce of change management in a fast-moving consumer goods company in KwaZulu-Natal, South Africa.

1.4.2 Research questions

1.4.2.1 How did the company prepare for the transition from a manual to a system-guided process at the logistics study site in Durban, KwaZulu-Natal, South Africa?

1.4.2.2 What are the challenges experienced at the logistics study site in Durban, KwaZulu-Natal, South Africa faces in transitioning from a manual to a system-guided process?

1.4.2.3 What framework can be developed to facilitate effective change that embraces technology and the workforce at the study site in Durban, KwaZulu-Natal, South Africa?

1.4.3 Objectives of the research

1.4.3.1 To determine how the logistics company in Durban, South Africa prepared for the transitioning from a manual to a system-guided process.

1.4.3.2 To examine the challenges faced in transitioning from a manual to a system-guided process at the logistics site in Durban, South Africa.

1.4.3.3 To develop a framework for change that embraces technology and the human element at the logistics site in Durban, South Africa in transitioning from a manual to a system-guided process.

1.5 Assumptions of the research

Most studies are based on assumptions. It has been maintained that it is necessary to have assumptions as these enable a study to be conducted (Simon & Goes, 2013). For this research, the assumptions were kept to a minimum. There are no change management champions/leaders within the company, although there have been changes in the organisation on an ongoing basis. For example, in previous changes that were experienced within the organisation, which included the logistics study site of this research, Google cloud was implemented in 2017 (Pioneer, 2017b), and SAP Fiori was implemented in 2018 within the organisation and at this study site (Pioneer, 2018).

An understanding of the change management process and change management guidelines was not evident in the participants at the study site. It was accepted that the organisation had not thoroughly scrutinised a theoretical change management framework, and there was no evidence that they had done so previously.

1.6 Delimitations of the research

Delimitations are set by the researcher to work within defined parameters and limits, enabling the aims and objectives to be achieved (Theofanidis & Fountouki, 2018). A logistics company in Durban was the study site. The qualitative methodology was applied. Focus of the study was on change management from a manual to a system-guided process in managing short-dated inventory.

1.7 Significance of the research

Deciding on an appropriate change management framework is extremely important to achieve the effective results (Galli, 2018; Holloway, 2015). The theoretical contribution of this research was to propose a change management framework underpinning the implementation of digital technology in transitioning from a manual process to an automated system-guided process in embracing the 4IR. Prior research has covered change management in other sectors (Appelbaum et al., 2012; Baloh, Zhu & Ward, 2018; Mørk et al., 2018; Nitta, Wrobel, Howard & Jimmerson-Eddings, 2009), but there were no studies that included the logistics sector in transitioning from a manual operations process to an automated system-guided operational process in managing short-dated inventory within the context of change management (Hausberg, Liere-Netheler, Packmohr, Pakura & Vogelsang, 2018; van Hoek et al., 2010).

Manually operated systems are subject to errors in accuracy by the workforce. There are limitations to the capability of the human operator in sustaining high performance levels (Matheson, Minto, Zampieri, Faccio & Rosati, 2019). The researcher sought to develop a change management framework for transitioning from a manual operational process to an automated system-guided operational process for the logistics study site in Durban, KwaZulu-Natal, and this research explored the change management framework that could underpin this transition effectively. This may enable managers and leaders within the logistics environment to utilise the change management framework in transitioning from a manual operational process to an automated system-guided operational process, with the assurance that its applicability and appropriateness in effective change management have been validated by findings of this research as well as in the literature.

This study was unique in that it was an attempt to identify the gap through reviewing the literature about a change management framework in transitioning from a manual process to an automated system-guided process in the logistics environment. The researcher was of the view that this study highlighted the logistics perspective of change management in transitioning from a manual process to an automated system-guided approach relevant to the 4IR. This study also augments the literature that exists through providing an adapted change management framework for the logistics environment in transitioning from a manual process to an automated system-guided process pertinent to the 4IR. It was evident that there was an urgent need to identify the workforce’s needs, as well as the digital technological requirements for the manual operational processes of the future, to design and make available a framework for the rest of the industry (Bortolini et al., 2021).

1.8 Research methodology

The research entailed enquiries as well as investigations which were conducted systematically, methodologically, and ethically. It was intended to assist in solving pragmatic issues as well as to increase knowledge (Collis & Hussey, 2003; Smith, 2017). A key portion of this research emphasised the literature review to provide a holistic understanding of the perspective of the study and the problem area.

The constructivist philosophical worldview was the basis of this study as this research was undertaken from a qualitative perspective. This paradigm is about understanding the phenomenon under study from the experiences or perspectives of the participants, through the different data collection strategies (Adom, Yeboah & Ankrah, 2016). The philosophical worldview is relevant in the qualitative context in which this research was based (Creswell, 2013; Johnson & Onwuegbuzie, 2004). The key characteristics relevant to this study were: triangulation of data that had been collected; framing of the research within the broader context; and the flexibility in allowing the research to use the various data collection tools with reference to the identified research problem (Christ, 2013; Wahyuni, 2012).

For the purposes of this study, data was collected using semi-structured interviews as well as qualitative focus group discussions. The researcher had to develop a change management framework for transitioning from a manual process to an automated system-guided process in the logistics sector. This research was undertaken using the qualitative method as the study was exploratory and no previous studies had been conducted in this study context.

A purposive sampling method was utilised in this research. This method allowed the researcher to apply his own judgement in choosing the participants that would best furnish answers to the study's research questions and would achieve the research objectives (Saunders, Lewis & Thornhill, 2016). In addition, literature that was particularly informative and relevant to the study was utilised (Saunders et al., 2016). The qualitative interviews that were conducted used semi-structured and open-ended questions. This enabled the participants to respond, expressing themselves freely, without limiting their contributions. The data generated was thereafter transcribed verbatim, analysed and thematically categorised.

1.9 Structure of the thesis

Chapter One, which presents the introduction and context of the study, covered the logistics service provider, which was the study site in Durban, KwaZulu-Natal, and the workforce at the logistics study site. This was followed by a brief consideration of the manual process of managing short-dated inventory; change management strategy; changes to digital technology leveraged as a result of COVID-19; and an introduction to technological change underpinned by the 4IR. Finally, the problem statement; study aim; research questions; objectives; limitations; assumptions; and significance of the research were discussed. The research methodology for this study was also discussed.

Chapter Two looks at the change management processes, and it focuses on various change management models to implement large-scale change in an organisation. It further covers the organisation and change management; change management models; resistance to change; the challenges in change management; and the factors necessary for achieving the objectives in change management.

Chapter Three is a literature review on technological change underpinned by the 4IR. The 4IR is covered in detail, as are the required skills for the 4IR; the development of the workforce; Technology Acceptance Model (TAM); Unified Theory of Acceptance and Use of Technology (UTAUT); and empirical evidence.

In the fourth chapter, the research methodology that directed this study is explained. This includes the philosophical worldview; strategy of enquiry; population and sampling strategy; data collection tools; data analysis; and data trustworthiness, which refers to credibility, dependability, and transferability. Thereafter, bias, and ethical considerations are discussed.

Chapter Five presents the findings; the primary data collection; the analysis of the data collected; and the themes that emerged from the data generated. The three themes linked to change management are discussed.

Chapters Six discusses the fourth theme linked to change management and technology adoption. Chapter Seven presents the discussion of the key findings covered in Chapter Six, from the themes that emerged from the data collected, and Kotter's Change Management framework was overlaid and critically reviewed.

In Chapter Eight, the conclusions, and recommendations of the research, premised on the findings and theoretical framework, are discussed. Also, the research questions are answered, and recommendations for future research are suggested.

1.10 Chapter summary

This chapter introduced the concept of change management, the study background, and the logistics study site. The overview of the workforce at the study site, the manual process of managing short-dated inventory, and change management strategy were discussed. The impact of COVID-19 was also discussed, as it had been disruptive and unprecedented. Due to the risk-adjusted strategy of lockdown, which had a significant impact on human interaction, digital technology had to be leveraged because of COVID-19 for the 'new normal', which was the world of virtual work except for essential and front-line workers. Thereafter, the technological changes underpinned by the 4IR were discussed.

The study context was presented, and the problem statement was discussed, followed by the study aim, research questions and research objectives. The assumptions, delimitations, and the significance of the research, were subsequently discussed. Thereafter, the research methodology for this study was discussed. This was followed by the structure of this study and an overview of each chapter was presented.

Chapter Two of this study presents the literature review. It covers the theoretical and conceptual framework of salient literature that underpinned this study. The chapter will cover change management in detail.

CHAPTER TWO: LITERATURE REVIEW: CHANGE MANAGEMENT

2.1 Introduction

In transitioning from a manual to a system-guided process it is important to understand change management theories and the associated challenges. Transformation of processes within a company is always a challenge (Banerjee, Tuffnell & Alkhadragy, 2019). World renowned change management author, John Kotter, confirmed that the difficulty with effective change management is that it goes beyond process changes and operational changes in a company – the behavioural aspects of the workforce need changing, which is the most challenging of changes (Kotter & Cohen, 2002).

Reluctance and scepticism regarding change management is normal with all forms of implementation. It must be noted that many of the impediments are surmountable when the change management leadership and companies plan the implementation of changes using appropriate change management planning (Banerjee et al., 2019). The choice of a change management framework, as indicated by Senge in *The Fifth Discipline,* should take account of the fact that people are afraid of, and yet require, changing (Senge, 1990). Banerjee et al. (2019) stated that it is not about the resistance to change but rather the resistance to changing behaviour. Hence, the inherent challenge for the organisation is to choose a change management strategy that will be instrumental in achieving the objectives through the process of change (Banerjee et al., 2019).

Chapter Two discusses change management and the change management framework. Challenges with change management will be discussed, followed by the factors for success and why the chosen change management model was considered suitable for this study in transitioning from a manual to system-guided process.

2.2 Background of change management

The choice of the most appropriate change management model is imperative for any organisation in achieving its goals (Galli, 2018; Holloway, 2015). Change management is one of the biggest undertakings that may influence a company. It is a calculated approach, bringing major changes to meet the expectations of an organisation to transition forward smoothly. When the need for change arises, organisations have no option but to respond, or they will lose in the market due to a lack of competitiveness. The scope of change management ranges from planned evolutions to organisational transformation (Bekmukhambetova, 2021). Tactical and functioning transformation remains ongoing for competitiveness. A two-way approach from management to the shop floor and vice versa is imperative for effective communication, by understanding the expectations from the company; and the employees can communicate the challenges as well as potential obstacles (Mahadi et al., 2020). Defined and structured objectives will assist the transformation process in effective communication, obtaining buy-in from the workforce, and directing the change management process (Bekmukhambetova, 2021; Galli, 2018). Effective implementation of change management must be fully supported and is a cardinal reference point in managing change (Applebaum et al., 2012; Bekmukhambetova, 2021).

There must be sufficient awareness and knowledge-sharing at the various levels in the organisation to direct change management. The leaders need to be well trained with respect to the different facets of change, as well as the desired outputs to be achieved. Insufficient training for leaders, skills, and supervision are huge concerns in change management implementation (Ahmad, Ibrahim & Nadeemet, 2021; Bekmukhambetova, 2021; Chandel & Sharma 2022). Appropriate development of the leadership enables them to focus on the different aspects of effective management, the information, and framework, instead of specifically on profitability and cost management (Galli, 2018). The complex nature of companies and their footprints results in unplanned factors emerging; leaders must take cognisance and respond systematically to this by taking a holistic view (Clancy, 2018; Mahadi et al., 2020). It is important to note that the change management framework must be appropriate for the business (Deborah, 2018; Galli, 2018).

2.3 Organisation and change management

Organisations need to remain competitively positioned in their market segment (Manavalan, et al., 2019). To maintain competitiveness, companies should evaluate their capacities, strategic direction, and culture; their skill sets to advance creativity; and digitalisation to achieve consumer demands (Ahmad et al., 2021). In initiating the change management venture, transformation is appropriate for aligning the company with the correct interventions to achieve innovative product offerings and service offerings (Loyola, 2018). The transformational journey is important to adapt and align the company with reference to the change management journey (Loyola, 2018).

Growth necessitates changes, more especially in organisations (Galli, 2018). Digital transformation will contribute to economic growth (Nagy, Oláh, Erdei, Máté & Popp, 2018; Reyneke, 2019; Tardivo et al., 2021). Another dimension of growth is that of inventory in the warehouse (Borisoglebskaya et al., 2019). The reputational growth of an organisation and individuals is the result of successful change management implementation (Ik & Azeez, 2020).

The limitations of change are evident if the same standard is maintained a decade or so later (Galli, 2018). Some limitations are in the scope to change, resources, and strategic vision (Eriksson & Fundin, 2018; Kersten, Blecker & Ringle, 2017). Also, limitations exist in management capacity and roles, when resistance cannot be dealt with effectively, and there is a lack, or ineffective prioritisation, of change (Rønningstad, 2018). The workforce has to fulfil the demands of the job created by change, yet they may have their own physical limitations (Sippli, Schmalzried, Rieger & Voelter-Mahlknecht, 2021). The constrained capacity at the company poses a limitation that requires change to optimise efficiencies (Borisoglebskaya et al., 2019).

It is difficult to adapt to change because people and companies are usually habitual in nature (Galli, 2018). How successfully organisations adapt to change is dependent on the type of individuals involved, the kind of change being pursued, and the kind of the trading of the organisation (Deborah, 2018; Herzog, Handke & Hitters, 2019). Employees in the organisations are more likely to adapt to the changes that management desires, only if they are ready and willing to change. Employees who are satisfied with their jobs and the company's benefits readily adapt to management change for the better (Laig & Abocejo, 2021).

Organisational change is complex to effect for the person spear-heading change management. A change management leader is accountable for assisting the team, as well as the workforce, in maximising their abilities to achieve the desired change objectives effectively (Bekmukhambetova 2021; Chandel & Sharma 2022; Thi, 2021). The leader needs to be a visionary, that is a strategic planner, providing appropriate resources to deal with internal and external changes to the business and assist with practical solutions (Chandel & Sharma 2022; Sulieman, 2018). Further characteristics of an effective change management leader include the ability to deal with ambiguous situations; to provide leadership as required; to have sufficient experience; to encourage the correct attitude; and to have the ability to escalate when necessary (Aranyossy, Blaskovics & Horváth, 2018); as well as having the ability to change behaviour, change direction, and deal appropriately with resistance (Ahmad et al., 2021). This is by no means an easy task, due to the differences between people (Ahmad et al., 2021); but a change management model assists the process (Galli, 2018).

In general, leading companies and their project management teams usually have a planned change management guideline for projects, structural change, process or system change, and changes in the roles of staff. There are three tiers to managing change: company, workforce, and planned project. In understanding the different frameworks for managing change, it is imperative to know their use and the fundamental impact of change management (Bekmukhambetova, 2021; Deborah, 2018; Galli, 2018). Change management involves applying a systematic process and interventions in directing the human element of change in achieving the objectives of the organisation; thereby increasing the level of the workforce's skill set (Creasy, 2018).

Change emanates from a company, the project management team, or a person that has identified that change is needed. The intent is to transform the business/process/systems. 'Processes' implies repetition once successfully implemented, and competencies imply that the outputs were effective. In essence, change management is the transformation from the present status quo to the planned and envisaged destination (Ahmad et al., 2021; Chandel & Sharma 2022; Deborah, 2018; Galli, 2018). The leadership of any organisation should be competent in implementing changes in any environment (Guérin, Lebel, Hall & Bussières, 2015). The authors further stated that focus must be on leading, organisational culture, and improving the teams and digital technology at the various levels of the organisation (Guérin et al., 2015).

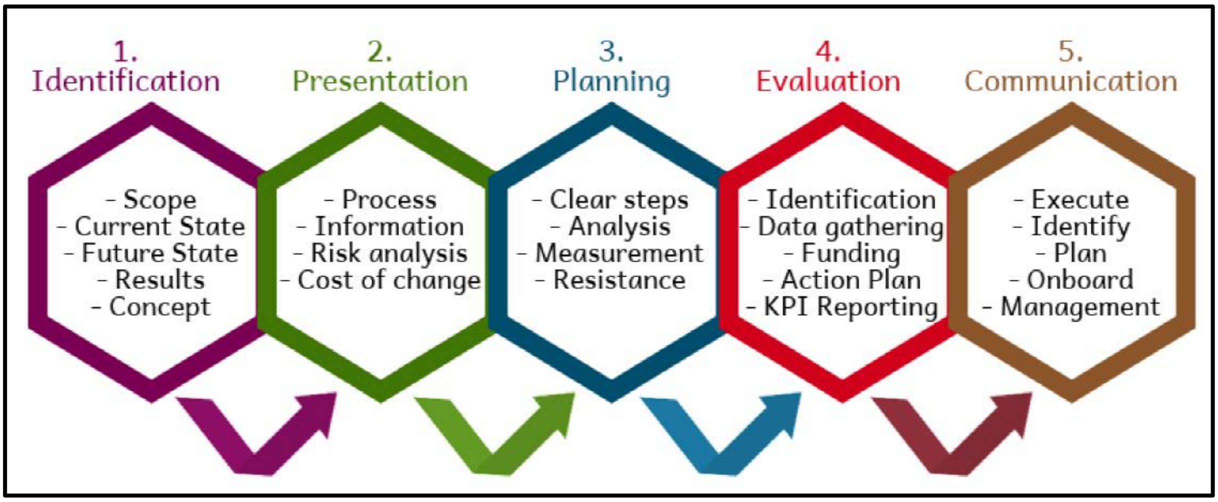


Figure 2.1. A general change management process

Source: (Setyanto, Ikhwan, Amin, Muhammad Shabir & Suharto, 2019, p. 3824)

Figure 2.1 gives an overview of a general change management process from a project management point of view. The company identifies the need for change, establishes the details of the required change, decides on a change management framework, executes implementation of the planned changes and by observing the implemented change, ensures that the objectives of the change management are achieved. The company must be able to recognise the pre-requisites for change; formulate a mitigation plan for resistance; minimise obstructions; and foresee openings in implementing new initiatives (Ahmad et al., 2021). The planning and allocation of resources is very important, as well as the presentation of a clear roadmap for the changes to be effectively implemented (Sulieman, 2018).

In organisational changes where new technologies are implemented, change management is more likely to be effective when the workforce is influenced by their emotions (Kotter & Cohen, 2002). The ability to change the behaviour of the workforce to accept the technology aligned to the changes required will minimise their resistance to change. They must be motivated to embrace change, as the main difficulty is influencing transformation behaviour; hence their feelings need to be influenced through seeing the truth (Ahmad et al., 2021; Chandel & Sharma, 2022; Kotter & Cohen, 2002; Thi, 2021). A sense of urgency needs to be created to sustain transformation (Kotter & Cohen, 2002). Behavioural transformation is assisted by the things that the people can see and feel, rather than by analysing and thinking (Kotter & Cohen, 2002).

2.4 Conceptual framework

The theoretical underpinning of the thesis was developed from a literature review which focused on change management models and theories (Bekmukhambetova, 2021; Deborah, 2018; Galli, 2018; Mahadi, Tamin & Baskaran, 2020), as well as technological adoption (Venkatesh, Morris, Davis & Davis, 2003). These are interrelated, as technological adoption is facilitated by a change management process, which is supported by a change management model. The conceptual framework of this research is captured in Figure 2.2. This conceptual framework guides the study through an understanding of the literature related to the focus of this study. In essence, this framework constitutes the theoretical basis for the analysis of the results from the data collected. The deductive approach will be used to discuss the results from the empirical data.

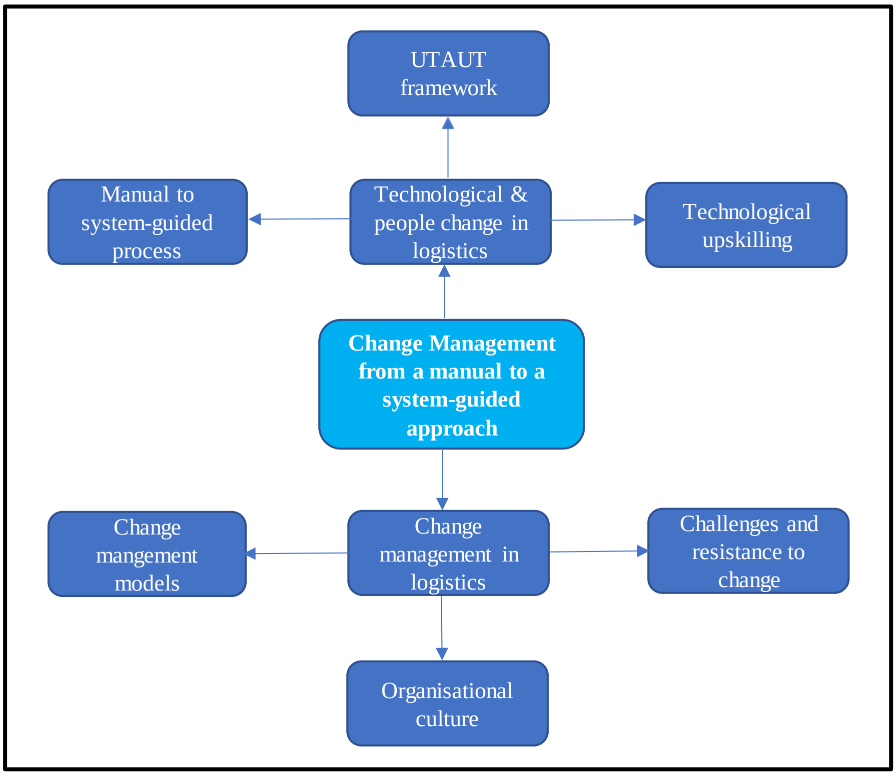


Figure 2.2. Conceptual framework

Source: Author

Figure 2.2 sets out the conceptual framework of this research, which focuses on transitioning from a manual to a system-guided process at the logistics company. This includes the manual to system-guided process, the Unified Theory of Acceptance and Use of Technology (UTAUT) framework, and technological upskilling. The change management deals with the change management models, the culture of the company, and challenges and resistance to change.

2.5 Change management models

The process needs to be defined without ambiguity in order to be more easily understood. In the change process, Kuo & Chen (2019) suggested that it would be wise to acquire information about the competition and related sectors; any challenging situations; possible crises and opportunities; as well as case studies of other organisations (Kuo & Chen, 2019). In bringing together a powerful team to spearhead the transformation, the attention of the leadership should be drawn to the need for the leaders to show their excitement and commitment. Leaders should foster togetherness within the teams to achieve the objectives (Ahmad et al., 2021; Kuo & Chen, 2019; Laig & Abocejo, 2021; Mahadi et al., 2020; Thi 2021).

The aim is to give direction to the transformation efforts and strategy in accomplishing the objectives (Chandel & Sharma 2022). Everyone should be aligned to, and engaged in, using the effective communication methodologies available in order to retain, on an ongoing basis, an outcome aligned to the vision and strategy of the organisation, using simplified communication to facilitate behavioural changes. The aim is also to remove any barriers and to align the processes as well as organisational structure in keeping with the vision. Tangible achievements in changed processes should be highlighted and applauded. Recognition for these achievements should assist in reinforcing the changes. Showing resilience during the change process, which involves a change of behaviour, needs to be reinforced. Ultimately, the new way of doing things should be reinforced and confirmed within policy and procedure (Chandel & Sharma 2022; Kuo & Chen, 2019).

Change varies from organisation to organisation due to the variability of internal factors; hence, the leadership should apply the appropriate change management framework given the context (Schech-Storz, 2013). Change management frameworks are based on different theories. Due to various personalities as well as the corporate culture of various organisations, different views exist (Galli, 2018). Studies on managing change have been underpinned by transforming the organisation and driving efficiencies (Chappell et al., 2016). There are numerous frameworks to manage change (Bridges & Mitchell, 2000; Kanter, 1984; Kotter, 1996; Lewin, 1947; Moran & Brightman, 2000; Pfeifer, Schmitt, & Voigt, 2005; Quinn, 2006). These include the following: Lewin's Change Management Framework; McKinsey 7 S Framework; Nudge Theory; ADKAR Framework; Bridges' Transition Framework; and Kotter's Change Management Model, which are discussed below.

2.5.1 Lewin's Change Management Framework

Change management frameworks that were established and have been available include Lewin's change management framework, as designed by Kurt Lewin (Lewin, 1947). Lewin's Change Management Framework is one of the foundational theories in assisting one to better understand organisational change (Cummings, Bridgman & Brown, 2016; Deborah, 2018). This change management framework is a three-step framework to facilitate planned changes (Lewin, 1947; Rosenbaum, More, Steane, 2018). It entails a first phase which is unfreeze; a second phase which is change; and a third phase which is refreeze (See Figure 2.2) (Belyh, 2019; Deborah, 2018; Galli, 2018; Herzog et al., 2019; Lewin, 1947). Changes are viewed in transitioning from the current state to the envisaged end state, which is supported by force field analysis and team dynamics facilitating the organisational changes (Rosenbaum et al., 2018; Stouten, Rousseau & De Cremer, 2018).

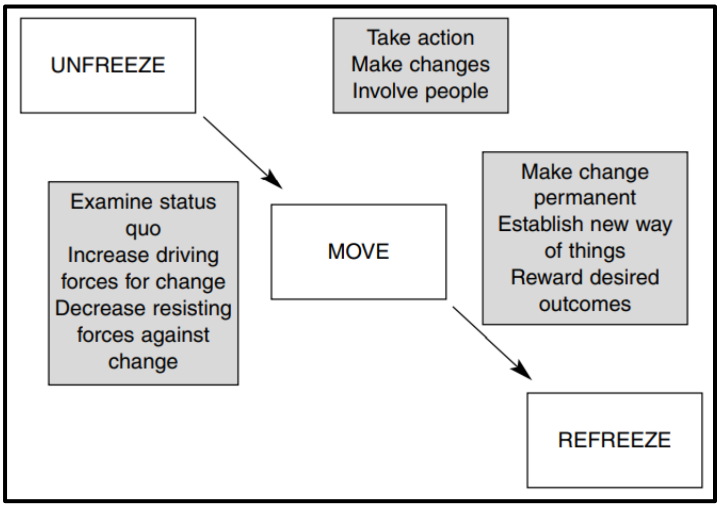


Figure 2.3. Lewin's Change Management Framework

Source: (Lewin, (1947) as cited in Cameron & Green, 2019, p. 111.)

Figure 2.3 indicates the three phases in Lewin's (1947) change management model. The first phase of 'unfreeze' is to examine the status quo, accelerate the drivers of change, and decrease any resistance to change. The second phase is taking the necessary action to drive change involving the people, Lastly, 'refreeze' means that the change should be made permanent, establishing new ways of working, and rewarding achieved objectives (Cameron & Green, 2019).

Burnes (2004) explained the three phases as follows: having an ice cube, when an ice cone is needed instead: firstly, the ice needs to melt so that the necessary change can be applied (unfreeze). The next step is for the liquid form to be shaped into the ice cone (change). The third step is for the cone shape to be maintained, which is the desired objective (refreezing) (Burnes, 2004). This model, according to Rosenbaum et al. (2018), is as relevant now as when it was first developed (Rosenbaum et al., 2018).

The success of organisational adaptation to change is dependent on the type of individuals involved, the kind of change being pursued and the kind of the trading in the organisation. Lewin's theory of change is one of the pillar theories that help individuals to better understand organisational change. A team that works well together is best placed for success due to their dedication and commitment, and by displaying behaviours that perfect changes (Deborah, 2018; Herzog et al., 2019).

Some of the criticism of this model has been that it is simplistic, linear, and a static conception of the organisation as an ice cube (Kanter, Stein & Jick, 1992). Refreezing is not as simple as that in modern times, when organisations need to be adaptable and flexible (Child, 2005). The model seems to be onedimensional, and hence does not identify the other facets that are applicable in understanding all elements of change (Rosenbaum et al., 2018).

2.5.2 McKinsey 7 S Framework

The seven stages involved in this framework are: strategy; structure; systems; shared values; style; staff; and skills. Some of the disadvantages of the model are its interrelationships and interdependence on one another; so being unsuccessful in one part resulted in being unsuccessful in all. This was seen as the greatest disadvantage of this framework. In addition, it is a complex framework in comparison to the other frameworks, and differences were not highlighted; and organisational failures were experienced in some cases (Belyh, 2019; Galli, 2018).

The benefits of this change management framework are that it enables an understanding and acquiring insights into the operation of the organisation; it allows integration of the emotional and practical aspects enabling the workforce to deal with the transition easier; all components are considered for change management without the risk of leaving anything out; and it gives direction to desired change (Belyh, 2019).

2.5.3 Nudge Theory

This model has mainly been accredited to Sunstein and Thaler (2003). Nudging someone or encouraging and inspiring them to change is the essence of this theory. Nudge theory is useful in exploring and gaining an understanding of existing influences, and in explaining them to either eliminate them or to change them positively. In comparison to other existing models, this theory was different and sophisticated in change management (Belyh, 2019; Leonard, 2008).

As an example, the COVID-19 pandemic has been associated with the word ‘nudge’. Nudge theory can be utilised to explore, comprehend, and explain existing influences on how people behave, especially influences that are unhelpful, with a view to removing or altering them. It is a method or concept in behavioural economics, that proposes positive reinforcement and indirect suggestions as ways to influence behaviour and the decision-making of groups or individuals (Huang, 2022).

Another example is that to eradicate unsafe behaviour in the work environment, it is vital that management provides personal protective equipment such as earplugs, masks, and protective shoes.

Furthermore, the nudge principle needs to be established to emphasise safety in the working environment, with the option of process improvement and ensuring effective safety protocols are adopted. Nudge has successfully changed the way people work through administrative controls and making safety behaviour a priority (Prabowo & Syaifullah, 2021).

2.5.4 ADKAR Framework

This model focuses on awareness; desire; knowledge; ability; and reinforcement – refer to Figure 2.4 (Belyh, 2019; Galli, 2018, Stouten et al., 2018). It entails being aware of the needs and requirements for change; the desired outcome to be achieved through the implementation of the necessary changes, as well as participation in it; the knowledge to bring about this change; the ability to incorporate the change on a regular basis; and the reinforcement of the changes that were implemented as the new way of working (Belyh, 2019; Galli, 2018, Stouten et al., 2018).

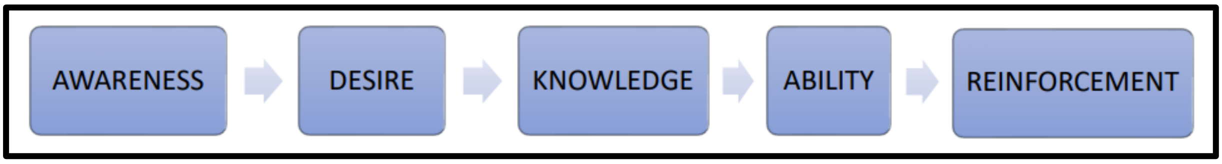


Figure 2.4. ADKAR Framework

Source: (Hamdo, 2021, p.5.)

An example of business processes changes in E-Catalog system implementation in 16 subsidiaries were identified. A change management model that had been utilised in the study was the ADKAR model embracing Prosci methodology. This model is based on the premise that organisational change can only happen when individuals change. The five core elements of the ADKAR model are awareness; desire; knowledge; ability and reinforcement. By illustrating the outcomes for successful change in an organisation, the ADKAR model enables leaders in change management teams to focus on their tasks to maximise individual change to achieve organisational results. It is, however, a complicated process that requires extensive testing and training (Ariestyadi & Taufik 2020).

Information technology (IT) plays a pivotal role in solving business issues in the economy. The most decisive changes that have occurred in the service sector are due to the invention of information technology. According to Fortune Survey 1100, business entities have been accustomed to failure when rolling out a new form of technology. In a study that was conducted, a statistically significant relationship emerged between the dimensions of the ADKAR change model and the technology acceptance model. The success of a change project depends entirely on the desire of an individual to consent, encourage and implement the desired change in the company effectively. This could increase users' level of self-assurance on online business channels and boost the speed of acceptance of the online banking system (Ali, Zafar, Mahmood & Nazim, 2021).

The benefits of the ADKAR Model are its ability to identify and evaluate reasons why changes are unsuccessful, and the desired outcomes are not achieved; it makes it possible to segment the changes and ascertain where the objectives have not been achieved and gives both a business and people view of change (Belyh, 2019).

2.5.5 Bridges' Transition Framework

This model was designed by William Bridges and it entails: stage one – ending, losing, and letting go; stage two – the neutral zone; and stage three – the new beginning (Belyh, 2019; Bridges, 1991; Miller, 2017). It is a three-stage framework with the focus on the end-state (Rosenbaum et al., 2018). Bridges (1991) is of the view that planned changes are a physical movement of changes, whereas transition is about the psychological aspect of people in letting go of the past way of thinking and adopting a new way of thinking and behaviour (Cameron & Green, 2015).

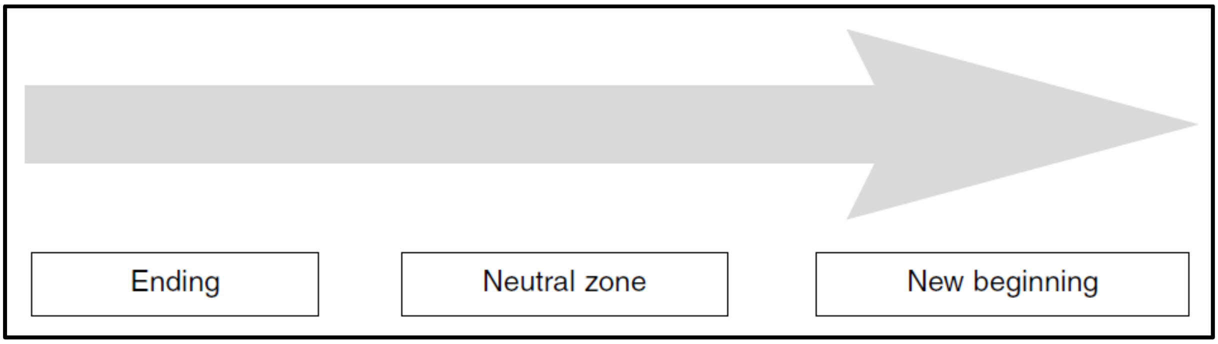


Figure 2.5. Bridges' Transition model

Source: (Cameron & Green, 2019, p.123)

Figure 2.4 indicates the three stage approach to ending what currently is in place in order to start with something new. This requires constant reminders of what is changing. People feel disoriented in the neutral zone and hence there is a decrease in motivation and an increase in anxiety. The final stage is the new beginnings, which should be supported, encouraged, and reinforced. According to Bridges (1991), there are four key elements that assist in making new beginings. These are understanding the purpose of the change; visualising the end state's look and feel; having a detailed plan for this change journey; and knowing where people fit in in achieving the outcome (Cameron & Green, 2019).

The benefits of this model are that it is useful when dealing with unavoidable changes, such as sites that need to be closed, redundancy, acquisitions, and mergers (Cameron & Green, 2019). Ending and beginnings are very real in these situations and the neutral zone is important, however uncomfortable (Cameron & Green, 2019). According to Bridges (1991), change agents should take note that, while they are at the new beginning, the workforce could be still dealing with the ending. This could be frustrating and difficult to handle for managers and team leaders. This happens with this approach to change (Cameron & Green, 2019).

2.6 Kotter's Change Management Model

The change management framework that many academics and change management practitioners' reference is Kotter's Change Management Framework that spearheads changes that are planned (Appelbaum, Habashy, Malo & Shafiq, 2012; Brisson-Banks, 2010; Mento, Jones & Dirndorfer, 2002). This was developed by Kotter through his studies of companies that were unsuccessful in their implementation of change (Kotter, 1995; Kotter, 1996). This resulted in an effective framework that involves eight steps for effective change, and which emerged from Kotter's (1996) observation of unsuccessful implementation of change which revealed, by implication, what was relevant in implementing change (Appelbaum et al., 2012). Kotter advocated that the leader should create sustainable change for a successful and competitive organisation globally (Kotter, 1996).

There are eight steps involved in implementing changes in a company, as shown below in Table 2.1 (Kotter, 1996; Smith, 2005). According to Kotter, the following steps maximise the potential to achieve change that is meaningful (Kotter, 2015): (i) creating urgent reactions; (ii) forming a team to give guidance; (iii) outlining strategic intent; (iv) disseminating the aim of transformation; (v) ensuring that the workforce is empowered for practical application; (vi) achieving quick positive achievements; (vii) aggregating wins and increasing changes; and (viii) reinforcing effective changes in the operations (Chappell et al., 2016; Kotter, 2015). Table 2.1 details the eight steps of Kotter's change management framework with the associated change in behaviour of each step.

Table 2.1. The eight steps for achieving the objectives in change management

Step	Action	New Behaviour
One	Creating urgent reactions	People communicate with each other, "Let's go, we need to change things!"
Two	Forming a team to give guidance	A group strong enough to facilitate a big change is formed and they begin to function together well.
Three	Outlining strategic intent	The guiding teams develop the right vision and strategy for the change effort.
Four	Communicate for buy-in	People start to buy into the change, and this is evident in their behaviour.
Five	Empowerment for action	More people feel enabled to act, and do act, on the vision.
Six	Create short-term wins	Momentum builds as the workforce try to fulfil the vision, while fewer and fewer resist change.
Seven	Don't let up	The staff make wave after wave of changes until the vision is achieved.
Eight	Reinforcing effective changes	New and winning behaviour continues despite the pull of tradition and the turnover of change leaders, etc.

Source: (Kotter & Cohen, 2002, p. 7)

Success in achieving the objectives of change management was premised on an organisation following the model systematically and in sequence (Kotter, 1996). The model (Kotter, 1996) had been designed meticulously, hence it is no surprise that its steps are evident in other frameworks of change management (Brisson-Banks, 2010). Kotter (1996) confirmed that each step builds on the preceding one, so while circumventing some may lead to immediate results, this would not be sustainable for continued success. The follow up research of Kotter and Cohen (2002), suggested that the eight-step model can be divided into three (3) phases: The first phase entails steps one through three – adopting a culture conducive to change. The second phase entails steps four through six – empowering the entire company. The third phase entails steps seven to eight – applying and continuing with changes made (Cohen, 2005; Kotter & Cohen, 2002).

This model was applied effectively in other studies and gained support as a recommended change management model (Baloh, Zhu, & Ward, 2018). There is no agreement on the most critical of the steps that change hinges on. To exemplify this point, Ellsbury et al., (2016) were of the view that step one was most important (having urgency). Other authors had difficulty in maintaining urgency for the course of the implementation (Dolansky, Hitch, Piña & Boxer, 2013), on account of different stakeholders' requirements for individual attention (Baloh et al., 2018). Further difficulty was encountered with step five – empowerment, and with step eight – making changes stick, due to cultural challenges (Baloh et al., 2018).

In reviewing the research with reference to changes in organisations, observations supported Kotter's framework, even though the framework had not been fully investigated (Appelbaum et al., 2012). However, Kotter's change management framework (Kotter, 1996) was still relevant for the effective management of change (Chappell et al., 2016). Kotter's Change Management Model was identified as a popular and recognised framework in transforming organisations (Mento et al., 2002), and as a prudent way for transformational changes to be effected (Nitta, Wrobel, Howard & Jimmerson-Eddings, 2009; Pollack & Pollack, 2015). It is also considered to be the most effective systematic approach for managing change (Phelan, 2005). The Kotter model attracted corporate leadership that had plans to implement change management (Brisson-Banks, 2010). As a result, using qualitative research, Kotter's eight-step framework (Kotter, 1996) is applied in changing the processes. Kotter's eight-step framework was the theoretical framework that underpinned many change management exercises (Chappell et al., 2016).

Kotter (2012) maintains that the first step is imperative in heightening corporate awareness of the need for strategic changes to capitalise on opportunities (Kotter, 2012). Secondly, it is imperative for the effectiveness of change that the team comprises effective leaders collaborating to give impetus to the transformation process. The workforce should know that changes are necessary (Kotter, 1996). In outlining the strategic objectives this will necessitate outlining precise and sensible change management objectives (Galli, 2018). This is required for the alignment of objectives and the team's progress (Calegari, Sibley & Turner, 2015).

In order for changes to be implemented effectively, there needs to be a clear strategic vision (Galli, 2018). The support of the workforce is likely to be more effective once they understand the need for change. In the following step, it is imperative to communicate the strategic vision effectively (Eriksson & Fundin, 2018). Leadership of the organisation and the change management team must be tasked to inform the workforce and teams affected of the objectives of change (Aranyossy et al., 2018). It is imperative that the staff realise the need for change. This is an important step in avoiding staff resisting transformation and for some teams feeling isolated from the process. The next step is about empowering the workforce by allowing them the flexibility to apply innovative ideas and approaches (Ahmad et al., 2021; Galli, 2018).

The workforce needs to be supported to remove barriers to achieving the desired vision (Kotter, 1996). The sixth step is about highlighting the positive achievements of the implementation and the communication of these achievements. Highlighting the effectiveness of the implementation boosts the morale and confidence of the staff in the acceptance of the change process. The short-term wins assist the change management teams in measuring the objectives against the operational execution, and they can adjust their assessment of progress accordingly. The seventh step is about putting together all effective achievements of implementation in facilitating and encouraging more changes. The objective is to continue progressively without being complacent (Thu & Thu, 2022). If the team defaults to previous ways of doing things, this would result in the transformational changes failing. Lastly, actions are related to the changed processes (Galli, 2018). It is important that the objectives are documented and that they are incorporated into policy and procedure, as this is the new way of working (Kanter, 2003).

Irrespective of the change management framework, for it to be effectively implemented there must be effective communication as well as acceptance among the workforce (Cameron & Green 2019; Eriksson & Fundin, 2018; Galli, 2018). Management of the processes is crucial, together with back-up support, intrinsic knowledge, and appropriate resources (Galli, 2018; Mahadi et al., 2020). Due to change management being continual, the change management team should be able to identify all resistance to change factors. If these factors are not identified, this will jeopardise the effective implementation of change which consequently will have a hugely negative financial impact on the organisation. Some factors of resistance should encourage the organisation to reflect on the objectives or plans in order to change parts of their plans (Ahmad et al., 2021; Bayiz, Liu & Butt, 2020; Cameron & Green, 2019; Ik & Azeez, 2020; Kersten et al., 2017; Laig & Abocejo, 2021; Galli, 2018; Rønningstad, 2018).

This also assists the organisation in understanding the strong emotions of the workforce regarding the issues raised and provides a way for them to express their feelings (Ahmad et al., 2021). Kotter's change management framework provides enough information from the start to enable the management to continue the change processes. The lack of a proper understanding of the management of change management frameworks is a contributing factor to failed execution (Aranyossy et al., 2018; Galli, 2018). It is important that the change management leaders apply their thinking to determine the most effective change management model that will facilitate an effective transitional change for the organisation (Rosenbaum, More & Steane, 2018).

Each plan of action has a defined time frame for completion; hence the application of the change management framework must be implemented effectively so that it can be completed within the specified time frame. Kotter's framework simultaneously includes the pertinent representatives of change, who are the interested parties or teams who execute the process effectively by implementing the change management process timeously (Cameron & Green, 2019; Galli, 2018; Thu & Thu, 2022).

Phase 1: Creating the climate for change

2.6.1 Establish a sense of urgency

Every stakeholder has to realise that change is imperative and unavoidable (Teixeira, Gregory & Austin, 2017). The workforce will be resistant to change if not convinced of the reasons which necessitate transformation (Appelbaum et al., 2012). Firstly, one has to create urgent reactions when detecting any difficulties which must be communicated with a change agent/manager/team leader tasked to action step one in Kotter's eight-step framework: 'Establishing urgent action.' This first step is critical in obtaining buy-in. Where there is a relaxed attitude, change is retarded due to a lack of interest in executing the changes. In this instance, where there is a lack of urgency, it becomes challenging to form a team to drive the process, as well as to motivate relevant people to allocate the time and effort required in designing and disseminating the transformation objectives. Complacency in this instance is not appropriate from the team leader's perspective, as the leadership of the organisation needs to communicate the vision of change prior to expecting the workforce's commitment to a major transformation process. (Cameron & Green, 2019; Hackman, 2017; Mørk, Krupp, Hankwitz, & Malec, 2018).

2.6.2 Form a strong guiding team

Team leaders and delegates of other sections of the organisation who can be trusted and have credibility in inspiring a team (Teixeira et al., 2017) constitute a highly motivated and inspiring team to be at the forefront of the change (Appelbaum et al., 2012). Step two is forming a group to guide the processes of change. It is recommended that the group should consist of members who are at the appropriate levels; who have the right skill sets; who have a good reputation; and who can lead the change processes. This group should be trusted and co-operated with to achieve common objectives. It is impractical to expect the chief executive officer (CEO) to follow the magnitude and intricacies of challenges and to cope with the speed of transformation in a modern company. Forming a team to guide the process of change is therefore critical to the success of any change management endeavour (Hackman, 2017). Tangible involvement must be present and evident in the top structures of the company during the transformational processes for the success of the affected changes, and for sustainability into the future. Stakeholders must be solicited from top management structures and staff from site operations (Cameron & Green, 2019; Mørk et al., 2018).

2.6.3 Create a vision

Involving all in a sense of togetherness is important in changing the way forward (Teixeira et al., 2017). What is envisioned in the transformation process must be explained to the staff, together with the rationale and the process of achieving this vision (Appelbaum et al., 2012). Step three is to create the outcome and plan for intended transformation. The author confirms a three-fold implication in creating a vision: it gives clarity on the course ahead and encourages individuals to be a part of the change process, although some individuals may be uncomfortable with this. This assists in the co-ordination of the various stakeholders and encourages them to act with speed and efficiency (Hackman, 2017). The aims and objectives must be clearly stated and communicated. This reduces complexity in the workflow, assists with the motivation of role players and gives structure to stakeholders. Importantly, the relationship between champion-based initiatives and a structured approach to change management is mutually reinforcing (Mørk et al., 2018). Champion-based collaborations are encouraged as catalysts for change actions to be effectively implemented. Critical aspects which encourage information flow in consultation rounds include a standardised rounding structure, allocated responsibilities, and a conducive, co-operative culture which encourages engagement (Cameron & Green, 2019; Lane, Ferri, Lemaire, McLaughlin, & Stelfox, 2013).

Phase 2: Engaging and enabling the profession

2.6.4 Communicate the vision

Stimulating eagerness in those that are directly or indirectly involved promotes their expectations of, and creates excitement about, the changing future (Teixeira et al., 2017). The staff need to be constantly informed of every opportunity and provided with the reasons for, the objectives, and the process of the changes (Appelbaum et al., 2012). Step four is about informing the people of the objectives of changes and of the process that is to be followed (Hackman, 2017). This is the single biggest difficulty when implementing large-scale transformation: the effective and concise communication that states the aims and objectives clearly. Commonly, companies lack the capacity to communicate the transformational processes and to keep moving to subsequent phases (Cameron & Green, 2019; Mørk et al., 2018).

2.6.5 Empower the implementers to act on the vision

Developing effectiveness in the realisation of the goals, notwithstanding the challenges experienced with the implementation (Teixeira et al., 2017), involves including the staff in the process of change, and letting them apply their minds to how to achieve these changes, as opposed to them being resistant to change (Appelbaum et al., 2012). Step five is the empowering of people. Kotter stated that one of the barriers in implementing change effectively is existing systems and structures. If the organisational design is not aligned, it presents a barrier to the required action. Kotter emphasised the need to provide appropriate training as imperative in this step (Hackman, 2017). Encouraging feedback and making suggestions for improvements is important (Cameron & Green, 2019; Mørk et al., 2018).

2.6.6 Plan for and create short-term wins

Every effective step must be celebrated as this stimulates and encourages the team to achieve more, and it increases their capacity to reach the ultimate objective (Teixeira et al., 2017). Every little success must be celebrated as it inspires and motivates the team to achieve the desired objectives through the change process (Appelbaum et al., 2012). Step six is about immediate quick wins. Kotter emphasised the need for following each step consecutively, as it would be difficult to achieve effective results as the progression may not seem to be natural but may appear to be mechanical, laboured, or compelled. This could result in a lack of the energy required to overwhelm the sense of paralysis (Hackman, 2017). A key aspect in transformation is the creation of quick wins that can clearly be seen and linked to the newly implemented processes. Multiple strategies for creating quick wins should be developed. Whilst the implementation is in progress, the executive leadership team should be visibly supporting the workforce of that business unit. There should be internal communication from top management supporting the changes, as well as acknowledging the progress of transformation. The leaders must be available at daily end-of-shift handovers to be supportive of the processes, to educate the workforce, and to remind the staff of the flow of changes in other departments (Cameron & Green, 2019; Mørk et al., 2018).

Phase 3: Implementing and sustaining the change

2.6.7 Consolidated improvements producing more change

In learning from previous steps and applying this across the business (Teixeira et al., 2017), the change champions should evolve through the effectiveness of the change strategies which should empower, motivate and inspire the rest of the team (Appelbaum et al., 2012). Step seven is to build up wins and to encourage further changes. Kotter cautioned against taking one's eye off the process whilst the task remains incomplete, as this will lead to a loss of pace and the changes will slow down. Kotter emphasised that the team leaders need to capitalise on the positive achievements to maintain the momentum to drive change (Hackman, 2017). To facilitate the sustainability of the changes, the changed behaviour must be encouraged into the new way of working in that specific organisation (Kotter, 1995). Collaboration of the team leaders and the developmental framework must be effective factors in implementing these initiatives. Effective, historical change management encourages the workforce to envisage transformation and cultural adaptability. The wins must be effectively consolidated, and the champion model must be widely accepted as an effective framework for transformation, given the complexity of the unit characterised by a significant level of unpredictability. As there is progression through the quality initiatives, there should be fewer opinions opposing the transformation, indicating that previous quick wins create a momentum for future change (Cameron & Green, 2019; Mørk et al., 2018).

2.6.8 Institutionalise new approaches

It is important that the workforce know and understand the new way of working. This should contribute to their change in behaviour, and is critical for the effectiveness of change management (Cowan, Fitzpatrick, Roberts & While, 2004; McCallin & Frankson, 2010). Effective standard operating procedures (SOP) and an adequately trained workforce are keys to effective policy implementation (Kuo & Chen, 2019). The changes should be a part of the SOP, the operating working documents (OWD), and company policy, to enforce compliance with the changes (Teixeira et al., 2017). Of significant importance in the sustainability of the changes that are implemented is the need for these to be institutionalised. If this is not done, it would render the entire change process ineffective and the process would be a waste of time, as the workforce would default to previous practices in the way things were done (Appelbaum et al., 2012; Cameron & Green, 2019).

Step eight is making the changes daily practice and policy, which is a critical step in the effective sustainability of the changed processes. Irrespective of the efforts behind the changes, sustainability is dependent on the organisational culture, people's behaviour patterns and company values, which should be changed according to the new way of working. There are changes that occur at the start of the change management processes of behaviours and approaches. However, the main step is about entrenching these changes in the organisational culture, which can only be done at the end. Kotter confirmed that this entailed effective communication in convincing the workforce of the relevance of the changed processes, by providing evidence of the outcomes showing the effectiveness of the changes implemented and, to some extent, also convincing the key personnel (Cameron & Green, 2019; Hackman, 2017).

Kotter maintained that authentic organisational cultural changes occur when wins are tangible, effectively communicated, and tested. Positive feedback from the unit staff is needed in order to anchor these changes into the company way of working (Mørk et al., 2018). In ensuring sustained change, all new staff members should receive information about the quality initiative during the initial employee interview and in early meetings with the leadership. The managers should reinforce and model the quality initiative during employee orientation (Mørk et al., 2018).

Kotter's change management model is one of the most popularly used models in the world (Appelbaum et al., 2012; Belyh, 2019). This change management framework guides implementing and directing changes that are ahead of the organisation (Baloh et al., 2018). Identified benefits linked to using Kotter's change management framework are: providing a step-by-step framework can be followed by an organisation with relative ease, and to adopt it; and the idea of accepting the change and preparing for it (Belyh, 2019). Hence, the attitude and experience of the workforce are critical components of change effectiveness. Through training and development, the workforce's knowledge and attitudes will influence the transformation within the company and in each member (Kuo & Chen, 2019).

The benefits of Kotter's eight-step model are that it is a framed step-by-step model, which makes it easy to follow and incorporate, and it encourages the acceptance of change and preparing for the intended changes (Belyh, 2019). Disadvantages of this framed step-by-step model, which follows a sequence, are that a step cannot be skipped to progress to the one thereafter, and the time-consuming nature of the complete process (Belyh, 2019).

2.7 Organisational culture

According to Schein (1990), culture is the behavioural patterns that a group of people has formulated, conformed to, or developed and adapted to, as learning was experienced while coping with the challenges externally and integrating them internally. These behaviour patterns have sufficed and are workable and valid in that it can be expected of new recruits to adapt, as the correct way to perceive, think, and feel in the context of those challenges (Schein, 1990).

Existing behaviour patterns reflect the organisational culture that is prevalent. In a change management transition, the required behaviours need to be emphasised and the appropriate culture reinforced (Cameron & Green, 2019). This encompasses organisational life as a whole and is not confined to induction programmes. It is of vital importance for the organisation as it has an impact on the workforce and ultimately organisational performance (Cameron & Green, 2019).

For corporate culture to be understood, it is important to understand the characteristics of the corporate culture (Molenaar, Brown, Caile & Smith, 2002). Some of the most prevalent cultural characteristics are stated by authorities in the field of culture. Corporate culture represents behaviours that new employees are encouraged to follow (Kotter & Heskett, 1992). Standards are created for acceptable behaviour (Hai, 1986). It reinforces ideas and feelings that are congruent with the company's belief system (Hampden-Turner, 1990). The external relationship of the organisation is influenced by it, as well as the internal relationships of the workforce (Hai, 1986). Organisational culture has a powerful impact on people and performance (Kotter & Heskett, 1992). It influences employee motivation and goals (Hai, 1986). Behaviours associated with innovation, decision making, communication, organising, measuring performance, and rewarding achieved objectives are affected by corporate culture (Hai, 1986).

According to Schein (1990), it would be a challenge for an organisation to have a cultural shift if they begin with that specific idea in mind. It must start with the issues that are encountered by the organisation. He further adds that it must not be seen that the existing culture is completely misaligned and bad, as this would demotivate people. Culture must be viewed by its leadership as a source of strength. The cultural elements that are misaligned need attention and should be changed accordingly, as opposed to trying to change the culture completely. Corporate culture must always be aligned to the organisational vision, mission, and objectives, creating a sense of urgency and continually reinforcing the need to change (Carvalho, Sampaio, Rebentisch, Carvalho & Saraiva, 2019). The leadership and team leaders must pay attention to stakeholder issues; take note that the 'how' is as important as the 'what'; use the strengths to develop further; and transition into the new. They must create enabling mechanisms; be role models; establish a community of focused and flexible leaders; and encourage all stakeholders to take ownership of the changes (Cameron & Green, 2019; Schein, 1990).

2.8 Challenges and resistance to change

As resistance to change often occurs in most management projects, the type of leadership will act as a catalyst to determine the rate of change in organisational behaviour. This is a fundamental challenge as it is a human phenomenon. Resistance to change is due to fear and uncertainty and the need for job satisfaction (Bayiz et al., 2020; Laig & Abocejo, 2021; Lambrechts, Klaver, Koudijzer & Semeijn, 2020). Resistance to change is experienced as the workforce anticipates job losses due to technology automation replacing human labour. Hence, the transition can be interrupted (Gupta, 2020).There is an inevitable challenge for human resources of any organisation to continually conduct change management and thus maximise improvement. Employees in the organisations are more likely to adapt to changes that management desires, only if they are ready and willing to change. Employees who are satisfied with their jobs and the company's benefits readily adapt to change management for the better (Bayiz et al., 2020; Laig & Abocejo, 2021; Lambrechts et al., 2020).

Previous studies highlight that transformation is underpinned by the following factors: the anxiety of surviving has to transcend the anxiety of developing; and there has to be a reduction in the anxiety of learning as opposed to increased anxiety to survive (Cameron & Green, 2015). The anxiety to survive is the propelling driver and the anxiety to develop is the restricting factor. It is recommended to reduce the anxiety to develop, which is the restricting factor in the processes, by clearly stating the future that is anticipated; sharing the plan for structured development; providing on-the-job training; sharing details regarding projects and assignments pertinent to the job groups/teams; exposing effective team members to further training; creating collaborative teams; structuring environments; and looking and learning, as well as having experiential learning opportunities (Cameron & Green, 2015). The transformation of the organisation, due to technology, should reduce the need for middle management and should move in the direction of highly paid specialist staff (Ali et al., 2021; Drucker, 1998).

The literature assists the company management to keep to the vision and objectives by applying the change management model, particularly prior to management becoming preoccupied with the precise details of the change management framework's execution (Galli, 2018). Tactical and functioning transformation remains ongoing for competitiveness. A two-way approach from management to the shop floor and vice versa is crucial for effective communication in understanding the expectations of the company, and the employees can communicate the challenges as well as potential barriers (Mahadi et al., 2020). Defined and structured objectives assist the transformation process. The converse would be detrimental to the implementation of change management. The leaders need to be well trained with respect to preparing them to face the different facets as well as to the desired outputs to be achieved. Insufficient training for leaders, or skills and supervision, are huge concerns for change management implementation. Appropriate development of the leadership would enable them to focus on effective management of the different aspects, the information, and framework, instead of specifically on profitability and cost management (Ahmad et al., 2021; Chandel & Sharma 2022; Galli, 2018; Laig & Abocejo, 2021; Mahadi et al., 2020; Thu & Thu, 2022).

Allocation of finance and whatever else is required, if not adequate, could restrict the company's change management effectiveness (Mbuvi et al., 2016). If the focus is on immediate challenges this can affect the sustainability of the programme in the longer view (Galli, 2018; Sulieman, 2018). Given the complex nature of companies and their footprints, this can result in unplanned factors emerging; leaders must take cognisance of this and respond systematically by taking a holistic view (Clancy, 2018).

Management is required to take the lead and to work together, which are crucial functions. The managers' capacity to shadow and lead skill sets in all the teams enables them to recognise challenges (Ahmad et al., 2021). Analysing the gaps and setting the standards, in order to establish change requirements and challenges in view of best practices, will remain a challenging task (Chandel & Sharma 2022). Correlation of frameworks and elements, as well as resources outside of the scope of change management, is not easily integrated. Therefore, being aware and cultivating caution is important for the integration of the different change management frameworks (Galli, 2018). Consideration for team members transcends that which is extended to individuals. Group leaders of projects and companies give guidance and input into the contents of the training. Fundamentally, there needs to be an understanding of the alternatives available (Bekmukhambetova 2021; Galli, 2018).

The measurement of outputs leads to effective management. This is over-and-above monitoring mechanisms and key performance indicators. Importantly, subject matter expertise and competence is critical in achieving the desired objectives. The outputs of all the relevant stakeholders must be aligned to the overall outputs of the organisation (Chandel & Sharma 2022). Alignment of these targets, together with the objectives of change management processes, are critical processes. Caution must be exercised in the implementation of change management frameworks when sluggishness is evident. Considering too many factors whilst preparing may lead to procrastination in change management implementation (Galli, 2018).

Consequently, encouragement and cognisance of the emotions of the staff need to be carefully watched (Ahmad et al., 2021). The authors confirmed that the fundamental challenge with the implementation of the eight steps to change management was related to the change of people's behaviour as opposed to strategic thinking, structures, organisational cultures and systems (Kotter & Cohen, 2002). It remains a key challenge since the framework was introduced (Appelbaum et al., 2012). A barrier to change is considered to be anything that could hinder or slow the implementation of transformation (Guérin et al., 2015).

Challenges arise from resistance from those affected by change and also the role the leadership in the company. There are four factors that contribute to these challenges: change fatigue; resistance by individuals; management indecisiveness; and not applying discretion (Rønningstad, 2018). Other factors are a lack of, or ineffective, leadership; communication barriers; fear of the unknown; difficulties than cannot be justified (Mahadi et al., 2020); a lack of planning and resources in dealing with the impact of change, both within and in the external business environment; and the inability to find solutions when challenges are faced in change management (Sulieman, 2018).

2.9 Critical review of the change management models

The aim of research is to increase knowledge, and extract studies and historical references to change management frameworks. This gives detailed insight into the different factors impacting change management. It can be concluded that these are value add-ons to the subject of change management (Galli, 2018). For transformational changes to be effective, it is recommended to utilise a conceptual framework to facilitate change strategically (Mørk et al., 2018). There is no consensus on the leading change management model (Wentworth et al., 2018).

2.9.1 Analysis of the change management models

The ADKAR model was introduced in 2006. Hiatt (2006) supported resistance to change could be supported through the five stages of the ADKAR framework (Hiatt, 2006). This model has been criticised for its focus being on the people-change aspect and not on the change itself (Bekmukhambetova, 2021; Hiatt, 2013). This model is said to be more suited to integration of the management concepts in the process of change management (Siddiqui, 2017). The success of a change process depends entirely on the desire of an individual to consent, encourage and implement the desired change effectively in the company (Ali et al., 2021). The comparison of ADKAR and Kotter's framework - refer to Figure 2.6, shows that awareness aligns with urgency of change, desire aligns with effective coalition, change vision, and vision sharing. Knowledge and ability align with empowerment. Reinforcement meets short run wins, establish on change, and make change stable (Hamdo, 2021).

ADKAR	Kotter's Model
Awareness	Urgency of change
Desire	Effective Coalition
	Change Vision
	Vision Sharing
Knowledge	Empowerment
Ability	
Reinforcement	Short run Wins
	Establish on Change
	Make Change Stable

Figure 2.6. ADKAR compared to Kotter's model

Source: (Hamdo, 2021, p.9.)

Similarly, the comparison between ADKAR and Lewin's models - - refer to Figure 2.7, indicates that awareness and desire are aligned with unfreeze, knowledge and ability are aligned with change, and reinforcement is aligned to refreeze (Hamdo, 2021).

ADKAR	Lewin's Model
Awareness	Unfreeze
Desire	
Knowledge	Change
Ability	
Reinforcement	Refreeze

Figure 2.7. ADKAR compared to Lewin's model

Source: (Hamdo, 2021, p.9.)

Change management in the modern business context, identify the human capital as the key asset in any organisation (Hamdo, 2021). Hiatt (2006) has highlighted that the first four pillars of the ADKAR model point to the importance of heightened employee engagement in the change management process. This is an important factor for a successful change management transition (Hiatt, 2006). The human dimension has been considered in all models; however, the ADKAR model has the most focus on the human dimension (Hamdo, 2021).

McKinsey 7 S Framework is more complex in comparison to other models. This model does not have a high success rate as a change management model (Anastasia, 2015). There needs to be alignment of each pillar of the framework to ensure consistency so that the strategic intent of change is attained. In this framework, there is no clear process to manage the change notwithstanding the intensive focus on the human dimension of the organisation (Hamdo, 2021). These are staff, skills, and style which are important aspects of the framework. However, the McKinsey 7 S framework are integrating both the soft and hard dimensions of the organisation hence the change management agent must take a complete view of the company's change (Waterman, Peters & Phillips, 1980). Mckinsey's 7 S model is more suited to determining the organisational areas where the change should be conducted (Hamdo, 2021).

The Nudge theory has limited recommendations, with value in implementing administrative controls and safety-related behavioural prioritisation (Prabowo & Syaifullah 2021). Nudges are psychologically designed tools that encourages change in behaviour (Lin, Osman & Ashcroft, 2017). The ineffectiveness of nudges stems from people lacking insights of nudges being able to influence behaviour of people (Loewenstein, Bryce, Hagmann & Rajpal, 2015). According to Lin et. Al (2017), there is a lack of engagement with the decision maker on a level that will motivate them to reconsider the basis of their decision making that will influence their choice of behaviour. This is aligned to Loewenstein et al.'s (2015) view of level of insight of nudges that are designed to influence their behaviour. The design of nudges is to influence choice behaviour and not restriction in terms of options. Their right to choose is intact but the nudge is designed to promote the option that is more beneficial in the longer term (Sunstein, 2016; Thaler & Sunstein, 2008).

Bridges' Transition Framework is useful when dealing with unavoidable changes such as site closures, redundant operations, acquiring businesses, and mergers (Cameron & Green, 2019). People need assistance to deal with their losses during this first phase of the change management process. As people are ending the old and contemplating the changes ahead, is the second phase which is the "neutral zone". The third phase is the phase that the people realign psychologically and repatterning take place. They embrace new beginnings after the transitioning, new identities are developed, new energies are experienced, and new sense of purpose is discovered which embeds the changes (Bridges, 2009; Miller 2017).

Lewin's model is more suited to planned change but is not recommended for unexpected change (Rajan & Ganesan, 2017). Some argue that Lewin's model does not consider the aspect of power when it comes to organisational conflict (Bekmukhambetova, 2021; Dawson, 1994). Further critical argument is that Lewin's model supports the top-down management style (Bekmukhambetova, 2021; Dawson, 1994). Lewin's, ADKAR, Kotter's change management models consider the three main stages of the change process which are: recognition of the importance of change, transitioning, as well as change achievement and sustainability of the change (Hamdo, 2021).

Steps one-to-three of Kotter's model seem to be aligned to the first stage of Lewin's model, which is the 'unfreezing stage'. Steps four-to-six, it is suggested, are aligned to the next stage of Lewin's model, which is the 'moving stage'. Steps seven and eight are considered to fall within the final stage of Lewin's model, the 'freezing stage'. Refer to Table 2.2, which reflects these comparisons.

Table 2.2 Comparison of Lewin and Kotter's theories of change management

Author	First phase of change	Second phase of change	Third final phase of change
Lewin (1947)	Unfreezing phase	Moving phase	Freezing phase
Kotter (1995)	(1) Establish a sense of urgency	(4) Communicate the vision improvements and produce more change	(7) Consolidate
	(2) Form a powerful guiding coalition	(5) Empower others to act on the vision	(8) Institutionalise new approaches
	(3) Create vision	(6) Plan for and create short-term wins	

Source: (Cummings 2016, p.42).

Kotter's eight-step framework has frequently been applied, due to the model being adaptable to the company's design, as well as it being able to take into account the various responses from the workforce (Bridges, 2003; Kotter, 2012; Schein, 2004). Several authors have suggested that Kotter's eight-step framework should be applied in change management (Banerjee et al., 2019; Belyh, 2019; Cameron & Green, 2019; Thu & Thu, 2022; Tsuyuki & Schindel, 2008). Kotter's eight-step framework is recommended based on its clear and easy application (Small et al., 2016). Research confirms that Kotter's eight-step framework is a recognised and widely accepted change management model (Banerjee et al., 2019). In the logistics environment, there is a short lead-time for customers to receive their orders. Hence, urgency in implementing change must be a high priority (Kersten et al., 2017). It can be concluded, according to Thu & Thu (2022), that any project can be successful if the change process is evaluated by, and associated with, Kotter's steps (Thu & Thu, 2022).

2.10 Empirical evidence

Below are three case studies of change management that applied the Kotter's (1996) change management model.

2.10.1 Kotter's Change Management Framework applied in a social system

The researchers of another study involving the resolving of complex community issues within the social system utilised Kotter's Change Management Framework effectively. Their study established multiple characteristics responsible for its effectiveness. Amongst these were a realistic time period; evidence supporting the strategies; sensitivity to culture; ongoing campaigning; goals that could be measured; financial support; a tested change management strategy; and distinctive leadership (Caulfield & Brenner, 2020).

2.10.2 Kotter's Change Management Framework applied in a health care environment

The authors in another study supported Kotter's model as the change management framework of choice for the healthcare environment. The study tested the use of Kotter's eight-step change management framework for the change to a certified process. The results in that study confirmed that Kotter's model was proven to be an effective framework in supporting the change management process successfully (Kuo & Chen, 2019). The use of Kotter's model for transformation in preparing the nursing workforce and leadership to anticipate challenges and to find creative solutions, proactively, in ensuring a dynamic, continual process was successful. More importantly, the Kotter model served as a powerful guide by recognising the need to allow adequate time for each phase of the changing processes to take place (Mørk et al., 2018). As pointed out above, Kotter's model for leading change (Kotter, 1996) was recommended for implementation in a step-by-step approach (Mørk et al., 2018).

2.10.3 Kotter's Change Management Framework applied in the implementation of a quality initiative

It was recommended that a conceptual framework to organise strategic implementations should be utilised for an effective change management process (Titler, 2007). Kotter's eight-step model for *Leading Change* (Kotter, 1996) was recognised as an effective change model applicable in various environments. Kotter's framework details a number of sequentially organised steps that underpin and facilitate sustained change (Mørk et al., 2018).

Quality initiative in another study at a health care facility was implemented effectively and this was attributed to the methodically planned processes, as well as to the mutually reinforced activities supported by team leaders. The effectiveness of the changes implemented in a complicated intensive care unit (ICU) was attributed to following each step of the change management framework that Kotter advocated; team leader involvement; taking ownership; and the process being supported by the nurses' leadership. This framework adequately prepared the workforce at the ICU, as well as the leadership, to identify potential challenges in advance, enabling them to be proactive in finding creative solutions and to ensure continuity. More importantly, Kotter's Change Management Framework was a useful guide in allocating adequate time, necessary for every step of the change management transition (Mørk et al., 2018).

2.11 Chapter summary

This chapter covered the theoretical framework for change management in organisation during a transition. Thereafter, Lewin's Change Management Framework; the McKinsey 7 S Framework; Nudge Theory; the ADKAR Framework; Bridges' Transition Framework; and Kotter's Change Management Model were discussed. Then followed a discussion on organisational culture, resistance to change, challenges with change management, and the factors for effectiveness. Finally, there was a critical review of the change management models discussed earlier. Chapter Three is the second literature review chapter and covers technological changes underpinned by the 4IR.

CHAPTER THREE: LITERATURE REVIEW: TECHNOLOGICAL CHANGE

3.1 Introduction

In this chapter, technological change underpinned by the Fourth Industrial Revolution (4IR) is discussed. Thereafter, the Unified Theory of Acceptance and Use of Technology (UTAUT); the required skills necessary for the technological change; work enablers; the development of the workforce; and empirical evidence from the literature are discussed.

The 4IR has its roots in the actions linked to German authority which were viewed from the perspective of the United States with reference to web-based industrialisation (Gröger, 2018). The 4IR was referred to in German-speaking areas as Industrie 4.0. In other areas, General Electric referred to the Industrial Internet and similar concepts such as Integration of Business, Agile Business, or Agile Production. This was a world-wide trend, occurring concurrently in Germany (Industry 4.0); France (la Nouvelle France Industrielle); Sweden (Produktion 2030); Italy (Fabbrica Intelligente); Belgium/Netherlands (Made Different); Spain (Industria Conectada 4.0); and Austria (Produktion der Zukunft), where interests were activated. In the United States (Industry Connected 4.0), as well as in China, production industries had embraced the unavoidable phenomenon to facilitate their strategic objectives (Ślusarczyk, 2018).

The 4IR was the development of a digital and automated production environment, together with a creative digitised value chain that facilitates interactions amongst items, with its surroundings, and with supply chain participants (Lasi, Fettke, Kemper, Feld & Hoffmann, 2014). It has been stated that 4IR, is an all-embracing concept of digital technology, as well as an idea for value-added industries (Hermann, Pentek & Otto, 2016). In summary, the 4IR is the integration; adaptation; optimisation; service offerings; and the equivalent production processes, that correlate with algorithms, large information, and advanced technology (Lu, 2017).

3.2 Technological change: Fourth Industrial Revolution (4IR)

The 4IR, also known as i4.0 and information analysis fourth generation (i4.0), are commonly used terms referring to the coming industrialised genesis of benefit extraction leveraged from extensive engagement with web-based objects, digital technology, and computerised hardware. This was referenced as 4IR post-computerisation, electrifying data to promote information availability via the internet and having digital technological connectivity-encompassing systems, as well as articles in an organisational benefit supply model. The aim was to achieve optimisation of products as well as processes, with significant improvement and agility in productivity, and to innovate on service offerings (Gröger, 2018).

The advance of digital technology worldwide, with abbreviations such as 4IR and i4.0, has included the assimilation of various items of self-controlled digital technology, a source of information as well as electronic identification, and automatic manufacturing processes (Dalmarco, Ramalho, Barros & Soares, 2019). The 4IR has had a significant impact on government sectors, corporates, and financial sectors in so far as speed of development and execution is concerned, not confining itself to one area, but encompassing multi-dimensional technological advancements and revolutionising entire systems. Its impact has been on both businesses and economies. Economies that up-skill and reskill the workforce will be successful. Governments will have to prepare and enable the masses through legislation (Schwab, 2015).

The 4IR is the driver that underpins the modern economy, as creativity and advanced technology influence all companies. This new revolution has had a profound impact on the innovation of product and manufacturing systems in the design, processes, supply chain and services (Ślusarczyk, 2018). Globally, the concept of 4IR has posed challenges for organisations. It is widely accepted that there are many opportunities for improvements and competitive advantages; notwithstanding the varying levels of readiness for implementation in countries, industries, and individual organisations (Ślusarczyk, 2018).

The idea of the 4IR had been characterised by a blurred distinction between the work of humankind and that of robots. While the first Industrial Revolution resulted in operational improvements in manufacturing, the second electrified industries, and the third introduced automation in tasks performed by the workforce, the 4IR impacts data management and decision-making (Ślusarczyk, 2018).

Together with the IoT, it facilitates orders, manufacturing, execution, and delivery of the products without human intervention during the process flow. Organisations that do not want to be excluded from the future economy, must invest in advanced technology and in management models in order to reach new consumers and new members of the workforce (Ślusarczyk, 2018).

In the beginning of 2017, Bill Gates argued that there should be a tax on robots that will replace human jobs. He stated that governments had a responsibility to retard the speed of automation due to the potential of mass unemployment (Younus, 2017). Mignon Reyneke is an authority on digitised marketing, based at the University of Cape Town, Graduate School of Business. She stated that it was evident that there were fears that the introduction of new technology that was leveraged from the web using IoT will contribute to reducing employment as technology increasingly replaces labour (Reyneke, 2019).

The effects of technological advancement are already being experienced in the lack of job creation and remuneration in traditional sectors, as opposed to technological industries. The beneficiaries are those who are capitalising on the developing technologies and who are in and around high-wealth, high-income innovation hubs. Conversely, blue-collar jobs have decreased, leading to higher unemployment and increased levels of poverty (Younus, 2017). From an African perspective, digitalisation has the potential to create new opportunities for the enterprising and to stimulate inclusion (Reyneke, 2019).

It was reported that in the developing world, two-thirds of all jobs are said to be at risk due to automation and robotics. This can be exemplified in the manufacturing sector in the US, where 15 million were employed at the beginning of this century. In 17 years, this had been reduced by 3 million, although manufacturing output increased by 30%. Foxconn in China replaced 60,000 employees with robots (Younus, 2017).

Robotics are taking over from the current workforce and automated systems and processes using artificial intelligence are replacing service-sector jobs (Younus, 2017). It is predicted that one third of all jobs that currently exist will be replaced by smart technology, artificial intelligence, robotics, and algorithms (STARA) by 2025 (Brougham & Haar, 2018). Existing jobs that can be digitised and automated will become redundant (Corejova & Chinoracky, 2021).

The 4IR has indeed posed a risk to job security and needs to be managed effectively as the impact could be that of large-scale unemployment which will lead to inequality and social unrest. According to Kumeshnee West, at the University of Cape Town's (UCT's), Graduate School of Business (GSB), there are three fundamentals that managers and leaders should be equipped to face in the 4IR: workforce talent will be imperative, as opposed to capital; the flexibility of education will be important; and compatibility between education and business will be essential (West, 2018).

The 4IR has the potential to disrupt all industries, locally as well as globally, with the implementation of new technologies, large scale data and artificial intelligence. There is a certainty that current jobs, as well as the skills needed to perform these jobs, are changing rapidly. It was reported by McKinsey that automation will affect a third of the functions of 60% of jobs by 2030. This will, effectively, impact negatively upon approximately 375 million workers worldwide who may have to find alternative careers and develop alternative competencies. According to the World Economic Forum (WEF), this may result in sacrificing more than seven million careers, of which 75% will be in clerical/support functions (West, 2018).

Research at a leading university in London predicted that a little over 45% of American jobs will be affected by digitalisation as automation and computerisation are not restricted to routine manufacturing tasks. Large scale data and artificial intelligence have an impact on the different complex functions which are executed by computers (West, 2018). All is not doom and gloom as the importing of technology into the workplace, although it places current jobs at risk, will also create new jobs and new industries. The particular challenge will be in ensuring workers are up-skilled for these new jobs and for moving into different jobs in order to adapt to this transformed digital technological age (West, 2018). The World Bank was of the view that digital transformation will contribute to growth of up to 2% annually, with opportunities being created through creativity (Reyneke, 2019).

Throughout Africa there are challenges and opportunities that need to be leveraged through digitalisation to create novel items and value-added offerings, as well as industry frameworks with improved customer satisfaction levels with a focus on potential demand (Reyneke, 2019).

For a better transition to digitalisation in existing organisations, 4IR ideally includes collaboration with the supply chain sector (Dalmarco et al., 2019). The lack of training and development has been identified as one of the key challenges in 4IR; as well as the need to address factors that influence the workforce's resistance to change; challenges with securing suitably qualified workers; the inability to be creative; and a lack of ICT implementation skills. It also highlights the lack of investment capacity as a barrier to the implementation of 4IR (Karadayi-Usta, 2019). It would be most appropriate for a worker in the 4IR to have special skills or the right education, but the repercussions of exponential developments in technology will result in many people not advancing, as technology, artificial intelligence, as various technological advancements rapidly replace common work knowledge (Brynjolfsson & McAfee, 2014). There is huge concern that education and labour in Africa are not prepared for the changes as a consequence of transitioning into the 4IR (Reyneke, 2019).

The Internet has been a source of real-time information about things and the web-based applications, known as the IoT, have been introduced in the business world. It has enabled efficiencies, accuracy, and economic benefits; the users have become more agile and responsive; and it has produced related competitive advantages. By 2020, it was estimated that the IoT had incorporated about 30 billion objects (Crabtree, 2018), and by 2025, it is estimated that the IoT will incorporate about 75 billion objects (Hodgdon, 2021). The APICS dictionary records IoT as a place where things, creatures or humans are given individual identifications to enable them to transmit information electronically with minimal intervention. Items will be identified and recognised on the internet centrally, thereby facilitating interaction with technology and the material environment (Crabtree, 2018).

It has been suggested that all supply chain functions, processes and systems should be speedily engaging to leverage the benefits of digitalisation. Organisations are being forced to rethink business processes as digitalisation continues to displace traditional networks, and leads to data deluge, which affects all supply chain elements (Shukla, Goel & Vasudevan, 2018). Digitalised end-to-end solutions are now designed to leverage the IoT. These capabilities leverage internet connections and integrated systems, as well as information capabilities through smart devices and the IoT, which is defined as a place where things, creatures or individuals' identification enables them to transmit and receive information electronically with minimal intervention (Shukla et al., 2018).

This enabled visibility and central control over the internet provides the opportunity for collaboration between the material globe and technology. Its business value extraction led to the 4IR. Progressive organisations will increase value and turnover through IoT by creating innovative business models and through increased efficiencies, leveraging analytics for continual improvement and transformation of their workforce. Accenture reported that the global gross domestic product (GDP) could, potentially, grow to $12 trillion by 2030 if growth is accelerated unconventionally through the capabilities of IoT (Shukla et al., 2018).

The supply chain is vital in an organisation's operation. Improved and informed decision-making requires instant accessibility to information, which is currently limited by legacy technology, hence restricting end-to-end transparency. There has been a disruption in traditional systems and processes which have been replaced by digital technology with the potential to overhaul the entire supply chain management. In the short term (five-to-ten years), there is a very real possibility of supply chain functions becoming obsolete, to be replaced by advanced technology which optimally manages all the processes and reduces any physical input (Lyall, Mercier & Gstettner, 2018).

Digitalisation will increase analytical capabilities in understanding consumer expectations and competitor activities. It has the ability to dictate market-place demand for goods and services which did not exist previously (Shukla et al., 2018). Cisco Systems reported that companies that are innovative are embracing the potential of Industrial IoT and Digitalisation. About 33% of the market has already adopted the IoT and digitalisation. About 52% of companies have not invested in digitalisation and, hence, risk being disrupted. It was asserted that this disruption will affect about 40% of companies over the next five years (Shukla et al., 2018; Song et al., 2021).

Digitalisation has the capability to improve the accuracy of forecasting through increased data dissemination and statistical analysis. In the digital world, where reliable data is readily available, production plans and customer requirements can be executed with speed. Also, this visibility and real time tracking will increase risk management and threat assessment (Shukla et al., 2018). IoT and digitalisation will become the way of life and will enable dynamic decision-making; new governance models will be designed and implemented; and the workers' roles will be enhanced. Collaboration is imperative during this transformation, as technologies offer an extraordinary level of co-ordination among team members, notwithstanding their locations (Nagy et al., 2018; Shukla et al., 2018).

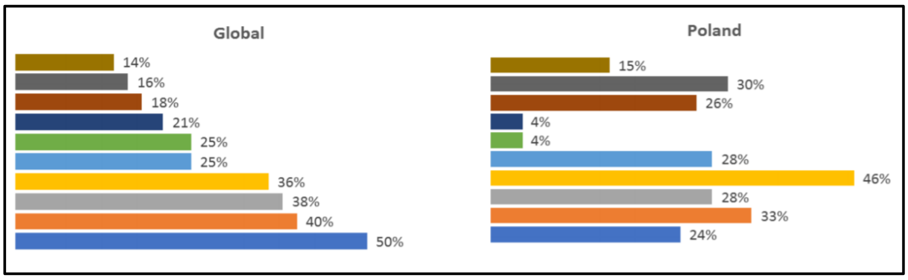
Digital foundations will enable companies to capture, analyse and combine information; and will also simplify access to, and process accurately, instant information that analyses and supports artificial intelligence, robotics, and machine intelligence. Digitalisation has replaced legacy technologies (Lyall et al., 2018). Leading companies use automation and digitalisation to reduce repetitive manual functions. Sensor data; block chains; robots; drones; and self-driving vehicles are beginning to revolutionise industries, allowing companies to manage centrally and securely, whilst phasing out labour, especially in rural areas (Lyall et al., 2018; Nagy et al., 2018). Companies are exploring the idea of a digitalised central node that can be a fundamental decision-making centre facilitating instant, value-added insights, and decisions holistically from an international perspective. It is evident that these advancements in a technological age are replacing people. The workforce will need to be reskilled for limited, highly skilled work, as well as for those new jobs that will be necessitated by the introduction of advanced technology (Lyall et al., 2018; Song et al., 2021). Virtual incubators will manage to interconnect businesses, customers, producers and partners through the internet for exchanging electronic data, video conferencing and other functions (Yeganegi, 2019).

As stated by the former Minister of Trade and Industry, Rob Davies (2017), it will mean that the workforce needs to stay abreast of the technological changes to remain competitive and relevant. This will require the facilitation of education and training of the workforce to master digital technology (Omarjee, 2017). The impact of the reduction of jobs (blue collar and white collar) needs to be mitigated. It is very possible that, due to computer advancement, organisations will reduce the size of their workforce (Brynjolfsson & McAfee, 2014).

Technological advancements have transcended the workforce. In the short term (five-to-ten years), there is a very real possibility of supply chain functions becoming obsolete, replaced by advanced technology, optimising the complete process flow through automation (Lyall et al., 2018). The current technological revolution requires preparedness as it cannot wait on a new generation's labour force while they prepare themselves. It is imperative that the business community facilitates the current workforce retraining (Reyneke, 2019).

The challenges identified are data analysis, integrating advanced innovative technology into the current infrastructure, as well as the limited computer skills of staff. Value extractions identified for improvement are efficiencies; flexibility; outputs; internet protection; the quality of materials as well as service offerings; and the ability to make decisions based on available data analysis (Dalmarco et al., 2019).

Some of the identified barriers are: In Poland, the significant barrier was the huge 46% capital outlay required; in South Africa, there was a lack of digital culture (58%), and in development of people (40%); in Japan, they needed clarity on returns on investment in Industry 4.0 (61%); and in Germany, proper qualification of workforce is an issue (43%) (Refer to Figure 3.4). Barriers may vary in different countries, which is indicative of the level of awareness of the requirements of the 4IR and strategic approaches required (Ślusarczyk, 2018).



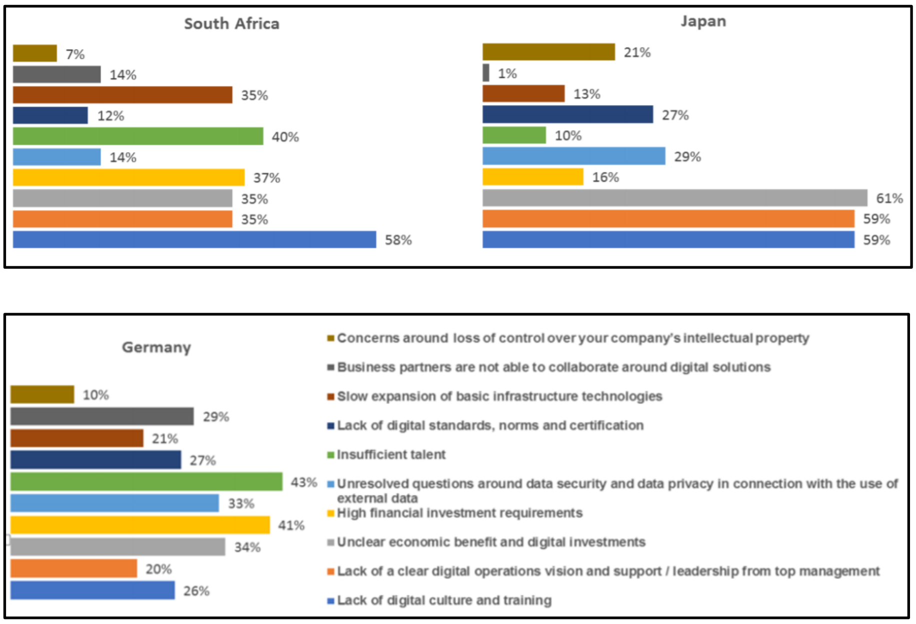


Figure 3.1. The biggest challenges or inhibitors for building digital operation capabilities

Source: (Slusarczk, 2018, p. 12)

Interestingly, South Africa (40%) and Germany (43%) (Refer to Figure 3.1) commonly share one of the most important obstacles, which is the shortage of qualified staff (Ślusarczyk, 2018). It is in Africa's interest to capitalise on the opportunities of the 4IR in creating connectivity and being economically inclusive; the consequences of being left behind in the technological revolution will be isolation, greater inequality, and a lack of market growth (Reyneke, 2019).

3.3 Technological change: logistics

An efficient and effective logistics operation ensures that the correct product is available, in the correctly ordered quantity; of the right quality; at the right price, place and time, and for the right customer (Erlingsdottir, Ersson, Borell & Rydenfält, 2018; Wisner, 2017).

Logistics companies are behind other sectors when it comes to digital transformation (Cichosz, Wallenburg & Knemeyer, 2020; Riedl, 2018). There have been struggles in logistics in adopting technology (Gunasekaran, Subramanian & Papadopoulos, 2017; Mathauer & Hofmann, 2019) and increasing their innovativeness (Cichosz et al., 2020).

Digital supply chain is directly linked to 4IR which is enabled by the IoT (Crabtree, 2018; Hodgdon, 2021; Hofmann & Rüsch, 2017; Tjahjono, Esplugues, Ares & Pelaez, 2017). IoT equips objects with the capability to exchange data over the internet (Crabtree, 2018; Hackius & Petersen, 2017; Hodgdon, 2021). IoT and cloud computing (CC) is being extensively utilised by logistics (Ponis & Efthymiou, 2020). Logistics utilises IoT to access real time data within the logistics network and to collaborate with stakeholders within their network (Crabtree, 2018; Hackius & Petersen, 2017). Access to real-time data enables decision-making and dealing with challenges encountered promptly. Data can be organised into various measurements, for example: replenishment of inventory; despatch of shipment; order fulfilment; and other key indicators that are required (Gallay, Korpela, Niemi & Nurminen, 2017; Hodgdon, 2021).

Logistics is evolving continually because of automation of data as well as physical logistics processes (Nitsche, 2021). Automation has various business benefits, ultimately impacting on creating visibility, improved efficiencies, and profitability of the company (Büyüközkan & Göçer, 2018). Automation provides visibility in real-time of the inventory and processes; it increases forecast accuracy; and reduces lead-time, standing time and manual labour **(**Kersten et al., 2017).

Automation is motivated by multiple factors, such as reducing costs; increasing productivity; improving efficiencies; and enabling individual decision-making with reduced dependency within the logistics network (Nitsche, 2021). The idea of automation began with supporting manual processes, or replacing them with technology, to promote mass production (Nitsche, 2021). This is a key transition for logistics and the supply chain in the present day and continues to increase in importance going forward. However, there are companies that are hesitant and find it challenging to develop automated solutions (Junge, Verhoeven, Reipert & Mansfeld, 2019; Nitsche, 2021).

Ensuring that inventory is accounted for accurately, and check-in-check-out (CICO) is efficient, are important key performance indicators. Manual processes to count inventory, and manual paper-based systems, lead to an inefficient CICO process in the logistics operation, and more time may be taken for the inbound and outbound loading of vehicles, which adds to the operating costs of the company, due to delays in the system and inaccurate stock keeping (Apolonio & Norona, 2021). The adoption of technology in logistics is recommended over manual operating processes (Apolonio & Norona, 2021). It is argued that converting to a system-guided process will improve the inventory accuracy and contribute to the company's competitive position in the market (Apolonio & Norona, 2021).

All processes within the logistics environment will take less time, which will enable the processing of more sales orders and will also reduce inventory stock out. The 4IR is being embraced by companies who are adopting technology based on the IoT to control and manage the logistical processes (Apolonio & Norona, 2021). The adoption of technology linked to 4IR is assisting companies transition from manual to automated processes. These offer opportunities for improvement in manual-based operations; space utilisation; damaged products; inefficient processes; people errors in encoding; and inventory accuracy (Apolonio & Norona, 2021). According to Jabbar et al. (2018), automated logistics operations are designed to utilise technology in operations and to operate at higher efficiency levels compared to manual processes (Jabbar, Khan, Silva & Han, 2018). The adoption of technology in automating the processes in the logistics environment improves cost efficiencies and warehouse operations, minimises setbacks, and mitigates human errors (He, Xue & Gu, 2020). It contributes to making life easier as efficiencies and productivity are improved (Amanda Istiqomah, Sansabilla, Himawan & Rifni, 2020).

Less, or minimal, human intervention is required in automated systems. The management of inventory is more efficient in automated processes, which reduces operating costs and ensures optimal inventory levels. Some of the perceptions that limit the adoption of technology are the cost of implementation; cyber security; and limited knowledge and skills. Any technological policy that is to be implemented should include engagement with the workforce to ensure co-operation and buy-in (Mbuvi, Namusonge & Arani, 2017).

Emerging technological capabilities are enablers, for example the internet of services (IoS) and mobile technology (RFID and GPS). These technologies enable supply chain integration through the creation of visibility (Brinch & Stentoft, 2017; Haddud & Khare, 2020; Hofmann & Rüsch 2017). The adoption of new technology provides a real-time data source, thereby creating opportunities for data-efficient supply chain management (Diedrich, 2017). Improved efficiencies are based on real-time access to data as challenges can be addressed promptly (Abdel-Basset et al., 2018; Crabtree, 2018; Shukla et al., 2018). Reduced lead-time impacts on cost and efficiencies. A reduced lead-time means that replenishment is timeous, ensuring that products are not out of stock, so order fulfilment is improved. Also, space within the warehouse is efficiently utilised as the number of delayed sales orders will reduce. This contributes to increased competitiveness as the associated costs are reduced (Kersten et al., 2017).

There has been a significant change in the world of logistics as it enters the era of technological dominance (Nitsche, 2021), with advancements in automation and the autonomisation of information, and the physical logistics process (Nitsche, 2021). This comes with its own challenges but presents opportunities for companies to achieve competitive advantage (Junge et al., 2019; Kersten, Seiter, von See, Hackius & Maurer, 2017). Some of the drivers of change to automation are cost efficiencies, increased productivity, and empowering of the workforce to make decisions individually in the logistics network (Nitsche, 2021). The transition from manual process to automation is gaining momentum within the logistics environment. There are still challenges being experienced by companies, but this is the way forward (Nitsche, 2021). Physical processes are being automated, for example within warehousing, and more so in the informational processes, although at a higher cost; and issues are still being experienced with integration into current systems (Nitsche, 2021).

The benefits, from a company perspective, are cost reduction, which is impacted by efficient utilisation of resources; optimal utilisation of the warehouse; increased productivity; minimising mistakes caused by reliance on manual process due to human error; improved lead-times; and reduction of wastage **(**Kersten et al., 2017). The earlier identification of possible errors is an added benefit. Increased competencies in technology and system-guided processes; flexibility; and adaptability in the logistics processes contribute further to meeting customer demands, thereby improving service levels to customers. Data accuracy is improved with automation and is available, almost in real-time **(**Cichosz et al., 2020; Kersten et al., 2017).

Logistics service delivery to customers comes with issues of customer service. Hence, companies are having to deal with these challenges of improving customer service to remain competitive. Research supports the utilisation of autonomous vehicles as a development that would improve customer service experience and prove a solution for logistics (Kassai, Azmat & Kummer, 2020).

Cost efficiencies in logistics, operations, and inventory management impact inventory turnover (Cichosz et al., 2020; Kersten et al., 2017). This enables the company to be competitively positioned within the market, leading to improvements in collaboration with customers and suppliers. Shorter lead-times mean a reduction in inventory levels, costs of warehousing, and costs of handling. The benefits outweigh the risks and, if effectively communicated and demonstrated, reduce resistance to change and contribute to acceptance of the changes by the workforce. One must be mindful that there will be some errors where people interaction is necessary. However, this should be minimal **(**Kersten et al., 2017). The integration of technology and the workforce is important to address the concerns of employees who fear that technology is replacing them, causing them to lose their jobs. Opportunities need to be created or found for the people whose jobs have become redundant through technological advancement (Nagy et al., 2018).

Factors that contribute to the success of technology adoption in logistics are effective leadership; an organisational culture that supports consumer centredness and change; a positive workforce; stakeholder engagement; alignment of the company and IT strategy; process standardisation; data integration; upskilling and reskilling of the workforce; agility in transformational management; and leveraging internal and external technological knowledge (Cichosz et al., 2020). There must be a reliance on teamwork; the workforce and customer engagement; communication, and feedback (Cichosz et al., 2020). There is no literature that deals with logistics from a change management perspective (Hausberg et al., 2018; van Hoek et al., 2010).

Some of the identified obstacles are complex logistics networks and processes; the availability of resources; a lack of skilled resources; resistance to embracing technology; resistance to change; data protection and security breaches (Cichosz et al., 2020). The IoT and cloud computing has influenced the logistics environment and also material handling (MH). MH entails the moving, storing, and controlling of inventory and materials in the warehouse, onto the logistics vehicles, during manufacturing and storing, and through the disposal ecosystem. This is a vital part of logistics which includes the manual and system-guided processes. These systems of material handling, in essence, are designed for customer service; efficient inventory levels; minimum lead times; the shortest possible production runs; and reduced distribution and transport costs (Ponis & Efthymiou, 2020).

With improved results due to the implementation of automation, operational costs are reduced, thereby increasing the economic benefits for the company, and moving it to becoming part of the core competence of the organisation **(**Kersten et al., 2017). The intended purpose of change is to improve the quality of work and processes, and the work environment (Erlingsdottir et al., 2018).

The failure rate with change management is 70%. It has been attributed to the following reasons: resistance to change (39%); lack of support from management (33%); lack of resources (14%); and other reasons (14%) (Bekmukhambetova, 2021). Change involves a diverse range of problems, such as the strategic direction of the organisation, or the upskilling and reskilling of the workforce. Strategic, technological, and structural changes, as well as changes in attitudes and behaviours, are all aimed at improving competitiveness and viability (Bekmukhambetova, 2021).

3.4 Inventory management

Inventory accuracies are key KPIs in warehouse management. Increasing inventory accuracy is the goal of warehouse operations. To achieve this goal, the company must adopt technology and move away from manual processes which will improve inventory accuracy consequently, improving the competitiveness of the company (Apolonio & Norona, 2021; Atnafu & Balda, 2018). The adoption of technology linked to 4IR assists the company to move from manual processes to system-guided processes. Based on the IoT using technology to manage logistics operations (Apolonio & Norona, 2021). Automated processes involve the use of technology with minimal or no human intervention (Mbuvi, Namusonge & Arani, 2016).

According to Al-Talib et al. (2020), companies are increasing competitiveness due to the evolution of IT systems. IoT assists companies to mitigate risks, deal with complexities, and realise business benefits through visible and transparent supply chain processes (Al-Talib, Melhem, Anosike, Garza Reyes, Nadeem & Kumar, 2020). This will assist in increasing competitiveness and market share of the company (Manavalan & Jayakrishna, 2019).

Manually operated warehouses experience challenges with inventory accuracy, lack of efficiencies in operations, human errors due to inaccurate recording of data which impacts integrity of inventory counts as well as expiry dates (Apolonio & Norona, 2021). Some of the manual inventory systems are fixed levels of ordering which means when the inventory reaches a defined level, then inventory is ordered. Fixed period of reordering which means at the set intervals, will inventory be ordered. Economic order quantities whereby the company determines the requirements and orders at once. Just-in-time ordering means that inventory is kept to a minimum and ordered when needed (Atnafu & Balda, 2018; Mbuvi et al., 2016). Inventory management is key within the value chain of the business (Atnafu & Balda, 2018).

Jabbar et al. (2018) argues that adoption of technology improves warehouse efficiencies thereby improving inventory accuracy (Jabbar et al., 2018). Technology will assist in improving cost efficiencies in operations, management of inventory processes, and mitigate human errors of data capturing (He, Xue & Gu, 2020).

To assist with these challenges of inventory management, using IoT in logistics will assist in combining data centrally, access to information in almost real time, visibility of inventory, and other associated processes (Abdel-Basset, Manogaran & Mohamed, 2018). The IoT is a part of 4IR that facilitates communication between the computer technology that has the information and the use of technology that is internet based (Gnimpieba, 2015). It is designed to execute and manage the logistics processes with ease to improve efficiencies and productivity of the company (Amanda Istiqomah et al., 2020). According to Witkowski (2017), 4IR and IoT will assist with the opportunities that exist in moving from a manual to an automated process in logistics (Witkowski, 2017).

3.5 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) utilises attitude; perceived usefulness (PU); perceived ease of use (PEOU); behavioural intention and user behaviour. These characteristics of the model allow the adoption of technology to facilitate logistics process efficiencies. This model assists in analysing attitudes; perceived usefulness (PU); perceived ease of use (PEOU); behavioural intention, and user behaviour (Jain, Singh, Chaturvedi & Rakesh, 2020; Ramkumar, Schoenherr, Wagner & Jenamani, 2019; Yuen, Cai, Qi & Wang, 2021). Limited or no technical knowledge, as well as a lack of interest in technology, are the reasons for not embracing technology (Valaei, Nikhashemi, Bressolles & Jin, 2019). According to Davis (1993) and Davis, Bagozzi & Warshaw (1989) the two significant aspects are PU and PEOU, which indicate the attitude of the user in utilising the technological device. These are the major dimensions of the TAM that are used to ascertain the attitude of the person in embracing technological adoption (Valaei et al., 2019).

According to the theory of reasoned action (TRA) (Ajzen & Fishbein, 1980; Davis, 1993) the attitude of a person is an important indicator in ascertaining the impact of technological adoption on a person’s behavioural beliefs (Ajzen & Fishbein, 1980; Davis, 1993; Jain et al., 2020). Attitude is as important as understanding one’s intention or the desire to adopt technology. As a part of TAM (Davis, 1993), behavioural intentions have been considered an important aspect in understanding an individual’s intention to use new technology (Jain et al., 2020).

Perceived ease of use (PEOU) plays a big role in terms of understanding an individual’s feeling of ease when using the technology for various purposes. PEOU is an important antecedent of TAM to understand the acceptance by an individual of new technology. It is an important antecedent, when determining the impact and behavioural intentions of an individual in terms of using a new technology (Valaei et al., 2019). However, this construct will not be able to determine the impact of the technology on an individual’s behaviour directly, but it will work as an important antecedent in predicting the same behaviour due to changes in technology. In the age of petabytes, where technology is very important in the life of an individual, TAM is important for a researcher to determine the impact of new technology on the attitude and intentions of an individual. Technology plays a major role for an individual in terms of providing different features and functions (Ramkumar et al., 2019; Yuen et al., 2021). Whether the importance of technology is related to hedonic or utilitarian features, the presence of technology will remain, and have an impact on, the individual. PEOU is an important antecedent of TAM and shows the effortless intentions of an individual to use a new technology and indicates the ease with which the new technology will be incorporated into the life of an individual (Davis et al., 1989). Although, at a superficial level, the purpose of using the technology will remain the same, the improvement in terms of having better features and ease will make the acceptance of new technology by an individual a lot more important. In the case of blockchain technology, PEOU works as an antecedent of TAM to understand the provided feature of transparency in information while getting information of the product for logistics operations ((Jain et al., 2020; Ramkumar et al., 2019; Yuen et al., 2021).

Perceived usefulness (PU) is another important antecedent of TAM and determines how an individual will see himself in terms of enhancing his knowledge and skills in using a new technology (Davis et al., 1989). It determines the level of an individual's belief about the usefulness of new technology. TAM has posited the two major antecedents in the model that play an important role in describing the impact of these two constructs on the attitude and intentions to using a new technology. As stated in previous studies, which have considered TAM, perceptions in terms of usefulness and ease of use have a significant impact on an individual when using a new technology platform and using the same for further application purposes (Jain et al., 2020; Ramkumar et al., 2019; Yuen et al., 2021). These studies found a positive correlation between PU and intention to use; whereas the relationship between PU and attitude is comparatively weak (Davis et al., 1989; Jackson, Chow & Leitch 1997; Lucas & Spitler, 1999).

This change has been accepted by customers in a positive way, which has been determined and proven by various studies by using the theoretical model of TAM and its three major constructs of PEOU, PU, and attitude (Valaei et al., 2019). The model fit shows the effect of these constructs on the consumer's intention to use new technology in a positive way or a negative one. To prove these relationships, all the items have been analysed for three major determinants to understand the use of behaviour in using blockchain technology for the logistics industry. The analysis has been performed using CFA and SEM (Jain et al., 2020; Ramkumar et al., 2019; Yuen et al., 2021).

The global logistics industry is increasingly relying on developing technology to cut costs, improve processes and enhance transparency. The literature supports the theory of TAM (Davis et al., 1989).

Attitude, PEOU, and PU have a direct impact on the online consumer’s behavioural intentions to use a new technology, whereas behavioural intentions have a direct impact on the actual use of the technology (Jain et al., 2020; Ramkumar et al., 2019; Yuen et al., 2021).

3.6 Unified Theory of Acceptance and Use of Technology (UTAUT)

The unified theory of acceptance and use of technology (UTAUT) model (Sarfaraz, 2017) has value when moving from a manual system to utilising technology for a system-guided approach within the framework of. Technology is evolving rapidly, thereby creating opportunities for improvement and efficiencies (Sarfaraz, 2017). Businesses implement technology to support processes to improve efficiencies and reduce manual inputs (Andwika & Witjaksono, 2020).

This model was developed from earlier theories, such as the Technology Acceptance Model (TAM); the integrated model of Task-Technology-Fit; Innovation Diffusion Theory (IDT); the Theory of Reasoned Action (TRA); the Technology of Planned Behaviour (TPB); the Motivational Model (MM); the Model of PC Utilisation (MPCU); the Combined TAM and TPB (CTAM-TBP) model; Innovation Diffusion Theory; and Social Cognitive Theory (Andwika & Witjaksono, 2020; Cheah, Teo, Sim, Oon & Tan, 2011; Dwivedi, Rana, Chen & Williams, 2011; Ronaghi & Forouharfar, 2020; Sarfaraz, 2017; Sulaiman, Jaafar & Mohezar, 2007; Zhou, Lu & Wang, 2010). The UTAUT model is a popular model that assists with an explanation of the factors that influence the embracing of technology (Sreeram & Madhav, 2022).

The model, developed by Venkatesh et al. (2003), was utilised to ascertain behavioural adaptation in accepting technology. This model explains that the adoption of technology is influenced by behavioural intention (Marikyana-d, Papagiannidisb–savvas & Alamanosc–eleftherios, 2019). It was used by various researchers in multiple technological acceptance and geographical contexts (Gharaibeh, Arshad & Gharaibh, 2018; Hardy, Veinot, Yan, Berrocal, Clarke, Goodspeed & Vydiswaran, 2018; Lescevica, Ginters & Mazza, 2013; Shiferaw & Mehari, 2019). Hence, it is accepted that this model is a suitable tool for measuring the success and adoption of technology by people (Im, Hong & Kang, 2011; Kalavani, Kazerani & Shekofteh, 2018; Šumak & Šorgo, 2016).

The constructs for assessing behavioural intention and the adoption of technology utilising the UTAUT framework are performance expectancy (PE); effort expectancy (EE); social influence (SI); and facilitating conditions (FC) (Refer to Table 3.1) (Ronaghi & Forouharfar, 2020; Venkatesh et al., 2003;

Xian, 2017). This theoretical framework is utilised to assess user acceptance of technology and the data is obtained from the workforce (Andwika & Witjaksono, 2020).

Table 3.1. Unified Theory of Acceptance and Use of Technology (UTAUT): factors of assessment

Variables	Definition
Performance expectancy (PE)	Individual's perception that technology usage will lead to the increase in performance.
Effort expectancy (EE)	Individual's perception of the ease of technology usage.
Social influence (SI)	Individual's perception in respect to the acceptance or non-acceptance of technology usage by others.
Facilitating conditions (FC)	The extent that an individual believes that technical and organisational infrastructure could support the technology usage.

Source: (Ronaghi & Forouharfar, 2020, p.11)

Table 3.1 provides the definitions of PE, EE, SI, and FC, factors of the UTAUT theoretical framework, which are discussed below.

Performance expectancy (PE) deals with the user's expectation and is an indication whether the user is likely to adapt to technology (Andwika & Witjaksono, 2020; Ronaghi & Forouharfar, 2020; Sarfaraz, 2017). In previous research, it was recorded that people were influenced as they accepted increases in performance, and hence the intent to adapt to technology (Brown, Zaheeda, Douglas & Stroebel, 2003). According to Venkatesh et al. (2003), adoption of technology is based on its perceived usefulness (Venkatesh et al., 2003). This factor is vitally important in shaping the behavioural intentions of potential users (Amin, Hamid, Lada & Anis, 2008; Dasgupta, Paul & Fuloria, 2011; Luarn & Lin, 2005; Riquelme & Rios; 2010; Sarfaraz, 2017; Sripalawat, Thongmak & Ngramyarn, 2011).

Effort expectancy (EE) refers to the user's perceived ease of use of the technology and influences their embrace of technology (Andwika & Witjaksono, 2020; Ronaghi & Forouharfar, 2020; Sarfaraz, 2017). Ease of use and minimal effort motivate users in technology adoption (Andwika & Witjaksono, 2020; Luarn & Lin, 2005; Puschel, Mazzon & Hernandez, 2010; Sarfaraz, 2017; Sripalawat et al., 2011; Venkatesh et al., 2003).

Social influence (SI) affects the degree to which new technology is adopted (Venkatesh et al., 2003). Previous research has utilised models such as TRA, TAM2, TPB, and others to understand the impact of social influence in adopting technology (Andwika & Witjaksono, 2020; Pederson & Ling, 2002; Ronaghi & Forouharfar, 2020; Sarfaraz, 2017).

Facilitating conditions (FC) refer to the level of confidence that the user has in the technical support and organisational support for the new technology being introduced into the business. Facilitating control is influenced by the perception of behavioural control, facilitation conditions, and compatibility (Andwika & Witjaksono, 2020; Ronaghi & Forouharfar, 2020; Sarfaraz, 2017).

Perceived risks in embracing technology will result in reluctance to adopt the technology. Insufficient information and being uninformed will lead to resistance in adopting technology. Also, if there had been previous bad experiences and associated risks, these will influence behaviour to resist technology adoption (Laforet & Li, 2005; Pederson & Ling, 2002; Sarfaraz, 2017). Trust is one of the key factors in embracing technology. It has a vital role in influencing users to adapt to new technology (Kim & Prabhakar, 2004; Sarfaraz, 2017).

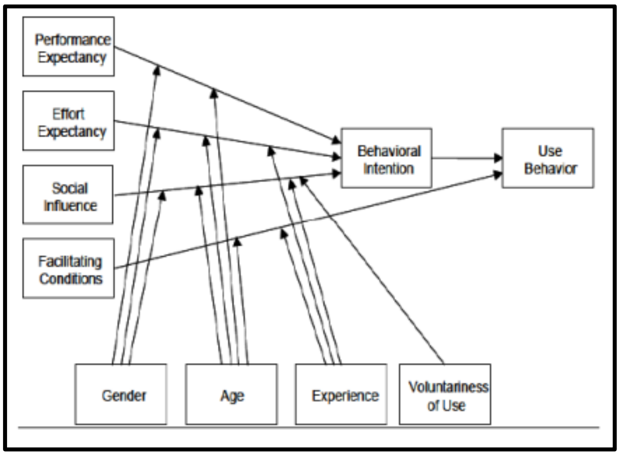


Figure 3.2. Unified Theory of Acceptance and Use of Technology (UTAUT)

Source: (Andwika & Witjaksono, 2020, p.28)

Figure 3.2 reflects the four elements that impact the four factors of the UTAUT model, which ultimately are an indication of the behavioural intention of the user to accept or resist technology. Gender and age influence PE, EE, and SI. Experience influences EE and SI. Age and experience are the only two that impact on the FC factor. PE, EE, and SI influence behavioural intent, which gives an indication of user behavioural acceptance. FC impacts directly on user behavioural acceptance (Andwika & Witjaksono, 2020).

The introduction of technology assists in the migration from a manual process to a system-guided process. The application of the UTAUT model gives an indication of user behavioural intention in embracing new technology (Andwika & Witjaksono, 2020; Ronaghi & Forouharfar, 2020; Sarfaraz, 2017; Sreeram & Madhav, 2022).

3.7 Required skills for the 4IR

In previous industrial revolutions, jobs that were made redundant by innovation were replaced by new jobs in new sectors. With the 4IR, there is uncertainty how this will happen. Digitalisation will replace many jobs in the high-skilled sector. Hence, only those companies which are adequately equipped through their appropriately skilled workforce will thrive in the digital age (Schwab, 2015).

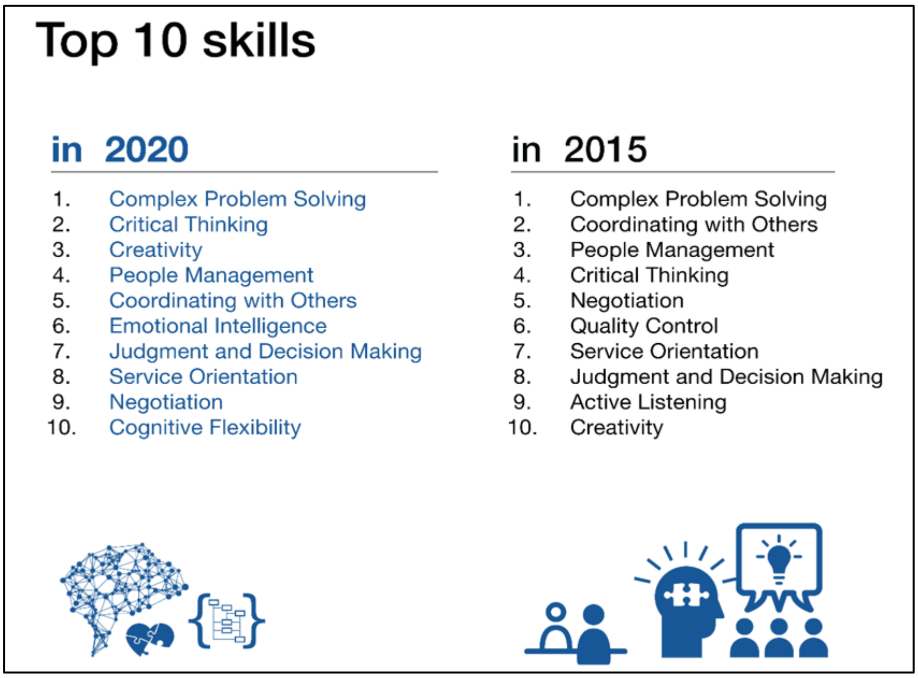


Figure 3.3. Top 10 skills according to the World Economic Forum

Source: (Adegbite & Adeosun, 2021, p. 37)

As shown in Figure 3.3, creativity is regarded as one of the top three skills required by workers. The 4IR will lead to new products, technologies and ways of working, so creativity is needed to get optimal results from these changes (Adegbite & Adeosun, 2021; Gray, 2016). Active listening will no longer be a core skill requirement, but emotional intelligence, which did not feature in the 2015 list of skills required, will be a skill that is required by the workforce (Gray, 2016).

The key top-ten skills listed in Figure 3.5, have been an integral part of good leadership development, master's in business administration, and advanced/executive development courses. These will need to be intensified (West, 2018). Among the top three skills that will be needed by workers is creativity. Interestingly, emotional intelligence was not one of the top ten skills required previously; but will become one of the priority skills required by the workforce to be successful in Industry 4.0 (i4.0), or 4IR (Gray, 2016). Three preceding industrialised transformations had brought about unique and generalised educational requirements. The 4IR will necessitate flexibility and emotional proficiency. This is the ability to readjust appropriately, participate in ongoing learning and have productive interaction with the different role players (Lozza, 2017). If the workforce does not acquire the skill sets necessary to thrive in the 4IR, there are implications for job losses, thereby increasing levels of unemployment (Abe, Abe & Adisa, 2021).

3.8 Development of the workforce

A prevalent view is that we are in a phase of hi-tech unemployment, that technology is rendering skilled workers redundant (MacCarthy, 2014). The workforce needs to be upskilled to operate and develop new technologies to compete for the available jobs relevant to the 4IR. If the workforce is not adequately prepared and up-skilled, the risk is that they will be unemployed (Younus, 2017).

Different organisations (e.g. IBM, Ford, NASA) have implemented project assignments to develop staff (Bakker & Demerouti, 2017; McCauley, Ruderman, Ohlott & Morrow, 1994). Projects allocated to individuals for practical experience are also intended to facilitate the development of skills needed as a manager (Day, 2007). A key output from these projects allocated to individuals for practical experience is the ability for upward mobility. An employee's ability to function effectively in a higher position needs to be developed (Bakker & Demerouti, 2017; De Pater, van Vianen, Bechtoldt & Klehe, 2009).

Development job experience encourages critical thinking in given situations, as well as the processing of ambiguous information. This facilitates the development of cognitive leadership skills (DeRue & Wellman, 2009). This sense of achievement effectively influences the employee's ability to cope with the demands of the job. A worker's enriching encounters may constitute a key factor in development job experience, and whether this leads to good or bad results (Bakker & Demerouti, 2017; Dong et al., 2014).

The focus of development job experience is the individual's view and appraisal of areas of development in the work environment, contributing to good performance and to positive attitudes (Dong et al., 2014). The basic, relevant, and valid dimensions of development job experience are additional responsibilities; a changing environment; responsibilities at a higher level; cross-skilling; and the ability to deal with a diverse workforce. These are the aspects that reflect the scope of development job experience throughout the work experience (DeRue & Wellman, 2009). Employees undertaking projects within development job experience invariably have induced stress as they find themselves solving complex problems and having to make decisions under risky and uncertain conditions (DeRue & Wellman, 2009).

Applying Kolb's experiential learning cycle (Kolb, 1975) could be beneficial. This framework has four stages in its cycle of learning. It begins with experience (taking in sensory data); followed by reflection of the experience (data processing); then analysing and arriving at findings (planning an action); and finally, applying the actions required (Kolb, 1975; Kolb & Fry, 1974; McLeod, 2017; Wallace, 2019).

Experiential learning was conceptualised by Carl Rodgers in 1969 and thereafter this theory was developed by Kolb (1975). This theory is premised on the construction of knowledge by experiences being conceptualised (Urquidi-Martín, Tamarit-Aznar & Sánchez-García, 2019). Learning theory should be central to change management theories as it contributes to understanding and the ability to manage the various stages of the change process (Hendry, 1996).

The learning culture should be integrated into the process of change (Hendry, 1996). The four-stage cycle of experiencing, reflecting, thinking, and acting is simple as well as useful (Kolb & Kolb, 2018). Reflection of an experience is considered 'experiential learning' (Kuk & Holst, 2018). Participants are involved, active, experience what is happening, inquiring, and reflecting (Morris, 2019). Kolb's (1975) learning cycle allows the participant to understand the experience, reflect on this experience, communicate their thinking process, and apply the knowledge gained (Fewster-Thuente & Batteson, 2018). Experiential learning is acquired knowledge based on the theory of what is experienced and engagement (Moseley, Summerford, Paschke, Parks & Utley, 2020). Experiencing learning has more impetus than conceptualising theoretically. A simplistic way of understanding the concept is by using this formula (experience + reflection = learning) (Heinrich & Green, 2020).

Pleasant emotions experienced during development job assignments may encourage involvement; positive application; reinforced understanding; adaptability and creativity. This acquired learning, as well as the experience, can be utilised at a more senior level. On the other hand, negative emotions discourage participation and networking with others (Bakker & Demerouti, 2017; Cacioppo & Gardner, 1999). Pleasant experiences encourage, and are related to, advancement potential. Negative affective experiences have a related negative effect on advancement potential (Dong et al., 2014).

Employees who have developed EI are empowered to contribute to the results and processes of development job experience. Management and awareness of emotions are required when undertaking developmental tasks (Rode et al., 2007). Employees with developed EI, can control negative feelings by putting into perspective development job experience as a chance to improve skills, as opposed to it being perceived as a high-tension situation. Consequently, employees with high EI experience fewer negative emotions when undertaking developmental tasks (Dong et al., 2014).

Employees with high EI cope with the effects of negative experiences (Mayer, 1997). The heightened awareness of improved EI, assists the EI employee to deal proactively with the negative consequences emanating from their feelings (Dong et al., 2014). The focus of training and development should include the improvement of emotional knowledge and the shaping of transformational leadership skills (Deepika, 2016). EI should be included in developmental training. Adequate time must be given to the aspiring leader to develop relationships while coaching and mentoring their subordinates. This will allow the trust relationship to build (du Plessis, Wakelin & Nel, 2015). Upskilling and reskilling of the workforce to introduce automation into the logistics operations to manage inventory is key to the success of change in processes (Mbuvi et al., 2016).

3.9 Empirical evidence of other studies

The introduction of technology into the workforce, and articulating the need for it, is important. There have been instances where this was adequate in ensuring that the workforce would embrace the new technology; but companies also experienced the contrary when the workforce was resistant to change (Cichosz et al., 2020; Nagy et al., 2018). In one case, where resistance was experienced, it was unfortunate that the employees caused damage to sensors and interface devices, and/or did not adhere to instructions. This was established as the signal transmission was terminated, which had a negative impact on costs. Hence, the affected company had to resort to harsh measures and an approach where they informed the workforce that they needed to find alternative employment if they were not prepared to adopt new technology. Notwithstanding the resistance, not many resigned, although in that specific area there were other companies that the employees could have considered for alternative employment. With the adoption of technology, performance can be determined and those performing well can be recognised, while a lack of performance can be analysed and remedied more quickly and more easily (Nagy et al., 2018).

A beverage manufacturer in the Philippines with 78 distribution centres which were manually operated. They had stand-alone systems which were not integrated hence experiencing inefficiencies throughout the supply chain processes (Apolonio & Norona, 2021). One of their KPIs was inventory management accuracy with a target of 99.25% but could only achieve 98.01%. The company's aim was to adopt technology to improve operational efficiency and accurate inventory management. Using IoT of which bar coding was one of the tools so that products can be scanned in and out of the warehouse, was implemented. Implementing technology, bar coding and integrating their ERP systems improved the operation efficiencies and inventory accuracy to 99% compared to 98.01% achieved in 2020 (Apolonio & Norona, 2021).

Research that was conducted in Kenya to manage inventory and ascertain the factors that affect introducing automation of inventory management (Mbuvi et al., 2016). From the 200 respondents, it was determined from the data that was collected that the workforce did not have the necessary computer skills to adopt technology to manage inventory. Further findings were financial constraints hence funding of hardware and software as well as implementation which would include training of the workforce, was an issue. Upskilling and reskilling of the workforce as well as financial was the two biggest challenges to introduce automation into the logistics operations (Mbuvi et al., 2016).

In Ethiopia a study on inventory management was conducted to ascertain the impact of the company's competitiveness and increase organisational performance. Data collected from 188 companies indicated that high levels of inventory management enhance competitive advantage and organisational performance (Atnafu & Balda, 2018). Various methods of inventory management include economic order quantity at determined periods in the financial year, Just-in-time ordering so that you do not have overstocks neither understock, vendor managed stocks whereby the vendor has access to the data, and the ABC classification of products which categorises products into fast; medium; and slow stock turn. The findings were a positive impact on competitive advantage and improved organisational performance. Thereby implying that competitive advantage and improved organisation performance could have increased the level of inventory management. With the increased competitive performance of the company, enables further enhanced inventory management to outperform its competitors.

Further, financial improvement of the company will enable the company to invest in more advanced management tools to manage inventory more efficiently and increase organisational productively (Atnafu & Balda, 2018).

3.10 Chapter summary

This chapter covered, in detail, the technological changes prompted by the 4IR. Inventory management was discussed, and this was followed by a consideration of the required skills for the 4IR. Thereafter, the workforce and the development of the workforce due to the digital technological changes that these transformations in the workplace brought about was considered. The TAM and UTAUT models were discussed, and this was followed by empirical evidence of other studies in literature of technological changes.

The introduction of technology is key to the transitioning from a manual process to an automated system-guided process. The application of the UTAUT model gives an indication of user behavioural intention in embracing new technology in the company (Andwika & Witjaksono, 2020; Ronaghi & Forouharfar, 2020; Sarfaraz, 2017; Sreeram & Madhav, 2022). Technological dominance is evident from the empirical data in the logistics sector in improving efficiencies to obtain competitive advantage. The drivers of change to automation are cost efficiencies, increased productivity, and empowering of the workforce to make decisions individually in the logistics network. The next chapter will deal with the research methodology that was considered suitable for this research.

CHAPTER FOUR: RESEARCH METHODOLOGY

4.1 Introduction

This chapter discusses the research methodology that was utilised in recommending a change management framework for transitioning from a manual process to an automated system-guided process in managing short-dated inventory at the logistics study site in Durban, KwaZulu-Natal, South Africa. A qualitative research methodology was followed to achieve the objectives of this study. The data collected was thematically analysed using computer-assisted qualitative data analysis software (CAQDAS) (Dalkin, Hodgson, Lhussier & Carr 2021; Kalpokaite & Radivojevic, 2019; Schmieder, 2020). NVivo, a form of CAQDAS, supports code-based inquiry, searching, and theorising, combined with the ability to annotate and edit documents (Dalkin et al., 2021). The choice of this method was based on the fact that it supported the development of collaborative data generation. A key benefit of this method was the ability of research to assist in the development of theory from execution (Tardivo et al., 2021).

In the next section, philosophical worldviews are discussed and the worldview relevant to this study is highlighted. The research design is discussed, followed by a discussion of the population. The data collection tools are described, and the transcription of the data is covered briefly. Trustworthiness is also discussed, including credibility and transferability beyond the current setting, ethical considerations, thematic analysis and, lastly, a summary of this chapter is presented.

4.2 Philosophical worldview

Developing a philosophical view requires making some focused suppositions about the character of the community and the character of the scientific discipline (Burrell & Morgan, 1979). The cultural perspective presents the choice between regular or distinct transformation (Holden & Lynch, 2004; Ragab & Arisha, 2018).

This was the basis for the operation and interpretation, as well as the support on which the research methodology was developed (Creswell & Creswell, 2017; Hussein, 2009; Wright, O'Brien, Nimmon, Law & Mylopoulos, 2016). The decisions made by the researcher gave the study direction: the nature of the reality related to ontology (Lincoln & Denzin, 1994); the knowledge of this reality related to epistemology (Mason, 2002); the value-position of the researcher related to axiology; and the process followed during the research related to the methodology (Creswell & Poth, 2016; Lincoln & Denzin, 1994).

The assumptions were applied using paradigms as well as theoretical frameworks. According to the literature, paradigms refer to the fundamental belief system which directs the actions (Dźwigoł & Dźwigoł-Barosz, 2018; Greener, 2008; Guba, 1981; Lincoln & Denzin, 1994). The paradigms were introduced into the study process by the researcher and are referred to as worldviews (Creswell, Klassen, Plano Clark, & Smith, 2011).

The key characteristics relevant to this study were: triangulation of data that had been collected; framing of the research within the broader context; and flexibility in allowing the researcher to employ the various data collection tools with reference to the identified research problem (Christ, 2013; Wahyuni, 2012).

Philosophical worldviews are post-positivism; constructivism; and pragmatism (Creswell, 2013). The basis of this research applied the worldviews outlined by Creswell (2013). Epistemology is the philosophical worldview that deals with the construction of new knowledge (Johnson & Onwuegbuzie, 2004; Krauss, 2005).

Qualitative research applies the constructivist philosophical worldview (Johnson & Onwuegbuzie, 2004; Krauss, 2005). The constructivist philosophical worldview supports subjectivity in a given context, by looking at a wide range of possibilities, as opposed to channelling the findings into one reality (Tashakkori, Teddlie & Teddlie, 1998; Wahyuni, 2012). This involves time and social interaction. The constructivist philosophical worldview was the basis of this study as this research was pursued from a qualitative perspective (Creswell, 2013; Johnson & Onwuegbuzie, 2004).

The 4IR has brought about scientific changes that have disrupted society radically (Younus, 2017). Coronavirus, known as the COVID-19 pandemic, has also disrupted global society, governments and organisations radically, and this has prompted the world to embrace digital technology to a larger extent than ever before (Agarwal et al., 2020; MacArthur, 2020; Tedros, 2020).

The methodological approach included interviews, focus group discussions, and thematic analysis (Mayoh & Onwuegbuzie, 2015; Vagle, 2018; Valentine, Kopcha & Vagle, 2018). This study adopted the thematic analysis approach, and it included the participants (purposeful sampling) in transitioning from a manual process to an automated system-guided process using digital technology. The focus was on the change management from a manual process to an automated system-guided process in managing short-dated inventory by leveraging 4IR digital technology.

4.3 Qualitative research methodology

This research was undertaken using a qualitative methodology, and data collection was affected through interviews and focus. Applying this methodology is personal, as it involves examining the following aspects that cannot be seen, such as the beliefs, attitudes, and perceptions. This qualitative study focused on the interpretation as well as the presentation of the recommendations (Lincoln & Denzin, 1994).

The deductive approach, which is also referred to as the top-down process, begins with a general conclusion or theory and thereafter progresses in the direction of a specific observation (Creswell & Plano Clark, 2007; Khaldi, 2017). In qualitative research, the deductive approach means that the researcher normally deduces from theory in a deductive methodological process (Nasser, 2018). Engaging in deductive theories, the researcher must guard against bias, be able to generalise and apply the findings (Creswell & Creswell, 2017). Literature is used deductively as a framework to address the aims and objectives of the study (Creswell & Creswell, 2017). The researcher reflects, from a deductive perspective, on the data from the themes to garner evidence in support of the themes. The process of analysing the data begins inductively, but the deductive approach is an important part of the analysis progression (Creswell & Creswell, 2017).

Qualitative projects basically facilitate either a purpose or many of the intentions stated below (Leedy & Ormrod, 2015).The study could be considered exploratory, as further data can be gathered where there has been limited research conducted. This is relevant and applicable to this study as the study's aim was to present a framework in transitioning from a manual process to a system-guided process in a fast-moving consumer goods company in KwaZulu-Natal, South Africa.

A semi-structured interview guide (Appendices C & D) was formulated, and the sample groups were identified for data collection. For the purposes of this study, information was collected using a semi-structured interview guide. The research pursued an exploratory research approach (Leedy & Ormrod, 2015) as there were no studies found that addressed transitioning from a manual to an automated system-guided process in managing short-dated inventory in the logistics operations sector in the context of change management (Hausberg et al., 2018; van Hoek et al., 2010). Triangulation of sources involved analysing the trend of different sources, and the analysis of the differing viewpoints of the different people (Pandey & Patnaik, 2014).

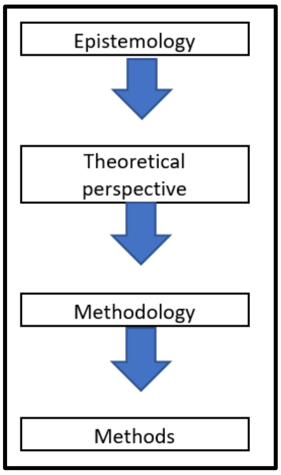


Figure 4.1. Crotty's model of the research process

Source: (Crotty, 1998, p. 4)

The framework in Figure 4.1 outlines the four stages of the research process which were articulated by Crotty as the fundamental stages in the research process (Crotty, 1998). This framework was the model underpinning the entire research processes and assisted the study with direction, from a generic philosophical ideology through the information gathering process to application of the analytical protocols (Creswell, 2003).

4.3.1 Crotty's four-step model for the research process

Methods: refer to the approach or process followed in collecting and analysing information with reference to the questions pertaining to the field of study (Crotty, 1998).

Methodology: refers to the strategic intent, planned actions, processes or designs that underlie the choosing as well as utilisation of the chosen method, with the objective of correlating this choice with the outcome that was sought (Crotty, 1998).

The theoretical perspective: refers to the philosophy that informed the strategy, giving a theoretical underpinning to the process as well as to the rationale and criteria (Crotty, 1998).

Epistemology: refers to the construction of new knowledge (Crotty, 1998). This outlines every step related to the specific facet that the study enquirer should make use of in researching, which includes the methods used, the methodological approach, the theoretical framework and the theory of knowledge which was used in conducting the study (Crotty, 1998). The discussion of the design of the research was advanced by looking into key factors, such as the concepts that were being advocated by the study promoter, which included the theoretical views. This qualitative research perspective concentrated on personal encounters as well as on experience (Creswell et al., 2011).

The research design divided the study processes into the following phases: philosophy; approach; strategy; choice; time horizon; technique, and procedure (Taylor, 2017). The author condensed this into four stages which were: epistemology; theoretical perspectives; methodology, and methods (Crotty, 1998).

It was important to take note of the strategic importance of these factors. Reflective qualitative researchers are active in identifying biases of a personal, social, political, or philosophical nature, which would impact negatively on the collection and interpretation of information gathered. Reflexivity was imperative in reducing biases and its influence over the integrity of the data collected (Leedy & Ormrod, 2015).

Interviews frequently result in quality, enriched data. Some of the interview questions related to (Silverman, 1993): facts (e.g., biographical information); a person's beliefs and views in relation to facts presented; emotions; reasons; current and historical behaviour patterns; behavioural standardisation (view of contextualised circumstances); and awareness of reasoning of acts and emotions (desirability of a certain behaviour pattern) (Leedy & Ormrod, 2015).

The readers, reviewers, and practitioners are enabled to identify the quality of the qualitative research as the inherent factors of a qualitative study should be evident. From experts in the field of qualitative research, the following suggested criteria should be considered (Altheide & Johnson, 1994; Creswell, 2013; Eisner, 1998; Gall, Gall & Borg, 2007; Glaser, 1992; Howe & Eisenhardt, 1990): The purpose of the research questions is to drive the methodology applied to the collection and analysis of information. Identify bias and explicit assumptions which the researcher has identified, and which could affect the collection of information as well as its analysis. Employ rigorous methods that are accurate and comprehensive in recording and analysing the information collected. Objectivity is important for the duration of the study process. Keep an open mind and present findings that reflect the latest information, compared to what was collated in prior research. Be completely reflective of all aspects of the phenomenon being researched, even in its complexities. Adequate time should be allocated to the understanding of the various difficulties, descriptive location settings, reactions, and views of participants in order to richly describe and comprehensively detail the objectives of the study.

Research should be coherently put together and there should be consistency in the findings of the study. The different information sources should confirm the findings consistently through the application of triangulation. The study should be persuasive through logical presentation and articulation of evidence in support of a perspective. This study presented supportive evidence which was covered in detail in Chapter Seven. The findings and conclusions were transferable to other operational units within the logistics environment. Results and the conclusion of the study should be useful in yielding and promoting a clearer grasp of the problem within the field of research. The results and conclusion of this study were indeed useful as they recommended a change management framework for transitioning from a manual to an automated system-guided process in the logistics environment (Altheide & Johnson, 1994; Creswell, 2013; Eisner, 1998; Gall, Gall & Borg, 2007; Glaser, 1992; Howe & Eisenhardt, 1990).

4.4 Strategy of enquiry - research design

Epistemology (knowledge) establishes the acceptable knowledge and addresses the facts accordingly. It was imperative to understand the important information in relation to the field of study and this study's focus was on transitioning from a manual process to an automated process utilising digital technology relevant to the 4IR. It is incumbent on the researcher to provide information acquired (Hennink, Hutter & Bailey, 2020; Lincoln & Denzin, 1994; Smith, 2017). This assists with the presentation of evidence in the field of study. Critical realism and interpretivism were the philosophical positions related to epistemology (Hennink et al., 2020; Smith, 2017). Interpretivism assisted with the interpretation of the way in which a person engages. It helped to determine what people understood about their own and others' actions (Glaser & Strauss, 1967; Lincoln & Denzin, 1994; Smith, 2017).

The main philosophies utilised can be explained in a few important hypotheses related to the ontological (which is real), epistemological (which is knowing), people natured (which may be determined in advance or otherwise), and methodological aspects (Holden & Lynch, 2004). This qualitative research explored the descriptions and opinions of the participants in this study (Smith, 2017).

There is a clear differentiation between epistemology and theoretical views, according to the research framework (Crotty, 1998). Thornhill et al., (2009) confirmed that the research design framework graphically illustrates the entire research process in six layers that focus on critical aspects of the research process (Thornhill, Saunders & Lewis, 2009). The study design, advocated by the author, acquired its shape from the understanding of the outer layer of the research onion, which led the researcher to arrive at the design decisions.

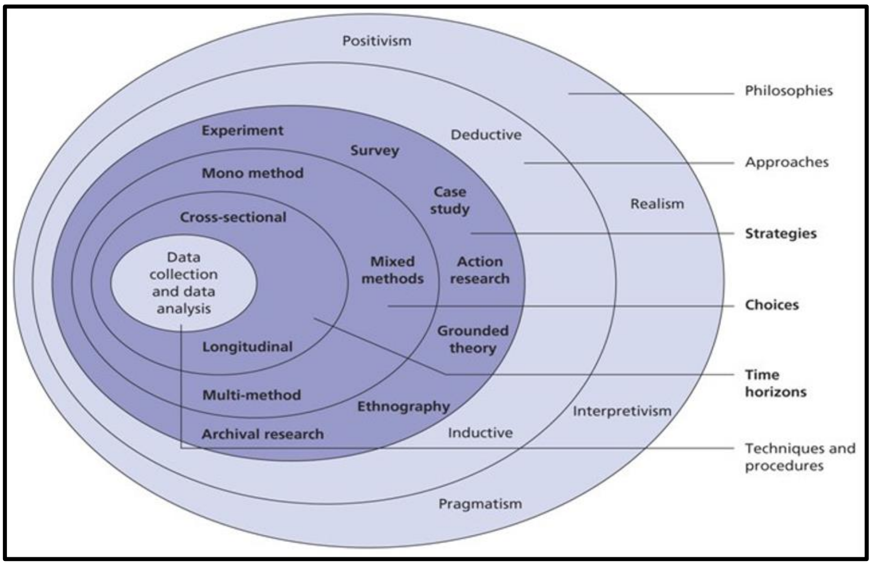


Figure 4.2. Research design framework

Source: (Saunders, Lewis & Thornhill 2007, p.130)

With reference to Figure 4.2, and applicable to this study, were the following: The study method utilised the data collection tools that were face-to-face interviews, virtual interviews, and focus group discussions; as well as secondary data from the study site. Data collected were analysed thematically.

4.5 Population determination and the sampling strategy

This section discusses the determination of the population and the sample size for this study. Qualitative research was undertaken that included face-to-face interviews, focus group discussions and digital video interviews. Sandelowski (1995) posited that a sample of ten should be adequate. Hence, a sample size of ten interviews should be adequate for data collection for a qualitative study (Sandelowski, 1995). Other authors also confirmed between three to ten for a qualitative design research study (Creswell & Creswell, 2017).

The sample size for this study was eleven face-to-face interviews; three focus groups that constituted a total of nine participants; and three digital video interviews conducted after the transition from a manual to a system-guided process. The inclusion criteria applied were that participants had the experience in, and control of, the manual process in managing short-dated inventory. The inclusion criteria were clear, practical and ethical (McElroy & Ladner, 2014).

A purposive sampling technique was used (Etikan, Musa & Alkassim, 2016). The purposive sampling method allowed the researcher to apply the researcher's own judgement in choosing the participants who were best situated to answer the study's research questions and meet its objectives (Saunders, Lewis & Thornhill, 2016). In addition, the researcher was allowed to choose specific cases that were particularly informative and relevant to the study (Saunders et al., 2016). All categories of the workforce (pickers; forklift drivers; reach truck drivers; clerk stock controllers; co-ordinators and managers) were included in the sample (Etikan et al., 2016).

4.5.1 Sampling strategy

It is claimed that what is commonly misunderstood is the importance of the quantity in the sample technique, by making sure there is sufficient coverage in the strategic intention of the sample size (Sandelowski, 1995). There could be contrasting issues with the small sample size which would not validate findings by reaching saturation point; or conversely, the numbers could be too large to undertake an in-depth study for qualitative research. Establishing the best sample size was really about understanding the evaluation processes of the data gathered in view of its intended purpose, the research methodology applied, the strategic purposeful sampling adopted and, ultimately, the aim of the research (Sandelowski, 1995).

Thinking and impact (Patton, 1990) in the different facets of purposeful sampling applied in qualitative research are based on the integrity of the data from the sample participants in each section and on the quantity of data received. A creative effect of sampling using a qualitative methodology lies in selecting a smaller sample. Insufficient numbers in the sample may cast doubts on how credible the study conclusions are. In qualitative studies, a base quantity cannot be computed, nor can the kind of sample unit that the research requires be pre-determined. However, the objective of the sample, as well as the category that was purposefully sampled, together with the research methodology adopted assisted the researcher in deciding the adequacy of the information obtained from the sample size (Sandelowski, 1995).

4.5.1.1 Purposive sampling strategy

Size and sampling are fundamental in extracting perspectives from the number of participants. Hence it is imperative to use a method of sampling that obtains the views of the people that are reflective of the entire sample size (Bock & Sergeant, 2002; Boddy, 2016). The strategies in choosing a sample can be categorised into probable and non-probable sampling techniques. Non-probability sampling is when an investigator does not have full charge at the outset of the population to be selected. Alternatively, being in control of selecting people to participate does not feature as a crucial aspect. One of the sampling techniques applied in qualitative studies is the purposeful sampling technique (Kuzel, 1992; Morse, 1986; Patton, 1990).

Purposively chosen samples were utilised to enable the researchers discretion in choosing those that constitute the population; alternatively, those that were available and who fit the requirements or objectives of the study (Sandelowski, 1995). There are various categories in this sampling technique, including the securing of detailed and comprehensive data that reflects common, peculiar, or alternative viewpoints that contributed to the rich data in this case study (Sandelowski, 1995).

The qualitative approach focuses on developments, facts, and involvement, which is the aim of a purposeful sampling technique (Miles & Huberman, 1994; Strauss & Corbin, 1990b). The human aspect, as well as locations, evidence, and documentation, together with information collated as samples of data produced in reference to the field of study undertaken, were noted. The quantity of the sample in qualitative studies refers to the number of people; the number of interviews conducted; the number of observations undertaken; and to the events included (Sandelowski, 1995). Humans play a critical role in the various research projects undertaken (Sandelowski, 1995).

4.5.1.2 Data saturation strategy

Saturation of data occurs when the research does not produce any additional patterns, themes or new information if the researcher conducts further interviews, focus groups or case studies related to the research topic (Guest, Bunce & Johnson, 2006). This concept informed the discussion around the constitution of the sample size for the purposes of qualitative analysis (Boddy, 2016). This study reached the level of data saturation when no new data were collected from continued investigations (Sandelowski, 1995).

Analysing data from a qualitative perspective refers to a generic maximisation in its diverse nature which is based on case studies (Ragin & Becker, 1989). A sample size is considered big when it is not conducive to a case study approach that gives impetus to a qualitative research methodology (Sandelowski, 1995). Increased variety in any qualitative research, like the different types of samples, requires an increased number of sample locations in order to arrive at the point of saturation (Sandelowski, 1995). The quantity is important to ensure that the sample size is adequate to support a specific qualitative outcome. An important principle is that the number in the sample size should be sufficient and supported by a comprehensive case study, analysed using the fundamentals of a qualitative analysis. The findings which were arrived at enrich the knowledge on the topic of the research (Sandelowski, 1995).

It is justifiable to use the concept of data saturation when deciding on sample size, which informs the sampling technique used when conducting an investigation through the qualitative approach (Boddy, 2016). Commentators have suggested that it is sufficient to have a sample size of ten when dealing with a homogenous population (Sandelowski, 1995). There is evidence in research conducted on data saturation that data saturation became apparent after six participants had been interviewed; and it was more definitely apparent after the twelfth interview had been conducted with a sample population in two different countries (Guest et al., 2006). Therefore, it is suggested that a sample size of twelve comprehensive interviews should be adequate (Mason, 2010) for the qualitative research (Boddy, 2016).

The researcher, using a qualitative methodology, was encouraged to refer to the sphere of the research as well as to the essence of the study to justify the sample size (Morse, 2000). An interaction period was allocated for all the confirmed participants who were interviewed (Marshall, Cardon, Poddar & Fontenot, 2013).

It is argued that purposive sampling is preferable in qualitative research (Bock & Sergeant, 2002; Boddy, 2016). The best sample size, considering the qualitative perspective of the study, was construed from the aim of the study. Within a constructive and comprehensive qualitative approach to any research, one case study or example could be very enlightening (Boddy, 2016).

The researcher considered data saturation (Boddy, 2016) in terms of a sample that was sufficient, in-depth, and which contributed to a comprehensive case study. The sample size for this study was twenty-three, made up of eleven face-to-face interviews, three focus groups that constituted a total of nine participants, and three virtual interviews. The participants that constituted the sample were from the various levels and job functions at the study site. These participants had experience in managing, controlling, and executing the processes involved in managing short-dated inventory at the logistics study site.

4.5.2 Population of the logistics study site

The logistic services solution was a logistics division of the holding company, which was the logistics service provider for the Essential Foods and Beverages divisions. This study was conducted at the logistics operation at the Durban Regional Distribution Centre in KwaZulu-Natal, which had a total of 69 staff, comprising managers (administration, warehouse, primary distribution, and secondary distribution); safety health environment and quality supervisors; despatch and receiving co-ordinators; clerk stock controllers; reach truck drivers; forklift drivers and general workers. Functionally outsourced (FO) service provider personnel were also included in the study as they were the strategic service providers to the operations in Durban. This was a total of 21 staff. (Refer to Table 4.1).

Table 4.1. Population of the logistics study site

No	Department	Position	Pioneer	FO	Interview
1	Administration	Admin Clerk	6		1
		Admin Manager	1		1
2	Distribution	Billing Clerk	2		
		Forklift Driver	8		
		Primary Manager	1		1
		Secondary Manager	1		2
		Stock Clerk	5		2
		Transport Expeditor	1		
		Temp General Workers		4	
3	Health & Safety	SHEQ Supervisor	1		
4	Reworks/Debriefing	Forklift Driver	2		
		Stock Clerk	2		
		Temp General Workers		2	
		Supervisor		2	
		General Workers		11	
5	Warehouse	Dispatch/Receiving Cordinator	3		3
		Forklift Driver	6		
		PI Counter	2		2
		Reach Truck Driver	3		
		Stock Clerk	3		1
		Warehouse Manager	1		1
		Temp General Workers		2	
	Total		48	21	14

Source: Author

Table 4.1 reflects the population of the logistics study site and identifies the sample for the study. The first column (No) lists the number of departments, and the second column (Department) reflects the sub-divisions in each of the departments. There are five departments: administration; primary and secondary distribution; health and safety; reworks and debriefing; and warehouse. The third column (Position) reflects the job functions. The fourth column (Pioneer) shows the number of permanent employees in each job function, and the fifth column gives the number of functionally outsourced (FO) personnel in the respective job functions to date. The sixth column (Interview) reflects the participants in the various job functions that were included in the qualitative face-to-face interviews.

Table 4.2. Focus group participants

No	Department	Position	Pioneer	FO	Participants	Focus Group
1	Administration	Admin Clerk	6			
		Admin Manager	1			
2	Distribution	Billing Clerk	2			
		Forklift Driver	8		1	
		Primary Manager	1			
		Secondary Manager	1			
		Stock Clerk	5		1 + 1	1
		Transport Expeditor	1			
		Temp General Workers		4		
3	Health & Safety	SHEQ Supervisor	1			
4	Reworks/Debriefing	Forklift Driver	2		1	
		Stock Clerk	2		1	
		Temp General Workers		2		
		Supervisor		2	1 + 1	1
		General Workers		11		
5	Warehouse	Dispatch/Receiving Cordinator	3			
		Forklift Driver	6		1	
		PI Counter	2			
		Reach Truck Driver	3		1	1
		Stock Clerk	3			
		Warehouse Manager	1			
		Temp General Workers		2		
	Total		**48**	**21**	**9**	**3**

Source: Author

In Table 4.2 the sixth column (Participants) reflects the participants in the focus groups from the different job functions and the numbers are colour-coded into red, blue and green. The last column (Focus Group) reflects the three focus groups with the relevant colour indicating the participants that constituted each group for this study. In summary, this study included the logistic services division in Durban, with a staff complement of 48 personnel across the various job function levels of the operation, together with the FO service provider's staff complement of 21, which included the supervisor on site. Hence the total population was 69.

The inclusion criteria applied were that participants had experience in the manual processes and were directly involved in checking of inventory and picking up of sales orders for short-dated inventory. Excluded were those participants who were included in the individual interviews. Inclusion criteria should be clear, practical, and ethical (McElroy & Ladner, 2014).

4.6 Data collection tools

The deductive method commenced with reviewing the information as the data were collected and included the information that was analysed earlier that was incorporated into the information gathered.

Thereafter, it involved an exercise to find the link between the cycle of the data collected and the analytic cycle (Hennink et al., 2020). The data collection tools used were in-depth interviews, both face-to-face and digital video interviews, and focus groups. Triangulation (Boddy, 2016; Guest et al., 2006) of data was applied.

4.6.1 Methodology

The research included interviews and focus groups. A key point to take note of in the construction of an interview schedule, and thereafter in applying it, are (Saunders, Lewis & Thornhill, 2003) the questions that assist in collecting information from the entire or a select number of participants who are asked the exact same questions. The responses were recorded in print format or electronically. A semi-structured interview guide (Appendices C and D) was used for this study. It was printed before the researcher conducted the face-to-face interviews, focus group interviews, and virtual interviews.

The researcher needed to be sure, when designing the list of questions, that the aims and objectives of the study were suitably covered. Consideration was given also to the collation of the data generated from the participants. The design of the questions was simple and direct so the responses obtained could be easily and meaningfully collated (Saunders et al., 2003).

For data to be relevant and transferable, the phrasing of the questions for the interviews and focus groups is important for information generation by the researcher and to confirm that it is transferable and credible (Saunders et al., 2003). The semi-structured interview guide (Appendices C and D) utilised for the interviews and focus groups. This can be explained as follows: Those that were open-ended meant that the participants had the opportunity to articulate their personal responses. This enabled the researcher to arrange the data collected thematically. These were categorised according to the aim of the study in a semi-structured interview guide for analytical ease (Saunders et al., 2003).

4.6.2 Qualitative interviews

Eleven participants were interviewed from the various departments at the study site, including those from administration, warehousing, and distribution. From a qualitative perspective, the interviews were not strictly prescriptive. The researcher tried to maintain an informal and cordial atmosphere so that the participants could freely express themselves in response to the questions posed to them. It was understood that the location of the interview could possibly influence the data being collected (Saunders et al., 2016). Hence, it was imperative that the participants in this research study were comfortable and in a familiar environment so that they could respond freely in contributing to this research. On this basis, the qualitative interviews and qualitative focus group interviews were conducted during their working hours and in their working environment, which was the study site for this research. The participants were relaxed and engaged with the researcher as a person that they were familiar with and someone who could be trusted (Leedy & Ormrod, 2015).

Table 4.3. Interviews

INTERVIEWS								
No	**Reference**	**Date**	**Duration**	**Department**	**Position**	**Qualification level**	**Member**	**Years of Service**
1	**P1**	2019 11 19	55	Secondary Distribution	Distribution Manager	B.Com Supply Chain/CLSCM	EE/SD	9
2	**P2**	2019 11 19	45	Secondary Distribution	Clerk Stock Control	Matric	Union	3
3	**P3**	2019 11 19	44	Warehouse - Inbound	Despatch/Receiving Co-ordinator	B.Com Hons Supply Chain	Safety	2
4	**P4**	2019 11 20	41	Administration	Administration Manager	B.Com Accounting	Safety	3
5	**P5**	2019 11 20	68	Administration	Administration Clerk	B.Com Hons Marketing		3
6	**P6**	2019 11 20	55	Warehouse - Inbound	Clerk Stock Control	Matric	Union	1.5
7	**P7**	2019 11 21	45	Warehouse	Physical Inventory Counter	B.Administration	Union	2
8	**P8**	2019 11 21	46	Primary Distribution	Distribution Manager	Diploma	EE/SD	12
9	**P9**	2019 11 21	46	Secondary Distribution	Clerk Stock Control	Diploma	Union	8
10	**P10**	2019 11 22	45	Warehouse	Physical Inventory Counter	National Diploma	Union	2
11	**P11**	2019 11 22	58	Warehouse - Inbound	Warehouse Manager	National Diploma	EE/SD	12
12	**P12**	2020 05 15	60	Warehouse - Inbound	Despatch/Receiving Co-ordinator	B.Com Hons Supply Chain	Safety	4
13	**P13**	2020 05 18	60	Warehouse - Inbound	Despatch/Receiving Co-ordinator	B.Com Supply Chain	Safety	2
14	**P14**	2020 05 19	45	Secondary Distribution	Distribution Manager	B.Com Supply Chain/CLSCM	EE/SD	9

Source: Author

Table 4.3 reflects the details of the eleven face-to-face interviews with participants 'P1' to 'P11' that were conducted at the logistics study site in Durban, KwaZulu-Natal, South Africa. Also listed are the three interviews conducted virtually after changing from a manual to a system-guided approach with participants 'P12' to 'P14'. The date the participants were interviewed is recorded, as well as the duration of the interviews; the participant's departments at the logistics study site; the position of the participants; their qualifications; membership of the trade, skills development/employment equity committee (SD/EE) and safety committee is also captured; as well as years of service with the company.

The researcher conducted the interviews and had a prepared semi-structured interview guide (Appendices C and D). These guides were utilised for the interviews and focus groups and points of clarity were obtained where necessary, based on the interactions and contributions received from the participants (Saunders et al., 2003). The following points need to be noted:

i. The semi-structured interview guide was prepared at the outset. The researcher prepared the semi-structured guides (Appendices C and D) in advance of the interviews.

ii. The inclusion of participants in the researcher's sample who were aligned to the data being sought was ensured. The purposeful sampling technique was applied to the sample selection in view of the aims and objectives of the study.

iii. To ensure the suitability of the venue, all participants were interviewed in a familiar work environment which was the study site. From the researcher's perspective, the participants were comfortable as they were interactive, engaged, and even exemplified their responses by referring to the study context.

iv. The researcher ensured that consent was obtained in writing. Each participant completed and signed the informed consent document (Appendix B).

v. Interaction was maintained by ensuring that, once the participants were settled into the interview, they were engaged and involved.

vi. The focal point was on reality and not on the abstract or hypothetical. This was inherent in all the interviews as the participants communicated what they experienced, understood, and felt in the study context.

vii. Care was taken not to lead the interviewee. The interviewer kept to the interview guide and only interjected for points of clarity.

viii. The recordings were transcribed verbatim.

ix. The record captured personal reactions and experiences of the participants. All personal responses were recorded and transcribed.

x. Consideration was given to the fact that the responses may not all be factual. Some participants clarified their perceptions by explaining their positions and the researcher treated these explanations as the participants' opinions (Leedy & Ormrod, 2015).

With reference to focus groups, the researcher should be aware of the patterns within the group when doing collective interviews. Where there is more than one person in an interview, it is uncommon for them to act equally. This was picked up by this researcher where a respondent was talking over another participant as thoughts were stimulated during the discussion. The researcher dealt with this tactfully by interjecting and ensuring all participants that they would be heard and that their contributions to the data were being collected and placed on record (Leedy & Ormrod, 2015).

The researcher conducted eleven in-depth face-to-face interviews (Refer to Table 4.3), which included with managers; despatch/receiving co-ordinators; physical inventory counters; a stock controllers' clerk; and an administration clerk. A further three interviews (P12, P13, and P14) were conducted over Google Hangout Meeting due to the impact of the Coronavirus pandemic which restricted face-to-face interviews (Refer to Table 4.3). A total of fourteen interviews were conducted. All participants were communicated with through each department head, and they all agreed to participate voluntarily. Times were agreed upon with the managers of the respective departments after consulting with the participants.

The identified participants were approached directly, the nature of the study was explained, and they confirmed participation. It was emphasised that they were under no obligation to participate and that they could withdraw at any point if they chose to do so. Ethical considerations, as outlined by Hennink et al. (2020), were considered and the researcher confirmed that their participation was for research purposes only and that the data would be confidential and anonymous, which is further elaborated on in Section 4.12. At the outset of the interviews, all participants were read and shown the informed consent letter (Appendix A) and, subsequently, each participant completed and signed the consent document (Appendix B).

It was also confirmed that the interviews would be audio recorded, to which no one had any objections. An audio recorder was utilised by the researcher to record the interviews to avoid any disruptions, insofar as note taking was concerned, and primarily for the transcription of the interviews.

All participants were eager to participate but were nervous at the outset of the interviews. As the participants were engaged, their confidence levels increased, and they were at ease and responded insightfully. The qualitative face-to-face interviews were guided by a semi-structured interview schedule with the emphasis on the following aspects (Qualizza & de Luca, 2021): the challenges that the logistics workforce faced in embracing technological change related to the 4IR; the competencies required by the logistics workforce to embrace the technological change relevant to the 4IR; and change management in transitioning from a manual process to an automated system-guided process. The research questions constructed by the researcher for this study related to the recommendations for a change management framework to apply at the logistics study site, but which could be transferable to the logistics environment in transitioning from a manual process to an automated system-guided process. Appendix C and Appendix D list the interview questions that were posed to the participants in this study.

In actively identifying bias of a personal nature, the researcher had to reflect to ensure that bias was reduced and that it did not influence the integrity of the data collected (Leedy & Ormrod, 2015). The participants freely expressed themselves without any inhibitions. In this study, the researcher shared the common knowledge of the manual processes and the experience of the operations with the participants. As recommended by Creswell and Creswell, (2017), the researcher shared his past experience with the research problem, the participants, and the setting, in order to illustrate his connection to the study. The authors were not suggesting that the researcher should share his past experience to influence the study, but rather to offer other insights into the data collected (Creswell & Creswell, 2017). The interview questions that were posed to the participants were indicative of a neutral positioning; also, the researcher did not offer any personal opinions or views to reduce any potential bias.

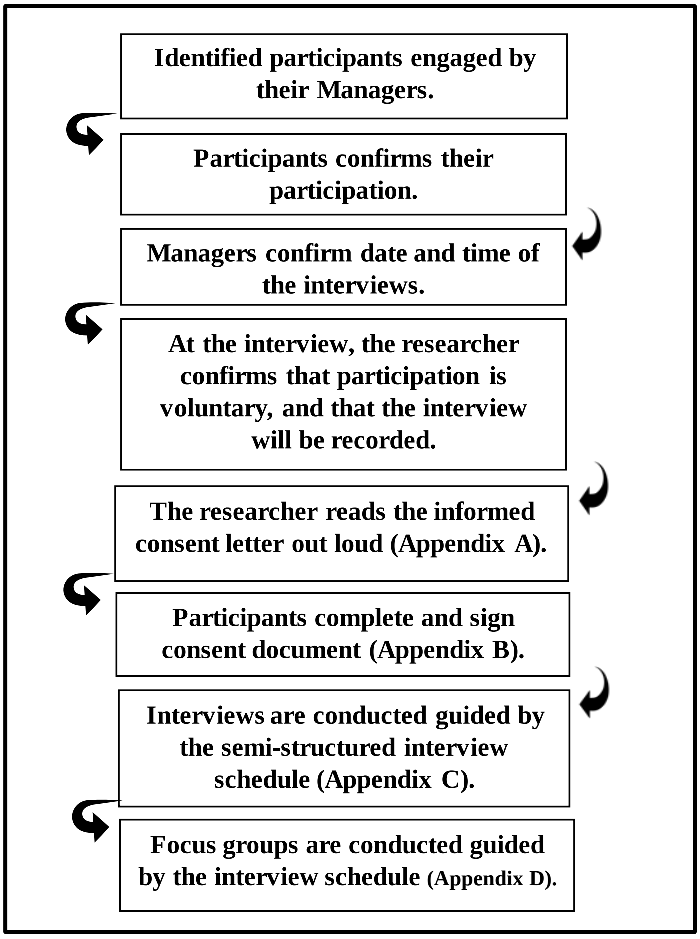


Figure 4.3. Flow of data collection

Source: Author

Figure 4.3 shows the sequence of the data collection that the researcher conducted.

4.6.3 Qualitative focus groups

There are instances where many people are interviewed together in what is referred to as a focus group. This should not be a very large group – generally a maximum of ten to twelve are involved to engage on a specific topic. This can include a natural person to moderate if the researcher so desires, to introduce the discussion points and ensure that all participate, and that the focus remains on the discussion points (Leedy & Ormrod, 2015). This could be particularly necessary when there are time constraints (Creswell, 2013; Neuman, 2011).

The collective participants that constituted a group were a source of information, generally offered from their points of view as an identified, collective, target audience with reference to specific topics or areas of the study. It was imperative that the interviewer provided a conducive environment for the participants to engage in, and in which the interviewer could keep a record of the responses using a tape recording, a video recording, note-taking or any other recording device (Saunders et al., 2003).

The objective was explained, as well as the procedure and direction of the interviews. These collective discussions were useful in ascertaining key challenges and areas of focus. These experiences further assisted in the formulation of questions and strategic approaches in interviews that will be developed for future research. Their usefulness was also demonstrated in the discovery of issues that had surfaced which may not have been encountered, such as the fact that some may not have voiced their opinions had it not been that they were in a group setting (Saunders et al., 2003). The researcher was aware of the patterns within the group during the collective interviews. Some did not respond easily, due to their introverted natures, or because they questioned whether or not their thinking was correct or valid. The representativity of the information collected, and its usefulness, was ensured by each participant's contribution. For this reason, compilation of the questions for a focus group should be relatively short (Leedy & Ormrod, 2015).

A purposive sampling technique was used (Etikan et al., 2016). All categories of the workforce were included in the sample size (Etikan et al., 2016). The researcher conducted three in-depth focus group interviews (Refer to Table 4.4. Focus Groups) which included forklift drivers, reach truck drivers, clerk stock controllers and supervisors. Focus group interviews were conducted at the logistics study site which was the place of work for all the participants. From a qualitative perspective, the interviews were not strictly prescriptive. The researcher endeavoured to maintain an informal and cordial atmosphere. Hence, the participants were relaxed and engaged with the researcher as someone with whom they were familiar and someone that they could trust (Leedy & Ormrod, 2015).

Table 4.4. Focus groups

No	Reference	Date	Duration	Department	Position	Qualification level	Member	Years of Service
				FOCUS GROUP 1				
1	**FG1**	2019 11 25	98	Warehouse - Inbound	Reach Truck Driver	Matric	Union	3
1	**FG1**	2019 11 25	98	Warehouse - Inbound	Forklift Driver	Matric	Union	1
1	**FG1**	2019 11 25	98	Primary Distribution	Clerk Stock Control	Matric	Union	1.5
				FOCUS GROUP 2				
2	**FG2**	2019 11 28	100	Reworks	Forklift Driver	Matric	Union	1
2	**FG2**	2019 11 28	100	Primary Distribution	Forklift Driver	Matric	Union	1
2	**FG2**	2019 11 28	100	Secondary Distribution	Supervisor	Diploma	Union	1
				FOCUS GROUP 3				
3	**FG3**	2019 11 29	111	Reworks	Supervisor	Matric	Union	1
3	**FG3**	2019 11 29	111	Reworks	Clerk Stock Control	Diploma	Union	8
3	**FG3**	2019 11 29	111	Primary Distribution	Clerk Stock Control	Diploma	Union	10

Source: Author

Table 4.4 provides the details of the three focus group interviews that were conducted at the logistics study site in Durban, KwaZulu-Natal, South Africa. It records the date of the interviews and duration of the interviews; the participant's department; position; qualifications; trade union membership, and years of service with the company. The inclusion criterion (McElroy & Ladner, 2014) applied was that the participants had to have had experience in executing the manual process dealing with short-dated inventory at the logistics study site. This included identifying short-dated inventory; checking for accuracy of data on short-dated inventory; picking up of the sales order for short-dated inventory; staging of the inventory; post pick-up audits; and loading the confirmed orders of short-dated inventory for delivery to the customers.

All participants were communicated with through their head of department (HOD), and they agreed to participate voluntarily, which was confirmed by the HOD with the researcher. The participants freely expressed themselves without any inhibitions. The researcher shared the common knowledge of the manual processes and the experience of the operations with the participants. It was recommended in the literature that the researcher should share details of relevant past experience with the participants (Creswell & Creswell, 2017). However, this did not influence the importance of the context and methodology of this study.

Interviews were conducted at a convenient time arranged with the participants at their place of work. All interviews were conducted by the researcher himself and he personally collected and analysed the data. A semi-structured interview schedule (Appendix D) was followed for each focus group and pertinent follow-up questions were also posed where necessary. These interviews were recorded using a digital voice recorder. At the beginning of the interview, each participant confirmed their identification as this assisted during the transcription in identifying the responses obtained (Leedy & Ormrod, 2015).

The participants were engaged and responded to all the questions posed to them. Participants were encouraged to freely express their views and the interviewer only intervened appropriately to assist the participants if there were challenges (Saunders et al., 2016). There were instances where thoughts had been stimulated by listening to the responses of the other participants in the focus group, and a participant would sometimes interrupt by trying to speak over another participant. When these situations arose, the interviewer intervened by allowing the participant who was contributing to complete the contribution and, thereafter, allowing the other participant to make their contribution. As stated by Leedy & Ormrod (2015), where there is more than one person in an interview, it is uncommon for them to act equally. There will always be a dominant personality (Leedy & Ormrod, 2015). Participants felt comfortable in expressing their emotions relating to their thoughts on the topic under discussion, which led to a very informative session (Creswell & Creswell, 2017). In response to the questions posed, the participants could exemplify their points by citing various experiences that related to what they had seen. This will be covered in detail in Chapter Five, which discusses the results of this study.

Once the interviews and focus groups were completed, the interviews were transcribed, verbatim, in Microsoft Word for subsequent analysis of the data that was collected. The data generated were categorised appropriately by applying the analysis procedure discussed in Section 4.7.

4.6.4 Data collection and transcription strategy

Most smart devices are equipped with the software for recordings. Video recordings can also be downloaded if the appropriate software is available. There is also software available for transcribing. If need be, qualitative interviews can be conducted through the IoT, which includes Skype, Zoom, and other digital technology tools. The web channels available through digital technology are also conducive to group interviews. Ethics should still apply when using these digital technologies for conducting interviews. This means that informed consent must be obtained, and protection of the respondent's privacy must be maintained. In addition, the researcher must ensure the appropriateness and qualification of each participant for the study being undertaken. This could pose a difficulty when the researcher does not see the participant in person (Leedy & Ormrod, 2015).

Audio recording was utilised for the qualitative face-to-face interviews and for focus group interviews. Due to the lockdown strategy implemented in South Africa, resulting from the pandemic (Zuma, 2020), face-to-face interviews from the end of March 2020 could not be conducted; hence, the researcher had to conduct digital video interviews after the technological change in process, based on the IoT and utilising the Google Hangout platform. This was conducted in conformance with the applicable ethical code. The researcher thereafter transcribed all the qualitative face-to-face interviews, focus groups interviews, and virtual interviews verbatim, in Microsoft Word for subsequent analysis of the data collected.

4.7 Data analysis

The researcher analysed the data generated from the transcription of the interviews conducted, which was premised on an inductive perspective in establishing recurring themes and coding them. This method of analysing data refers to the identification of patterns and themes, as well as to categories that emanate from the information collected. They are extracted from the information collected and not deduced before information is gathered and analysed (Patton, 1980).

Figure 4.4 (below) is a graphical representation of data analysis from steps one-to-five, as detailed by Creswell and Creswell (2017), which the researcher followed in analysing the data generated in this study. Thereafter, each step is discussed in more detail.

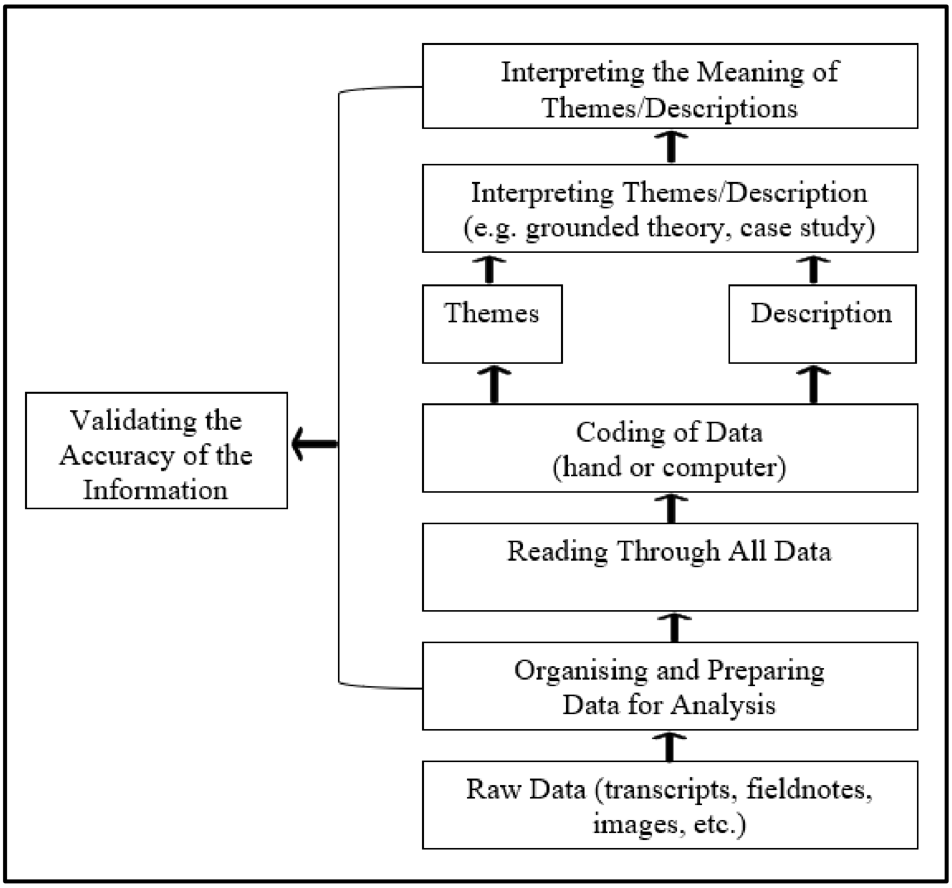


Figure 4.4. Steps in Data Analysis

Source: (Creswell & Cresswell, 2017, p. 317)

The steps illustrated in Figure 4.4, as advocated by Creswell and Creswell (2017), which was the process of data analysis that the researcher followed in the sequential step methodology, moved from the specifics to the general, and included various levels of analysis, as detailed below.

The first step was to organise and prepare the data collected for analysis (Creswell & Creswell, 2017; Hennink et al., 2020). In this step the researcher transcribed the qualitative interviews (face-to-face, focus groups, and virtual interviews) verbatim, thereafter visually scanned the information collated, and then proceeded to sort the data and finally arranged the generated data.

The second step was to read through all the data collected (Creswell & Creswell, 2017; Hennink et al., 2020). The researcher had a feel for the data and reflected on the participants' responses and what they had communicated through their tone of communication; their ideas that resonated with the subject matter; the depth of understanding; the trustworthiness of the data obtained; and the transferability of the information.

The third step was arranging the data into codes (Creswell & Creswell, 2017; Hennink et al., 2020). As explained by these authors, coding involves arranging information collected by grouping segments, and thereafter identifying a word that represents a category (Rossman & Rallis, 2011). Information was analysed by the researcher and this was thereafter compared (Glaser & Strauss, 1967; Strauss & Corbin, 1990a) to the participants' responses in the transcripts of the interviews. This was then categorised into thematic coding, as extracted from the information collected (Alyahmady & Alabri, 2013; Bowen, 2005).

The fourth step was the generation of a description and appropriate themes (Creswell & Creswell, 2017; Hennink et al., 2020; Mills, 2021). The codes were translated into themes that were analysed. This entailed referring to the process of manual operations; the understanding of digital technology; the change management process; and the end-state of systems-driven processes. These codes were analysed to identify consistencies, variations, and basic patterns. In essence, the information analysis involved the coding into themes as well as ideas. There was a gradual emergence of themes as the researcher became involved in the data sets, logically associating them with the research questions, as well as taking into consideration the learnings from the literature that was reviewed earlier. As the process developed, thematic identification became progressively more and more apparent, and it developed into a major, overarching theme that was premised on evidence extracted from the data generated. The emergence of these themes, in conjunction with the underpinning theoretical framework, lead to the ultimate results of this study (Bowen, 2005).

The fifth step entailed representing the descriptions and themes (Creswell & Creswell, 2017; Hennink et al., 2020; Mills, 2021). The themes and sub-themes that emerged from the data generated are discussed in Chapter Five. The researcher utilised figures and tables as adjuncts to the discussion. The themes and sub-themes that emerged from the data were generated from the qualitative face-to-face interviews and the qualitative focus group interviews. The four themes that emerged from the data collected, which ultimately reached the saturation point, were Technology Exposure and Awareness; Skills and Competencies; Challenges and Recommendations; and System Implementation – Manual to Automated.

4.8 Qualitative research – thematic analysis

Thematic analysis is the basis for a qualitative analysis methodology. This method identifies, analyses, organises, describes, and reports themes that are extracted from the data (Braun & Clarke, 2006; Nowell, Norris, White & Moules, 2017). It was important that this qualitative research study was conducted in a rigorous and methodical manner to yield results that were meaningful and useful (Nowell et al., 2017). For this data analysis of this study to be deemed trustworthy, the researcher endeavoured to conduct the analysis in a precise, consistent, and exhaustive manner, recording, systematising, and explaining the analysis methodology that was supported by adequate detail, thereby confirming the credibility of the process (Nowell et al., 2017).

4.9 Definition of qualitative techniques used for thematic analysis

Computer-assisted qualitative data analysis software (CAQDAS) was used. The value of CAQDAS to qualitative research comes when the software is used to carry out a methodologically sound study that adheres to quality standards, such as transparency, communicability, and coherence (Dalkin et al., 2021; Kalpokas & Radivojevic, 2022). CAQDAS assisted this study with the theory development, refinement, and testing, as the iterative process of analysing the data was conducted, which was useful in understanding the rich qualitative data. Utilisation of this software made transparent the rich data as it was analysed and documented, providing an 'audit trail' of sorts to track the emergence of the themes. This assists transparency for internal evaluation (Dalkin et al., 2021). In this study, NVivo create nodes; word clouds; tree maps; cluster analysis; hierarchy charts; and word trees (Dalkin et al., 2021; Hetenyi, Lengyel & Szilasi, 2019; Kalpokas & Radivojevic, 2022; Schmieder, 2020).

4.9.1 Word clouds

Word clouds demonstrate the most frequently used words. The larger the font, the more the word was used. This helps to identify key areas/themes (Hetenyi., et al., 2019). Figure 4.5 illustrates all words related to the theme of skills and competencies. Technological skills are needed for system changes.

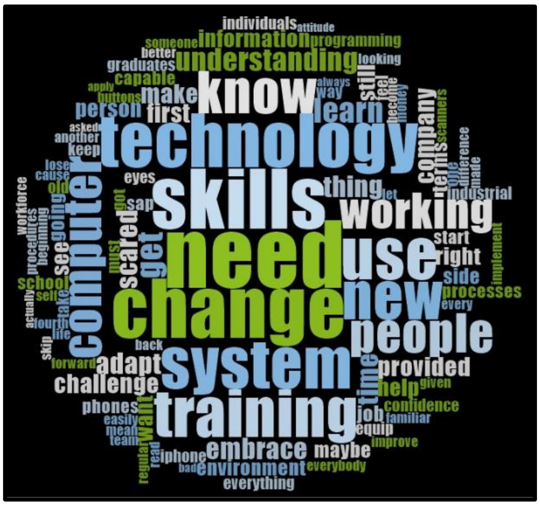


Figure 4.5. Word cloud on skills and competencies

Source: Author

4.9.2 Tree Maps

These show the data (frequently used words) in terms of size of blocks. Hence, the larger blocks reflect those words mainly used. The entire map gives a holistic view of how data is placed in terms of size of reference (Hetenyi., et al., 2019). Figure 4.6 illustrates the tree map related to the theme of technology exposure and awareness. The use of technology to implement the new EWM system with scanners to move from a manual to a system-guided process.

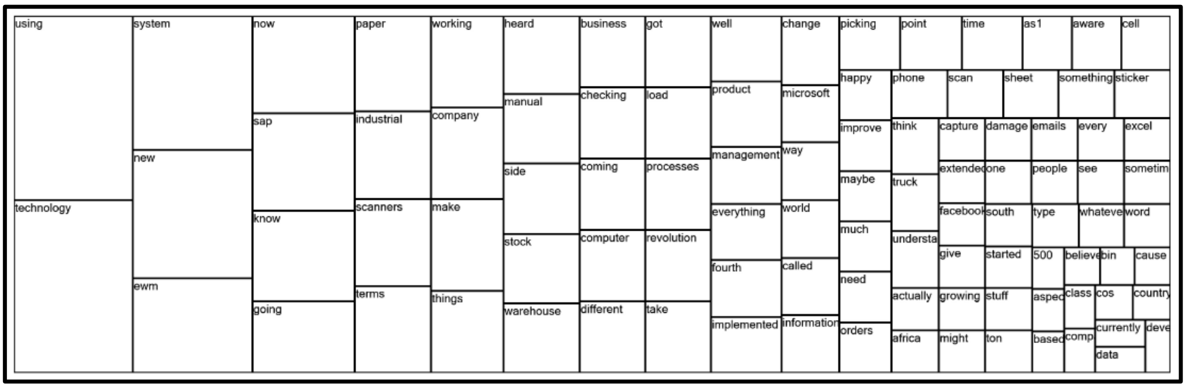


Figure 4.6. Tree map on technology exposure and awareness

Source: Author

4.9.3 Cluster analysis

Bubble diagrams were used. These diagrams illustrate the data (key words) in the form of bubbles. The larger the bubble, the higher frequency of words/references. Furthermore, the closeness of the bubbles shows that there is a relationship between those words (Hetenyi., et al., 2019). Figure 4.7 illustrates the cluster analysis related to the theme of challenges and recommendations. Create awareness so that people can understand the new system to overcome challenges which needs to be initiated by the leadership of the company.

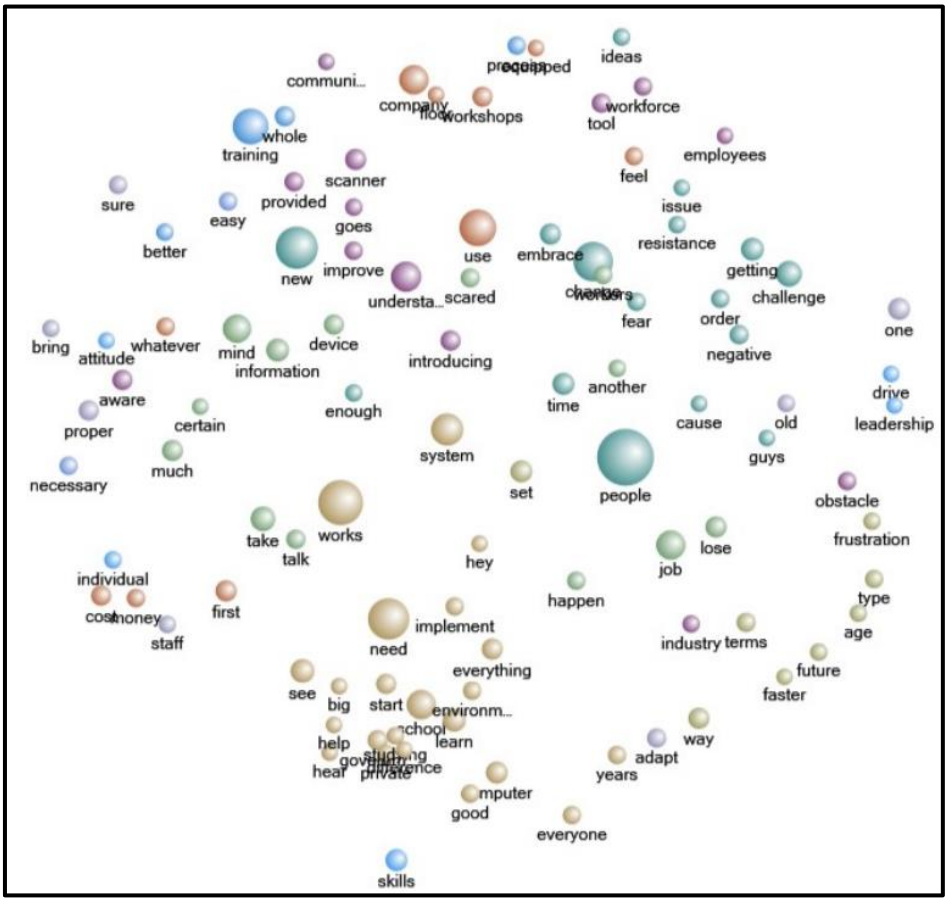


Figure 4.7. Cluster analysis on challenges and recommendations

Source: Author

4.9.4 Hierarchy Charts

These reflect the size of the nodes. The larger the size, the more volume/concentration of responses in that area (Hetenyi., et al., 2019). Figure 4.8 illustrates the hierarchy charts related to the theme of skills and competencies. The competencies that are needed to develop the skill sets of the workforce through training so that the workforce can embrace the technological changes.

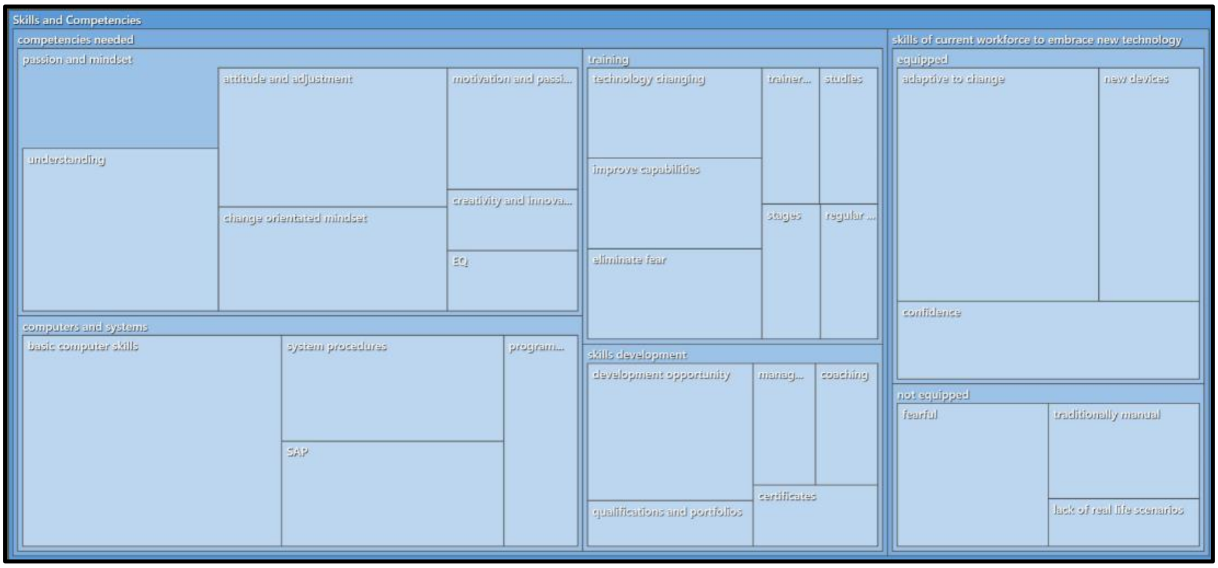


Figure 4.8. Hierarchy charts on skills and competencies

Source: Author

4.9.5 Word Trees

These are used to highlight key words and the words/sentences connected to that word. This allows the researcher to see how these words connect to other words and sentences/views (Hetenyi., et al., 2019). Figure 4.9 illustrates the word tree related to the manual process. The manual process is labour intensive.

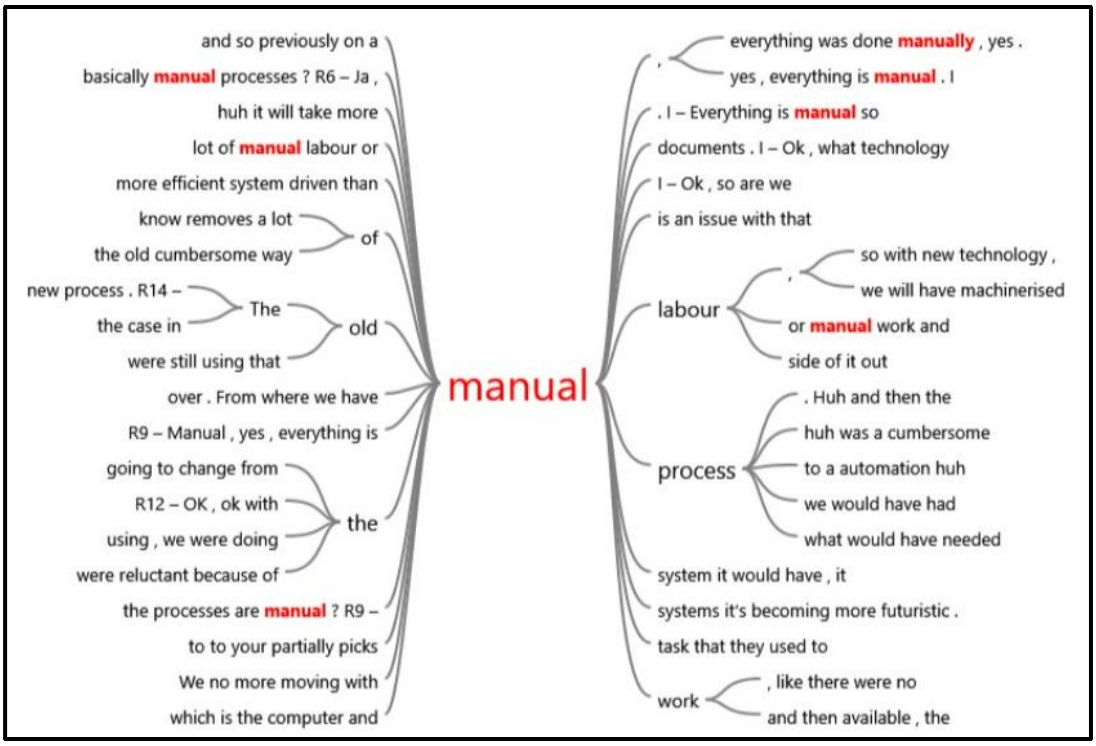


Figure 4.9. Word tree on manual process

Source: Author

4.10 Reflexivity

As advocated by research, reflexivity from a qualitative research perspective is about the researcher's reflection on their position as well as their experience, context, and background potentially assisting in formulating how data is interpreted in respect of inherent themes that are extracted, as well as the context of assimilation of information generated. It is not about supporting biases and values in the research. It is about utilising the background of the researcher to give shape and direction to the research (Creswell & Creswell, 2017; Dodgson, 2019).

These reflections necessitated comments on the following pertinent points: The researcher had experience with the research problem, with the participants, and with the study site. The researcher's experience included over two decades in manual operating procedures, as well as having worked with some of the participants for some time.

Interpretations shaped by the researcher's past experiences of the research problem, the participants, and the study site, assisted with the interpretation of the data generated from the participants, and the study site, with reference to inherent themes and contextualised evidence in support of the study objectives. This contributed to the reliability of the findings and assisted in recommending a change management framework for the logistics environment to transition from a manual process to an automated systems guided process.

According to Cresswell & Poth (2016) reflexivity should be included in qualitative research (Creswell & Poth, 2016). Included are observations of the data generation process, what was learned, and how the participants reacted. However, these discussions are limited to avoid overshadowing the importance of the context or methodology in this study (Creswell & Creswell, 2017; Dodgson, 2019).

4.11 Data trustworthiness

An inherent strong point in the qualitative methodology is a perceptive researcher with the ability to discern underpinning designs whilst acting within the social interaction context and organisational culture which application of the standard, quantitative tools could not shed light on. The researcher could be referred to as a research instrument in the very same way that an oscilloscope, interview guide, or a multiple-choice questionnaire can be used as an instrument of measurement. Potentially, the risk of relying on people's minds, is subjective, and can lead to biases and preconceptions, as well as expectations which will influence negatively the transferability (Malterud, 2001) and trustworthiness

(Graneheim & Lundman, 2004) of the information gathered. There are different strategic approaches that can reinforce the trustworthiness and transferability of the information gathered, thus making the data collection set credible (Leedy & Ormrod, 2015).

For data to be trustworthy, it is crucial that the study investigates the phenomenon that it intended to investigate from the outset. In this study, there has been no deviation, as the objective of the study was the change management process of transitioning from a manual process to an automated system-guided process in managing short-dated inventory. From a qualitative perspective, credibility, dependability, and transferability are referred to in describing the different facets of research being trustworthy (Berg & Welander Hansson, 2000; Graneheim & Lundman, 2004; Guba, 1981; Lincoln & Guba, 1985; Patton, 1987; Polit & Hungler, 1999).

4.11.1 Transferability beyond the study setting

The qualitative aspect of research does not have to find a measurement with reference to the quantifiable aspect. Emphasis is on the transferability (data that can be shared as well as applied beyond the study setting) (Malterud, 2001). In addition, the information which has been collected must be trustworthy (Graneheim & Lundman, 2004). Particularly important is the fact that information that is collected has, firstly, to be accurate and has to refer to the entity or phenomenon under study (transferable); and secondly, the research design has to be consistently applied (Graneheim & Lundman, 2004; Malterud, 2001).

4.11.2 Credibility of findings

Credibility relates to the main theme of the study and indicates the level of confidence in managing the information that was analysed in relation to the study focus (Graneheim & Lundman, 2004). The research focus confirmed that the study had, in fact, assessed that which the study set out to assess. The focus of the study through the selection of the context, the selection of participants, and the method of information generation, demonstrated the credibility of the study (Graneheim, Lindgren, & Lundman, 2017; Graneheim & Lundman, 2004).

This study focused on the change management framework in transitioning from a manually operated process to an automated system-guided process, leveraging digital technology relevant to the 4IR. The sample selection brought vast experience to the exercise and that gave impetus to the increased possibility of valuable contributions from different perspectives being made in response to the research questions (Adler & Adler, 1994; Graneheim et al., 2017; Patton, 1987). The study's sample selection was very experienced in the manual operating procedures and had both the practical and systemic experience, which made a valuable contribution to addressing the research questions from different perspectives. Well managed data in their appropriate nodes and themes ensured that pertinent data were not unintentionally omitted or, conversely, that irrelevant information was not included, and this contributed to the credibility of the study findings (Graneheim & Lundman, 2004).

4.11.3 Dependability of data

Dependability explores factors that accommodate aspects of volatility, as well as aspects of phenomenal or design-induced transformation, which influence the extent that the information obtained may vary over time, which subsequently leads to amendments that could affect the researcher's decisions during the analysis process (Lincoln & Guba, 1985). This also refers to the stability of the findings and an audit trail could be used to achieve dependability (Bowen, 2005). Transferability relates to applying the study findings to other contexts or organisations. This research aimed to apply the findings beyond the study settings (Graneheim et al., 2017; Graneheim & Lundman, 2004; Malterud, 2001; Polit & Hungler, 1999). This study's findings were applied to other operations within the group, and this achieved the desired results and objectives in the management of short-dated inventory, as is presented in the discussion of findings chapter.

4.11.4 Triangulation of data

The strategy known as triangulation is commonly used by researchers and it entails the collection of various facets of information concerning the research investigation, and aims at establishing whether the data was consistent or inconsistent (Leedy & Ormrod, 2015). Triangulation (Leedy & Ormrod, 2015; Pandey & Patnaik, 2014) was used to increase confidence in the findings of this study. The research extracted data from the interviews, secondary data, and literature reviews. This method of triangulation was utilised for corroboration as it lent credence to the study's conclusions.

4.12 Bias and ethical considerations

Reflective qualitative researchers are active in identifying bias of a personal, social, political, or philosophical nature, which impacts negatively on the collection and interpretation of information gathered. Reflexivity is important in reducing bias and its influence over the integrity of the data collected (Leedy & Ormrod, 2015). Adherence to ethics requires obtaining the permission of the participants to participate, and the researcher took care that the participants were not harmed in any way and were assured that the information obtained remained confidential and that they would remain anonymous. The researcher took care that the necessary permissions that were required were obtained (Hennink et al., 2020). Ethical clearance (Appendix M) was applied for once approval was obtained to proceed with the research from the University of KwaZulu-Natal; and thereafter the researcher proceeded with the collection of data with a purposefully selected sample.

The informed consent letter (Appendix A) was read out aloud by the researcher to the participants of all interviews and focus groups prior to them acknowledging their consent by signing the informed consent document (Appendix B). The voluntary nature of participation, the confidentiality of data collected, and their anonymity was assured. Consent was obtained ethically and responsibly (Leedy & Ormrod, 2015).

In South Africa, His Excellency, the president of the country, Cyril Ramaphosa, made a declaration that Coronavirus was a national disaster, according to the *Disaster Management Act 57 of 2002* (Zuma, 2020). Hence, the country was in level five lockdown from 27 March 2020 until 30 April 2020. Thereafter, this was reduced to level four lockdown from 1 May 2020 until 31 May 2020, and then to level 3 lockdown from 1 June 2020 (MacArthur, 2020). In compliance with social distancing regulations, the Human and Social Sciences Research Ethics Committee (HSSREC) issued a notice, dated 6 April 2020, on conducting helpful, hopeful, and respectful research during COVID-19 by adapting to remote data collection/generation strategies which could include telephonic or other online and remote methods when conducting interviews, surveys, and questionnaires. Where informed consent could not be obtained in writing or on the online platform that was being used, informed consent needed to be audio recorded (HSSREC, 2020).

Physical distancing was practised (Gerwel-Proches, 2020) due to the impact of the Coronavirus. Digital technology has been accelerated and capabilities leveraged for business continuity, learning, education, interaction, and communication through digital platforms such as Google Hangout Meet; Skype for Business; Microsoft Team; Zoom; FaceTime; and WhatsApp Video call (Gerwel-Proches, 2020). The researcher had informed the HSSREC that interviews conducted during the lockdown period were to be done electronically; informed consent (Appendix B) was to be obtained and the interviews would be audio recorded.

A purposive sampling technique was used (Etikan et al., 2016). All categories of the workforce were included in the sample size (Etikan et al., 2016). The data, which collected was collected from the Durban Regional Distribution Centre, which was the focus of this study in transitioning from a manual process to an automated system-guided process, is trustworthy and credible (data were analysed with reference to the focus of the study) (Polit & Hungler, 1999), and transferable information can be shared and applied beyond the study setting (Malterud, 2001). Interviews were conducted with individuals and focus groups utilising the purposive sampling technique, which included all levels of the workforce. Refer to Table 4.3 for sample selection from the identified population. Fourteen interviews were conducted with the managers and the various levels of the workforce from the different departments. The following categories of the workforce constituted the focus groups (three focus groups with a total of three participants in each group): supervisors; despatch/receiving co-ordinators; clerk stock controllers; forklift drivers; and reach truck drivers. These were conducted up to the point of saturation, when no new themes or information emerged (Boddy, 2016; Fusch & Ness, 2015; Guest et al., 2006; Morse, 1991; Sandelowski, 1995).

4.13 Chapter summary

This chapter prescribed the qualitative research process, and the methodologies and tools used. The researcher applied interpretivism as a philosophy and used the deductive approach. Thematic analysis, and data collection tools were discussed. Data generated from the interviews and focus groups were analysed thematically.

The population and sampling techniques were discussed. A purposeful sampling technique was adopted when choosing the sample from the logistics study site population. Subsequently, the data collection tools were described, together with theoretical underpinnings. This researcher conducted face-to-face interviews, focus groups and digital video interviews; as well as thematic analysis of the data collected; and secondary data. Due to COVID-19, the strategy had to be reviewed to use digital tools for research data collection, to conform with ethical protocols.

Thereafter, the trustworthiness of the data was discussed. This included credibility, dependability, and transferability (Berg & Welander Hansson, 2000; Graneheim et al., 2017; Graneheim & Lundman, 2004; Guba, 1981; Lincoln & Guba, 1985; Malterud, 2001; Patton, 1987; Polit & Hungler, 1999). Triangulation was applied in this research. This entailed the collection of various facets of information concerning the research investigation to achieve the research objectives.

The researcher has attempted to conduct a rigorous and trustworthy thematic analysis which has been illustrated in the process of interpreting and representing the data generated (Nowell et al., 2017). Three virtual interviews were conducted after the transitioning from a manual to a system-guided process and the participants were confident and satisfied with the outcome that can be transferred beyond this study setting. This will be discussed in detail in the results chapter that follows.

CHAPTER FIVE: FINDINGS – CHANGE MANAGEMENT

5.1 Introduction

The key data collection strategy involved the use of interviews, as was discussed in the previous chapter. There was rich qualitative data obtained from the participants at the logistics study site in Durban, KwaZulu-Natal, South Africa. The research necessitated a qualitative approach as it was exploratory, as new data can be gathered when there is no research available (Leedy & Ormrod, 2015), and a purposeful sampling technique was applied. All interviews conducted were audio recorded and transcribed. The analysed data is presented in two chapters as follows:

Chapter Five: Findings of the thematic analysis of the qualitative face-to-face interviews and focus groups with reference to change management.

Chapter Six: Findings of transitioning from a manual to an automated system-guided process in reference to change management and technology adoption.

This chapter will elaborate on the details of the results generated from the various face-to-face interviews and focus groups interviews that were conducted at the logistics study site in Durban. The findings have been presented in a thematic format to correlate with the aim of the study, which was firstly to explore how to integrate technology in transitioning from a manual process to a system-guided process and secondly to ascertain the impact on the workforce of change management in a fast-moving consumer goods company in KwaZulu-Natal, South Africa. The participants' feedback was used to identify pertinent themes and sub-themes relating to the objectives of this study.

The themes that emerged from the data analysis addressed the three objectives of the study. The first objective was to determine how the logistics company prepared for the transition from a manual to a systems-guided process at the study site in Durban. The second objective of this study was to examine the challenges that the workforce (human element) in a FMCG company in Durban experienced in transitioning from a manual to a system-guided process. The third objective was to develop a framework for change management to facilitate an effective change that embraces technology and the human element at the logistics site in Durban in transitioning from a manual to a system-guided process.

5.2 Themes linked to the objectives of the study

The four themes and associated sub-themes that emerged from the CASQDAS (Dalkin et al., 2021; Kalpokas & Radivojevic, 2022) data analysis in transitioning from a manual to a system-guided process for managing short-dated inventory were linked to the three objectives of the study.

Table 5.1 Themes linked to the objectives

Objectives		Themes	Sub-themes
1	To determine how the logistics company in Durban, South Africa prepared for the transitioning from a manual to a system-guided process.	1. Technology Exposure and Awareness	Understanding of 4IR Currently technology exposure Awareness of new technology, systems and processes in the organisation
		2. Skills and Competencies	Skills of current workforce to embrace new technology Competencies needed Training (System, process, technology) Skills development Passion and mindset Computers and systems
2	To examine the challenges faced in transitioning from a manual to a system-guided process at the logistics site in Durban, South Africa.	3.a Challenges	Challenges in embracing this technological change Recommendations in terms of embracing this change Leadership drive Communication (Different levels, awareness, transparency) Culture (Minset, passion, commitment, teamwork, embracing) Learning (Traning, mentorship & development) Research (Company analysis, human capacity & needs analysis)
3	To develop a framework for change that embraces technology and the human element at the logistics site in Durban, South Africa in transitioning from a manual to a system-guided process.	3.b Recommendations 4. System Implementation - Manual to automated	Impact of technology advancing Manual (Labour intensive and reliance on people) Transition to automation Trial process (bin locations, system-guided order & picking) Implementation (manual to system-guided process) Communication and training (manual to system-guided process) Rollout throughout the group (Transferred to other logistic sites) Residual (Full pallet orders and case pick orders)

Source: Author

Table 5.1 reflects the themes that are linked to the three objectives of the study. Theme one, 'technology exposure and awareness' and theme two, 'skills and competencies' are linked to the first objective, which was to evaluate the company's preparation to migrate from a manual to a system-guided process. Theme three, 'challenges and recommendations' are linked to the second objective, which was to examine the challenges of the logistics workforce (human dimension) in transitioning from a manual to a system-guided process. Theme four, 'system implementation from a manual to an automated process' is linked to the third objective, which was to evaluate the framework for change management to facilitate this transition.

5.2.1 Themes of the study

The data was analysed using multiple interpretive techniques. An objective interpretative analysis was conducted with minimal-to-no bias and aligned to the research questions. Overall, the analysis was found to be 'acceptable' with sufficient findings to stratify the research questions and study. This analysis was generated from the transcripts of the interviews and focus groups undertaken. Refer to Appendix C, D, and J for the semi-structured interview schedules.

Figure 5.1 Word cloud

Source: Author

In Figure 5.1, the word cloud highlights the most frequently used word which is centrally located and in the biggest font (Hetenyi et al., 2019). The workforce (human dimension) embraces technology, facilitated by upskilling through training in transitioning to systems changes.

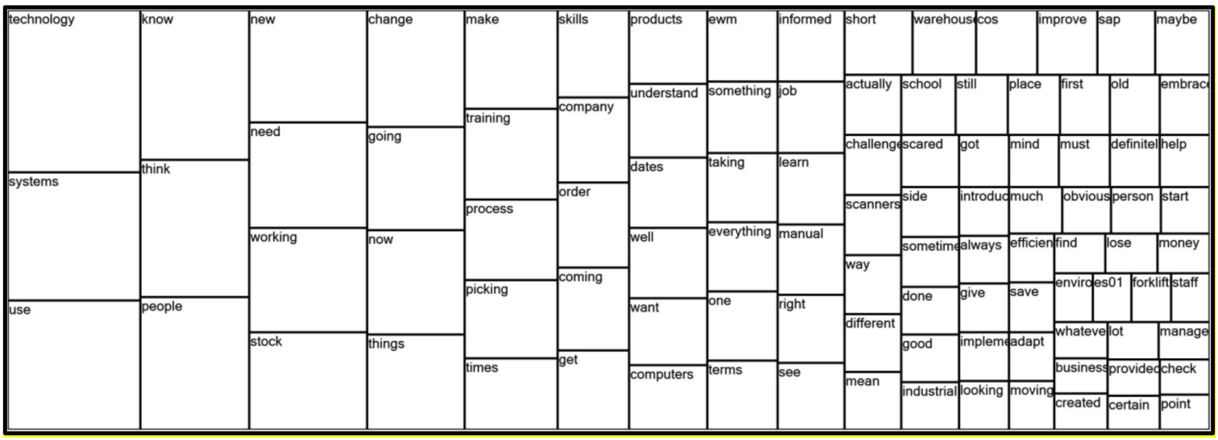


Figure 5.2. Tree map

Source: Author

The tree map, shown in Figure 5.2, communicates that the people (human dimension) will get to know the technology to be used for stock management changes through training provided. The product SLED will be available on the system as they transition from manual to a system-guided process.

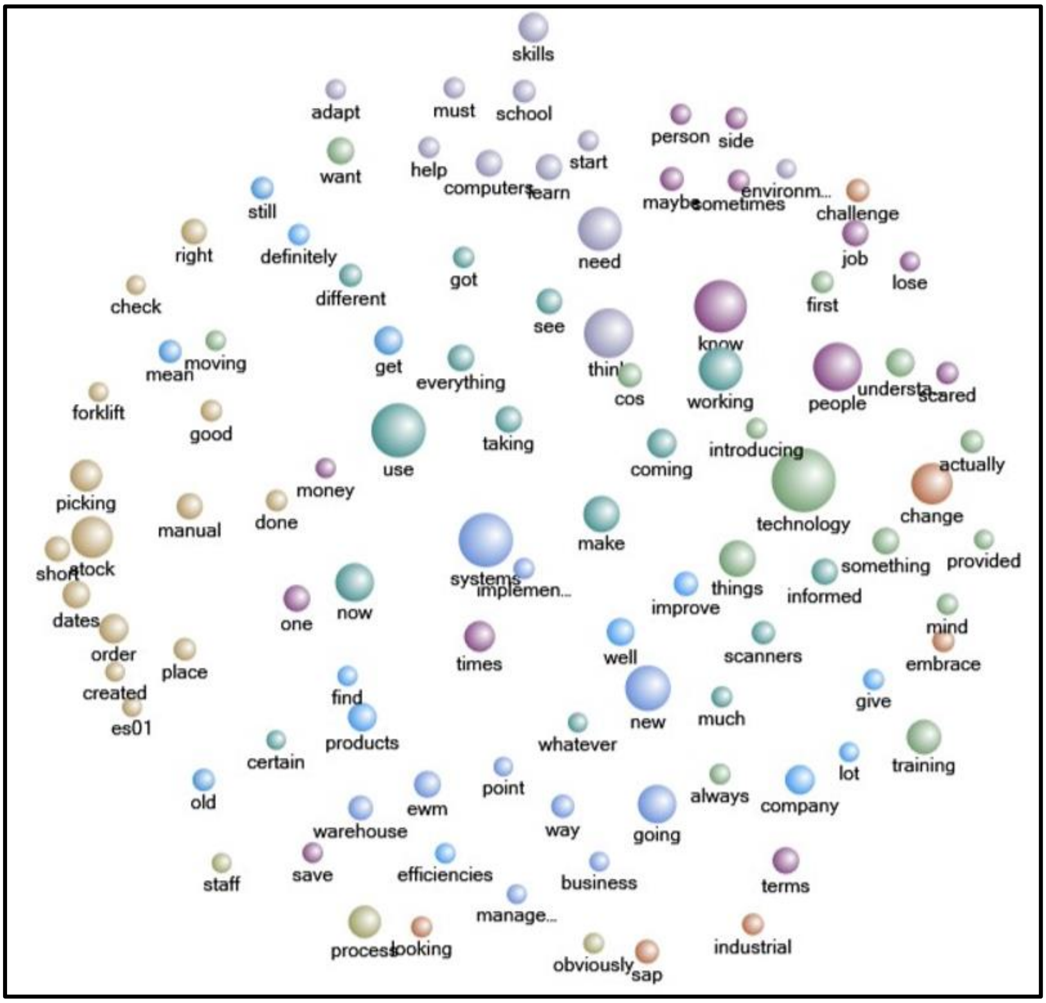


Figure 5.3. Cluster analysis of all themes

Source: Author

Figure 5.3 is the cluster analysis of all the themes that shows the manual picking of stock will be replaced through implementing new technological systems which the workforce (human dimension) will embrace through training.

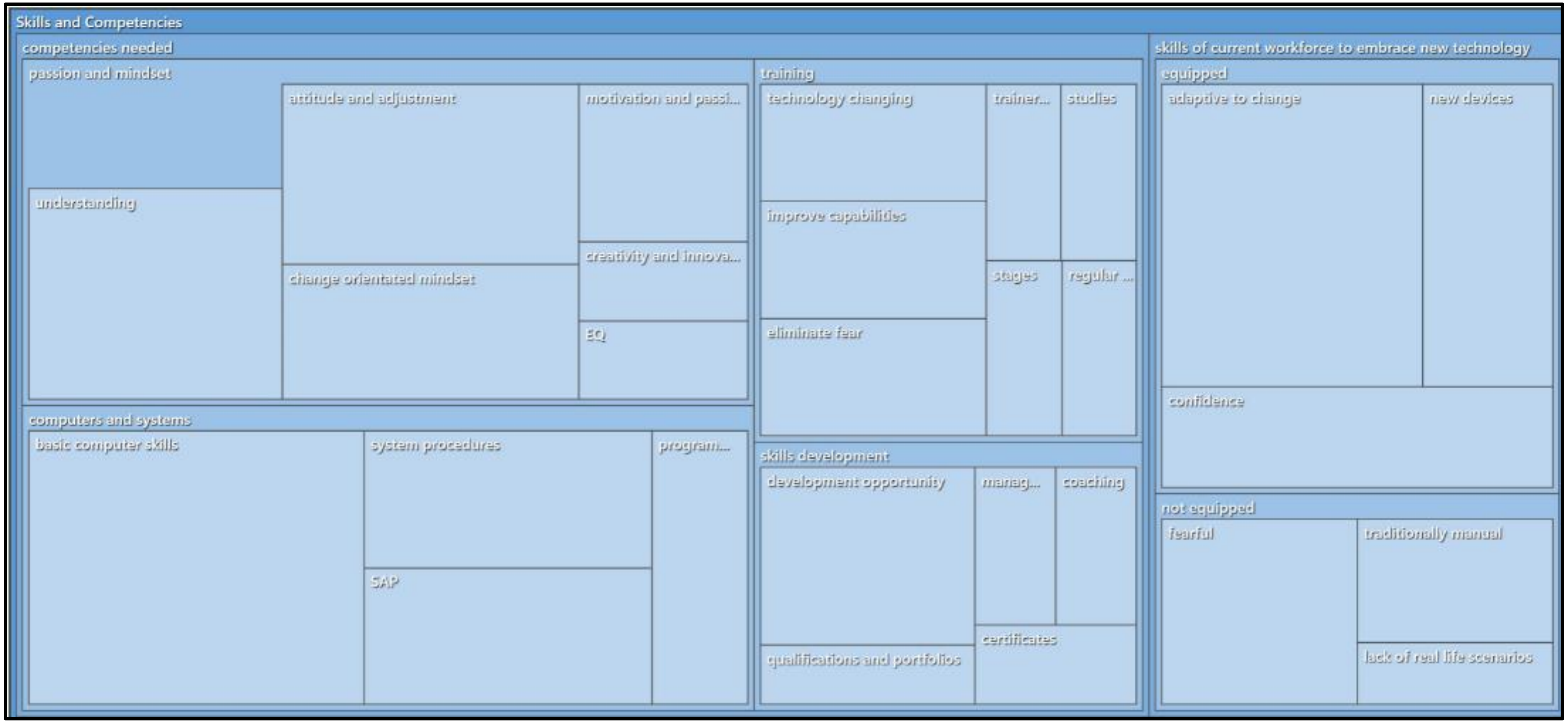


Figure 5.4. Hierarchy of the theme skills and competencies

Source: Author

The qualitative analysis has generated four key themes, with many related subthemes under each theme and many related categories under each sub-theme. Refer to Figure 5.4 that illustrates the theme of skills and competencies. The participants' responses at the logistics study site are quoted below as each theme and subthemes and further categories under each subtheme are unpacked.

5.3 Technology exposure and awareness

This theme examined the concept of technology exposure and awareness – refer to Figure 5.5. This was the key driver and the focus of the study on change management. All participants were familiar with the concept and contributed to explaining, from their perspectives, their understanding of what it entailed and the reasons for introducing technology in the working environment. They acknowledged using technology in some shape or form, with a common understanding of the basic use of mobile devices, such as a cellular phone for basic communication and social media interactions. They also acknowledged using personal computers (PCs); laptops; tablets and iPads; and accessing websites at internet cafés and using personal devices.

> *"… where the robots might be taking over. From manual labour, we will have machines and technology taking over."* (FG1_3)

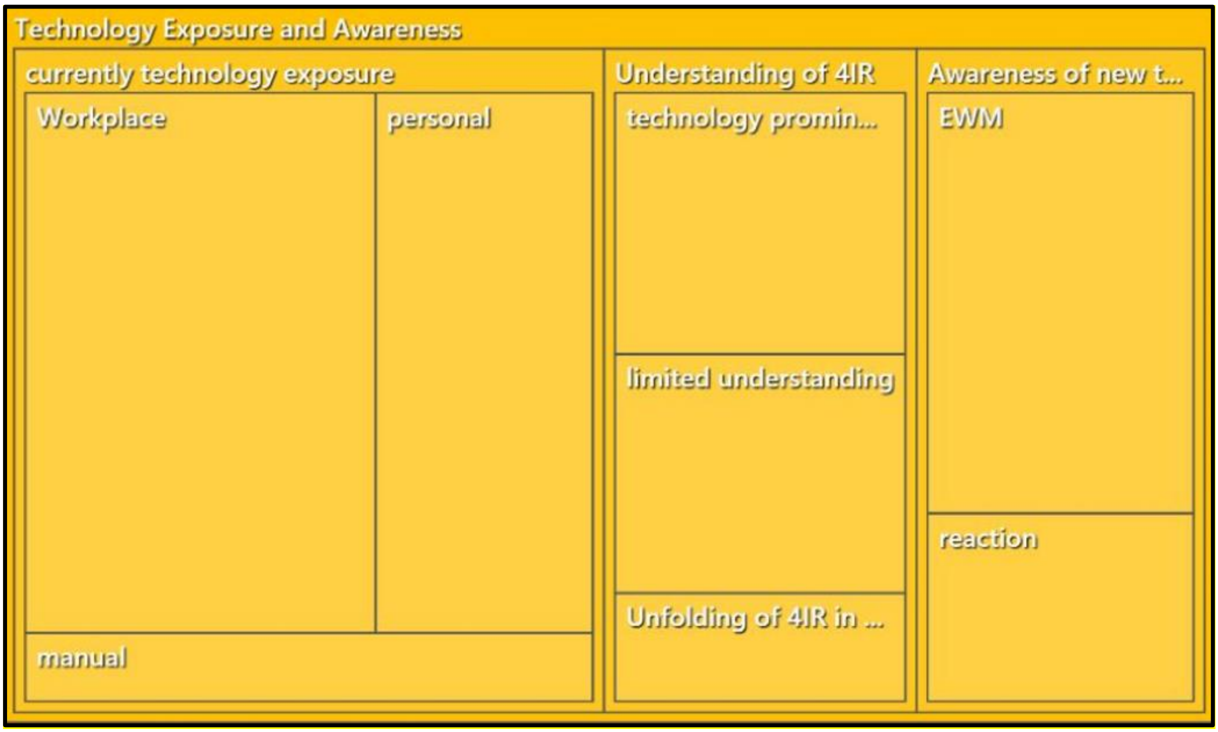


Figure 5.5. Technology exposure and awareness

Source: Author

5.3.1 Understanding of 4IR

This subtheme established the participants' understanding of technology in relation to the 4IR and its applicability in the workplace. Table 5.2 gives examples of the systems, uses, and benefits of 4IR.

Table 5.2. Understanding 4IR

Category	**Codes**	**Examples (direct quotes)**
Understanding 4IR	Systems of 4IR	*"SAP, SACO, FIORI, Google applications, and Dimention data…"* (P4)
	Uses of 4IR	*"SACO for time keeping, Fiori for HR Management, Google for emails… Dimention data for data keeping…"* (P4)
	Benefits of 4IR	*"It is decreasing the time that is making the money by being productive. If the company is more productive, there is more sales which will make the company more profitable. Technology is good."* (FG2_3)

Source: Author

5.3.1.1 Limited understanding

From the data collected, it was noted that many participants did not have a clear understanding of 4IR. Some had heard of it in general but not did not have a deep understanding of its implications and impact. Other participants were not familiar with the concept.

> *"No, I'm not familiar with it."* (P6)
>
> *"I don't know the depth of the Fourth Industrial Revolution. I only have limited understanding."* (P7)
>
> *"… empowering small businesspeople to make them reach the higher levels as well as to give them the opportunity to contribute to the country's economy and growth of the country."* (FG2_2)

5.3.2 Technology prominence in the workplace

It was evident that all participants were knowledgeable about technology, and all were using technology in the workplace and in their personal capacities. The organisational objectives had been achieved through communication, systems, and technology currently in place. Many participants believed that the 4IR meant technology would become prominent in the workplace in the following ways.

5.3.2.1 Technology in the workplace

There was a strong concurrence among the participants that the 4IR would bring technology into the workplace to drive business and create a human-technology mix. They were of the view that this could result in technology replacing certain functions and staff.

> *"Fourth Industrial Revolution, in my opinion, is the introduction of technology in the workplace to replace the majority of the workers."* (P4)
>
> *"Revolution that comprises different aspects of technology. It is something that we want to ascertain and determine how it fits into the workplace."* (P5)
>
> *"... the impact of technology and the future of where technology would drive a business."* (P11)

5.3.2.2 Robotics and AI

Some participants were familiar with the advent of robotics and AI which were the driving force of 4IR, and to their knowledge this entailed machinery based on AI driving processes at the workplace.

> *"Technology includes robotics and artificial intelligence."* (P4)
>
> *"... where the robots might be taking over. From manual labour, we will have technology taking over."* (FG3_1)

5.3.2.3 Skills enhancement

The 4IR requires developing new skills to embrace the changes, as noted by the participants. They highlighted that they would need skills to embrace the transitioning from a manual to a system-guided process at the study site, so their skill sets need to be improved.

> *"... changes in developing the skills within the company, improving the production and improving the employees as well in the company. Especially FMCG companies."* (P2)

5.3.2.4 Making processes easier

Production processes can/will be made easier, as indicated by participants. The participants had experience with the manual process and the effort required in performing each task to meet the customers' orders and the business objectives.

> *"The Fourth Industrial Revolution is based on changes in the environment of the big companies, in the corporate world, where new technology is being introduced to improve companies to make the processes easy to achieve more production."* (P2)

5.3.2.5 Technology diversity

Participants were of the view that different types of technology will contribute to rapid change in the workplace as they will impact speed of execution.

> *"... a rapid type of revolution using different types of technologies."* (P5)

5.3.2.6 Human-to-technology

The participants acknowledged that manual and human-driven work will be integrated into the technological processes. The reliance on people will reduce significantly as technology will replace the manual systems and processes.

> *"What I understand is that for decades we were using manual systems and doing manual work. There were no scanners, there were no systems. We were capturing on excel but now we are moving towards technology. We will have scanners; we will have the systems that will be doing the physical counts. We are moving away from the reliance on humans, and moving towards technology…"* (P3)

5.3.2.7 Unfolding of 4IR in industries

In terms of the unfolding of 4IR in the workplace, many participants believed that it was still a new concept. Some participants had a vague idea, while others did not; but overall, they acknowledged that technology is the future.

Participants believed that the introduction of technology in the workplaces has commenced, but is still evolving, and will grow as companies develop their systems.

> *"I think SA is beginning to embrace technology into the industry and looking at world class standards because of the interactions with world class economies."* (P1)
>
> *"The Fourth Industrial Revolution is the new system that has already started in South Africa but it's still growing. What I heard is that everything is going to be operated by technology."* (FG1_1)
>
> *"… Fourth Industrial Revolution is developing and growing our industries in South Africa."* (FG2_1)

5.3.2.8 Politics and economy

Some participants were of the view that 4IR technology implementation could be influenced by politics, which refers to the government and the economy, and the financial resources of the country.

> *"In South Africa, it is going to be a challenge in terms of the economy and the politics that goes with it."* (P1)

5.3.2.9 Reduce corruption

Participants suggested that it could reduce corruption in the workplace as many processes will be automated and not subject to human manipulation. They were of the view that, with visibility and better controls, businesses will mitigate risks, which should curb crime and increase the profitability of the organisation.

"It is up-grading businesses. The company can make more profits, and also it is going to reduce crime and thefts in the business environment." (FG1_1)

5.3.3 Current technology exposure

This subtheme examined the participants' previous and current exposure and access to technology in the workplace and in their personal lives, as well as the skills acquired in previous employment and those, they have acquired at the logistics study site.

5.3.3.1 Workplace

The responses from the participants about technologies that they used in their previous work environment, as well as technology they used in their current working environment, which is the study site, are captured in Table 5.3. This included warehouse management systems; enterprise resource planning systems; Microsoft packages; communication tools; logistics planning and tracking tools; and human resource management.

Table 5.3. Technologies the workforce are exposed too

Technologies	Responses
SAP (Systems Applications and Products in Data Processing)	*"SAP, which is a system for monitoring stocks."* (P11) *"When you say technology, you are saying SAP…"* (FG3_1) *"… we used SAP."* (FG3_2) *"We are using SAP, ERP."* (FG3_3)
EWM (Extended Warehouse Management)	*"EWM framework…"* (P1) *"… EWM, …"* (P3)
Microsoft	*"… the Microsoft packages."* (P5) *"… Microsoft word, Microsoft office, Microsoft outlook …"* (P10) *"I am using all Microsoft packages."* (FG3_1)
JDE (JD Edwards)	*"… JDE, used for capturing orders, but it is more like a third-party system that we were using to distribute orders …"* (P3)
AS1 (Applicability Statement 1)	*"… AS1, used to capture orders and print reports for outstanding orders, stock, physical inventory, and stock on hand …"* (P3)
SACO	*"… SACO for time keeping, …"* (P4)

(South African Computer Organisation)	
Google	*"Google emails, Google sheets, Google office packages …"* (P4)
Fiori	*"… Fiori for HR Management…"* (P4)
Checkmatic	*"I used to have a system called Checkmatic where I used to check trucks and the movements of the trucks. Every trailer and horse had separate devices on the tracker. They can be monitored on the screen for 24 hours a day."* (P7)
Telecoms	*"… telephones, fax, emails, …"* (P1) *"… and Dimension data in terms of the data keeping and the telephone calls."* (P4)

Source: Author

A variety of software is used in the workplace, which the workforce has been exposed to, as listed in Table 5.3. The most used platform was SAP, which was ranked highest by many staff members. The EWM followed and was seen as a new extension to the SAP system. The rest were specific to certain departments, as well as general Microsoft applications.

5.3.3.2 Manual processes

All participants indicated that, previously, manual processes were used, and they had experience in those processes. These included manual paper and pen tracking, and stickers were placed on inventory that was picked for each order. Manual counting of inventory and picking of customer orders implied the lack of system-guided processes, but a traditional, paper-based culture.

> *"… manual, everything was done manually …"* (P6)
> *"Manual, everything is manual."* (P9)
> *"… I was using paper and the pen, as we improved or as we implemented new technology we came across to the computer. You are given a sheet of paper and that paper comes with different stickers for different stocks. You put the sticker on the product. Then next thing, you come, there's no sticker, it is missing."* (FG2_1)

5.3.3.3 Personal

All participants had also had exposure to technology at a personal level. The participants at the study site confirmed that they had the necessary skills to operate personal technology, such as cell phones for social interactions and personal entertainment and keeping abreast of social news and events.

Most of the participants were accustomed to social media, including Facebook, WhatsApp and related applications for communication and social interactions.

"… other forms of technology will be the social media aspect." (P5)

"… something like Skype, Facebook. We can interact with different people around the world. If you cannot meet face to face, Skype allows virtual meetings." (P7)

"… WhatsApp, Facebook, social media." (P11)

Participants confirmed that cell phones and other mobile devices were also common technologies used at a personal level.

"… basic technology like a cell phone and a computer." (P2)

"… cell phone …" (P6)

"Mobile devices and I am using a tablet." (P7)

Computers and laptops were part of most participants' daily routine, and used both personal and work-related matters.

"… normal technology which is the computer and manual documents.' (P2)

"… laptop …" (P11)

Television, including entertainment technologies such as Netflix, was used by some of the participants.

"… televisions, programmes from the TVs and those that you stream – Netflix and other channels." (P8)

Some participants had exposure to computer games for social entertainment.

"… games and other applications you have on your computer." (P8)

5.3.4 Awareness of new technology, systems, and processes in the organisation

This subtheme determined whether the participants were aware of any new technologies. All confirmed their awareness of the implementation of the EWM system integrated into the existing SAP ERP system, to reduce manual processes and ensure that the processes are system-guided.

5.3.4.1 EWM

The only new technology that the participants were aware of was the EWM, which was serving as an extension to the current SAP. This was meant to bring high levels of automation which would have streamlined existing manual processes. It included scanning; checking; tracking orders and other related inventory; and warehouse management systems and processes.

"Yes, we have been informed that there is an upcoming new project that the company will introduce. The project is called EWM, which is a major warehouse management that is going

to be coming in where we are using the scanners to scan each product that is going in and out of the warehouse." (P2)

"EWM is one of them and I think the goal is going to be to streamline processes." (P5)

"… business has informed us of a new system that will be implemented which is (EWM) extended warehouse management system." (P11)

"I was because I have been exposed to technology such as a computer and scanners. My point of view is that it is makes things much easier." (FG2_2)

"It will most probably replace the manual labour side of it with computer technology. (FG3_1)

"It is a warehouse program that is centralised to track whatever is going on". (FG3_2)

5.3.4.2 Reaction

With any transformation, there are human emotions which are both positive and negative. It was critical that these emotions were understood and dealt with for an effective transition to the intended changes. The participants identified and described the emotions experienced by either themselves or the workforce from previous experiences, and their experiences at the time of the interviews. Different emotions were identified in the qualitative face-to-face and focus group interviews, and the extracts below highlight the participants' comments. There was mixed reaction to the introduction of the new system. These reactions are outlined below.

Unfortunately, many participants were fearful of the change. This was because they did not know how to use the new complex system at first. They were also afraid that this could replace their jobs.

"… from the SAP system that I was well acquainted with, when I first started with the company, the company did mention that there would be progress towards a much more sophisticated system at that stage which I was unfamiliar with, fearful of. So, embracing this new technology was not one of my stronger points. You must flow with the times, the processes that the new technology is going to be integrated with, are obviously used world-wide and hence, we have to get the work force to accept this. The new technology that is coming through and will be integrated into SAP." (P1)

"… when they change the system, I was scared because I don't know whether it is going to confuse me." (FG1_1)

"I would say I was scared because I was never exposed to technology." (FG1_3)

Some participants expressed that they were shocked at the changes that were to be implemented, but happy at the same time with the introduction of technology to replace the manual processes.

"I got a shock when they informed us of a new system, but on the other hand, I was happy because in workplaces, most companies are using technology." (FG1_1)

"On one hand I was shocked but on the other hand, I was happy." (FG1_2)

"… but on the other hand, I was happy." (FG1_3)

Some participants felt that, even though it was a new development, it was empowering in terms of developing new skills and creating new job opportunities. They identified the benefits of empowerment, upskilling, and opportunities presented by this transition.

> *"… I didn't have a clue about EWM but, on the other hand, I was happy because I saw that it is going to create some job opportunities. It is going to help us to learn the new system. We are going to be empowered and understand new ways of working.* (FG1_1)

5.4 Skills and Competencies

This key theme examined the existing skills of employees at the workplace in order to embrace new technology and systems, as well as other skills and competencies needed, from the participants' perspective.

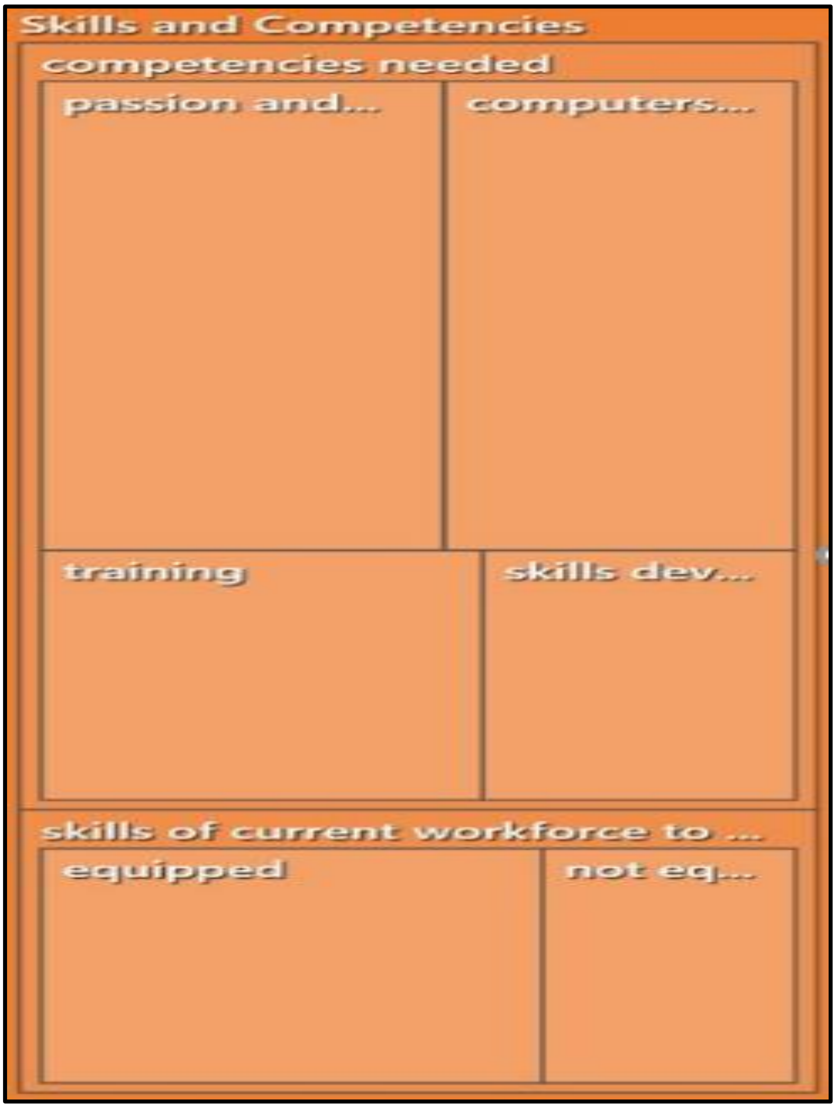


Figure 5.6. Skills and competencies

Source: Author

Figure 5.6 indicates that the workforce needs to be passionate and have a positive mindset to learn the new systems and adapt to the new technology. Training is required to develop the skills needed for the transitioning from a manual to a system-guided process. The workforce needs to be equipped for the change in process and to deal with the issues that they may not be equipped for, like human emotions and traditional processes.

5.4.1 Skills of current workforce to embrace new technology

This sub theme determined whether staff were equipped, or not, to embrace the new technology that was going to be introduced at the study site.

> *"Our team here will definitely embrace technology."* (FG3_1)

5.4.1.1 Equipped

The responses of the participants indicated that they would be equipped to handle the new technology in transitioning from a manual to a system-guided way of work. The participants' responses indicated that they had the emotional resilience and ability to adapt.

> *"… we have the skills; we can change the way the process has been run. In our business, we have individuals that make up a capable team that can handle any new challenge."* (P2)

The participants were of the opinion that the staff would embrace the new technology well, due their ability to adapt and change. They indicated that the staff was a cohesive team and was ready to take on challenges and change. This type of mindset would promote the integration of the new technology.

> *"I think being in the Fourth Industrial Revolution where everything is modernised in the sense that we are able to learn faster and adapt to the environment."* (P5)
>
> *"… although it's something new, technology is something that we are familiar with, hence adapting to it won't be a problem."* (P7)

The participants highlighted that staff and teams seemed to have a high degree of confidence to embrace any challenges that presented with the change-over.

> *"We have work with a strong team for quite a while. I have been with the company for ten years and I have the utmost confidence in everybody to get the job done if training will be provided."* (P9)
>
> *"We like new challenges…"* (FG3_1)
>
> *"We will embrace the new system."* (FG3_2)

Furthermore, the advent of new devices daily, including personal devices such as cell phones and computers, allowed for one to get accustomed to such change. This was a good measurement of how people could then adapt to similar changes in the workplace, as reinforced by the participants.

> *"Just like cell phones, for example we were using Nokia back in the day that had buttons, but we had to equip ourselves to use touch screens. The cameras and everything. Even the old people are using new phones as there are no longer phones that have buttons, but they had to equip themselves. We had to teach our mothers how to use the functionalities. It is all about equipping yourself, training yourself and being more familiar with the processes."* (P3)
>
> *"… we have technology like new cell phones and every person must adapt to a new system. It won't be difficult for people to adapt to a new system that we are going to implement. … mobile devices are like step-by-step to new processes."* (P7)

5.4.1.2 Not equipped

According to the responses of some of the participants, there was a concern that the staff were not equipped to deal with such changes, and this was informed by the following.

The view from the participants was that the primary problem was that the staff were fearful that new technology could threaten their jobs. In their opinion, this was a logical argument because, historically, technology has been shown to make certain jobs redundant. In this case, technology could change their current job descriptions, processes and even automate manual labour. The fear of job losses because of the introduction of technology in the workplace was also highlighted. Unemployment in South Africa is a huge challenge.

> *"... to get them to understand the culture took a while, like any driving lesson, people are going to be fearful in the beginning but when you get the feel of it, you are going to run like the wind."* (P1)
>
> *"I am so scared of new technology because most of the technology is reducing the number of people that are working. If I make an example, if we are fifteen, most of the time with technology you may only need about ten people. I am so scared that I could lose my job. Maybe I am not going to be qualified for this new technology."* (FG1_1)
>
> *"I am scared because when they start with the new system, I think that I am going to lose my job."* (FG1_2)

One participant, part of the focus group, had transitioned from a manual paper process to a computer-driven process and had experienced the fear of job loss at his previous company.

> *"... looking back to where I come from, the paper, and comparing it with new technology. At first, I was scared thinking that I am going to be jobless. My understanding before I had the information of how the system works, I thought this technology is going to take away all our jobs." (FG2_2)*

According to the participants, because the previous processes were manual, learning how to use technology could prove challenging, especially for older staff. They noted that people's mindsets were geared towards manual methods. Hence, reluctance to use technology could pose a problem.

> *"We cannot be the judge to say that somebody would not be capable. Our workforce was from the old school. They have an old school mindset and were reluctant because of the manual task that they used to perform, and it became a habit for them, so embracing anything that had to do with new technology was concerning."* (P1)
>
> *"... in the workforce you get different categories of people, graduates, and non-graduates. In terms of technology, you are going to find your millennials and graduates will want to embrace*

it because they like change. Those individuals that have been in the organisation for a longer period and are not graduates, will be reluctant to embrace technology." (P4)

The participants' view was that there was a lack of real-life scenarios for training and application of skills. They were of the opinion that there was more theoretical knowledge, such as SOPs and documented procedures; but staff needed test scenarios to apply their minds and skills.

> *"I don't think so, because in terms of skills you must provide real-life scenarios and SOPs. Also ensure that the candidates are ready to embrace change, for technology to work and be successful."* (P4)

5.4.2 Competencies needed

The participants' feedback indicates a need for more competencies and methods for staff to embrace the new technology in transitioning from a manual process to a system-guided process in managing short-dated inventory. The sub-themes are outlined below.

5.4.2.1 Training

All participants stated that training was imperative for the effective implementation of 4IR technology in transitioning from a manual to an automated system-guided process. The emotions discussed in Section 5.3.4.2, including those stated by the other participants during the interviews, indicated that change created anxiety among the workforce; and it was apparent that knowledge, acquired through various forms of training, had increased the confidence of the workforce to embrace the planned changes. Some extracts from the qualitative face-to-face interviews and focus groups, pertinent to the theme of skills and competencies, are quoted below. Training was the highest ranked subtheme, and it was informed by the following factors:

> *"… training of the new system. If people can get more training or workshops related to the equipment that they are going to be using in the work environment, it can make the working environment more productive. They need training, they need more training."* (FG2_1)

The participants highlighted that technology was always changing; hence training was important to keep abreast of new developments.

> *"… know technology is changing all the time and people are changing with technology. … you train people; however, they also need to keep up with the times."* (P1)

Training should not be a once-off, according to the participants. Regular training was also important as staff need to be updated with training to embrace new technology.

> *"… with regular training the labour force will certainly embrace new technology."* (P1)

The participants indicated that training should be done in stages. This would ensure more understanding by starting from the basics and slowly moving to the more complex areas.

> *"… training schedule levels also need to be changed to keep up with the ever-changing technology. I would say that people have evolved from class one right up to matric, so they had to do that in levels, in stages and so is the training. If done the right way and in stages, I think they will be able to do it."* (P1)

Improving capabilities to adapt and embrace the new technology was important to the participants. Therefore, training was fundamental to developing and even improving such capabilities.

> *"… it all goes back to training people. If you are training people, they are going to be ready to use the new systems."* (P3)
>
> *"I think everybody is capable of changing if the necessary training is provided for them then they should be able to change from manual to technology."* (P6)

Fear of technology was an ongoing factor (reflected in other themes) which was highlighted by the participants. Training could alleviate and eliminate fears of technology. It would also build confidence.

> *"… wouldn't be the first change in the industry and in the company, because we used to have an outlook and it was a scary feeling and a bit complicated when we changed to Google. But, once we were on Google, everything was fine. We asked ourselves what was so difficult, why were we so scared? … Changing is scary, but once you got the hang of it, you feel more confident, and you adjust."* (P10)

According to the participants, quality training for staff is dependent on trainer ability. Hence, highly qualified, and capable trainers should be considered.

> *"My thinking is that you get skills when you get someone to train you, and that's how you acquire skills, and it is dependent on the person. It also depends on a person how he is going to bring the change."* (FG3_1)

5.4.3 Skills development

In relation to training, the participants mentioned specialised skills development. They felt it necessary to upskill and reskill the workforce, enabling them to embrace technological changes to facilitate a smooth transition from a manual process to a system-guided process.

5.4.2.2 Qualifications and portfolios

The participants highlighted the company's position on having a suitably qualified workforce, and in identifying the skills gaps that may exist.

> *"Our company has made it quite clear, in terms of screening of staff when they employ, and regularly asking them to update their portfolios where the gaps are in terms of qualifications and the lack thereof."* (P1)

5.4.2.3 Management skills

Management skills were seen as pivotal because they include managing time and processes in line with technology, as indicated by the participants. They were of the view that this will lead to effective management, which implies efficiency.

> *"The skills that they will need. I think it is management skills, being able to manage time, and using time effectively."* (R3)

5.4.2.4 Coaching

The view of the participants was that coaching would be needed on an ongoing basis for skills development.

> *"I think they have the capability. With the proper mind-set, coaching and buy-in, it would work."* (P11)

5.4.2.5 Certificates

It was highlighted by the participants that certified skills development was needed, where staff would obtain certificates indicating the completion of their skills development for the new technology.

> *"... when we start the new system, they will need more skills to get certificates. I know that they are going to have a person who is going to help me to learn the scanners. I am going to get more information."* (FG1_1)

5.4.3 Passion and mindset

According to the participants, apart from training and academic development, continuing passion and mindset alignment to the new technology were equally important.

> *"...the passion to accept new technology and to give it a chance."* (P11)
>
> *"... technology is good for the business, individuals, and the communities. It needs to be changed in people's minds for them to appreciate what technology brings to them."* (FG2_2)

5.4.3.1 Understanding

Staff need to understand the technology, according to the participants. This entails ongoing communication and consultation. Participants noted that the staff should be free to ask questions to build their understanding of the systems and eliminate any doubts in their minds.

> *"I think a person needs understanding. Technology needs skills and understanding. As I said, proper training."* (P7)
>
> *"But once you see the difference, and once you can use new technology, then you overcome the challenges. The challenge at first is that you do not know what is expected or what to expect of yourself when you are using technology."* (P10)
>
> *"I think we will understand the system as we learn the system. Why do we need to change? Then it will be the system itself. How does it work? How is it going to help me? If I don't know how it's going to help me, I will be scared to embark or include myself and have interest in that technology."* (FG2_1)

5.4.3.2 Attitude and adjustment

The participants believed management should foster a culture of embracing change. This means that they should focus on building staff attitudes and promoting adjustment to the new technology. Staff are being exposed to something for the first time and need time and a comfortable space to adjust to this change.

> *"… it also goes back to your attitude, are you willing to learn those new things, are you willing to use those new technologies?"* (P3)
>
> *"And in terms of skills provided, I do not know. How will the workforce provide skills, have the right attitude, and embrace the change? The company can provide the resources, but it is up to the individuals to embrace the change and make the digital embrace a success."* (P4)
>
> *"They are more accepting because they can now see the difference. They now have more understanding as to what makes the changes and how the changes are beneficial.* (P10)
>
> *"Lots of people in the beginning, I think, would be scared as normal with change. Whether it has been in the work environment or personal environment. People are always scared of change or taking on something new. The more they are informed, told, or shown, it would then become easier and give them the confidence to proceed, and take it further."* (P11)

5.4.3.3 Change-oriented mindset

It was highlighted by the participants that a motivational mindset, and the drive to learn, will lead to effective technological change.

> *"… there are some skills that the company cannot provide, some skills you must acquire yourself. For example, you need to motivate yourself and look forward to changing."* (P2)

"I want to learn more." (P4)

"… skills you are learning everyday so that should be in your blood. From change to another change, you will be able to adapt easily." (FG3_1)

5.4.3.4 Motivation and passion

The participants felt that one would also need a motivational mindset to make a firm decision to learn the new system.

"You need to have it inside of you to be passionate about this and say I want to do this; I want to learn the system. We need to motivate ourselves and think of a way forward on how we can learn the system and make it easy for ourselves." (P2)

"… goal and deadline driven." (P4)

5.4.3.5 Creativity and innovation

According to the participants, a creative and innovative mindset would allow people to think out of the box and use the system to their advantage.

"Definitely being creative, being dedicated, being innovative …" (P4)

5.4.3.6 Emotional quotient

Apart from intelligence, a high emotional quotient (EQ) is equally important in fostering a culture of technological change, as indicated by some participants.

"… one is emotional intelligence. It is intangible, and I think it is one of the highlights in the Fourth Industrial Revolution." (P5)

5.4.4 Computers and systems

General competencies in computers and systems were also seen by the participants as important. This was based on the following sub-themes.

5.4.4.1 Basic computer skills

Basic computer skills were the most highly ranked by the participants. This was because many operational staff were computer illiterate and had been exposed to them for the first time in the workplace. They were used to traditional, manual processes. Therefore, a good place to start would be with computer literacy.

"… basic computer skills." (P8)

"… you have to be computer literate." (P9)

"… the computer, you need to get it. Maybe an operator for a machine." (FG1_1)

"I think it will be the computer first. Let's start from the beginning, some people are illiterate, as some of them cannot read, and write." (FG2_1)
"... they need introduction to computers." (FG3_1)

5.4.4.2 SAP

From the participants' viewpoint, SAP skills would be needed, as the SAP system was, currently, the dominant system in the organisation.

"More involvement with the SAP system and also with what the company is going to introduce." (P1)
"... we know we are moving to the Fourth Industrial Technology; we must start from SAP. You cannot skip SAP and just go straight to EWM. They must be trained starting from SAP and then move forward." (P3)
"... to use the computer and basic SAP skills." (P8)

5.4.4.3 System procedures

People must become familiarised with system procedures and SOPs, which would be very helpful in understanding the systems procedure. This was highlighted by the participants. Such information could also promote transparency and an understanding of the systems in place.

"In one's spare time, being able to train yourself. I know in every training you are given templates and the procedures to follow. If you are given time to read all those procedures, train yourself more rather than just relying on the training you were given. When the implementation is done, you would have practised it more." (P3)
"I think it will be understanding the system and learning the system at first. Getting to know how the system works. If you have information provided to you on how to use the system, you will be happy to use the system or whatever technology that is provided." (FG2_3)

5.4.4.4 Programming

For some, programming skills would be needed. However, this would be mainly for those interested in the development component of the system, as indicated by the participants. New/younger employees coming into the organisation may already have these skills, as programming is now even taught at school level.

"We need to get exposed to technology, such as computers and programming. One must know how to do programming, understand the systems, and processes that are programmed. The skill that is needed by the people is to operate the computers. The government must implement computer science at schools and programming. It is going to help the kids that are at school if

they are studying programming, updating the system, and IT - computer science. I think it is those skills that are needed most." (FG1_3)

5.5 Challenges and recommendations

One of the transitional challenges identified was that the South African economy put pressure on the workforce to transition to the evolving 4IR technology, and there was a fear of being unemployed. Technology was met with immense anxiety as there was a fear that artificial intelligence and robotics would replace humans in the workplace. The fear of losing one's job, especially in the slow economy in South Africa, was a reality. This had been exacerbated by the Coronavirus pandemic that had plagued the world, as well as South Africa.

This key theme examined important challenges in embracing automation and new technologies (Refer to Figure 5.7). The participants also made recommendations to overcome such challenges, and/or to promote systems implementation thereof.

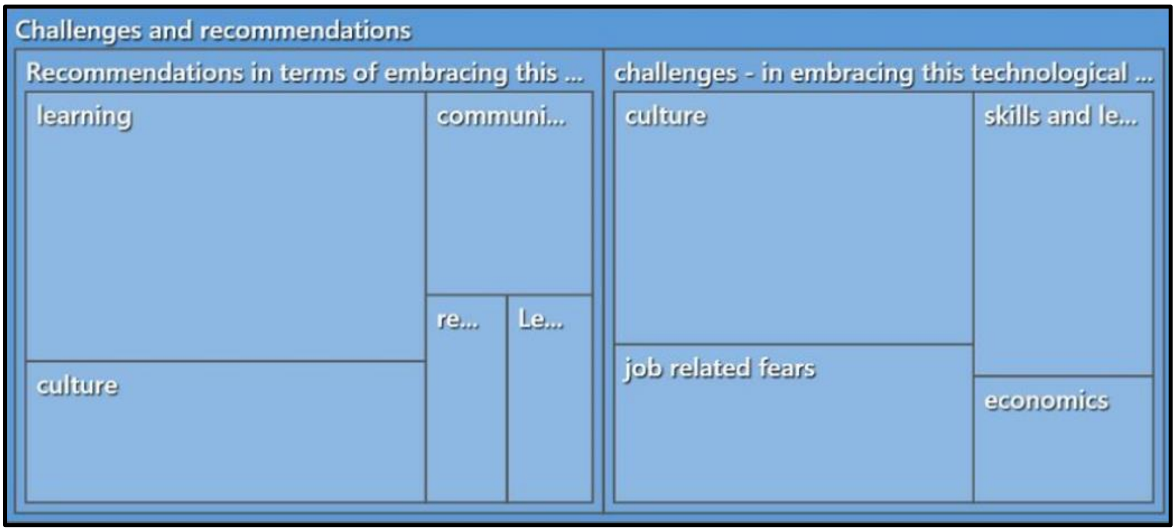


Figure 5.7. Challenges and recommendations

Source: Author

5.5.1 Challenges in embracing this technological change

There is a plethora of challenges that need to be addressed, as was highlighted by the participants. They are classified in themes below supported by necessary subthemes.

5.5.1.1 Culture

Organisational culture was seen by the participants as the biggest current challenge in embracing new technology. This was because of the following factors:

The participants indicated that resistance and reluctance from staff were the key challenges. This was because staff were accustomed to traditional, manual ways of working. Hence, the introduction of new technology would create a sense of anxiety related to adjustment to the new processes. People were also attached to older methods and were afraid that they would not have the knowledge and abilities to operate new systems.

> *"… the issues that might arise is that we are introducing a new challenge. This is always a problem with people. People must be motivated and encouraged, for all to be on the same page. That is the challenge the company may have to face in changing people's mindset, because people do not adjust so easily to change. Some people you need to follow step by step to get them to be on the same page with change."* (P2)
>
> *"… overwhelming and it is scary at the same time. Not knowing how I am going to be able to use this or did I get enough training? It is about fearing change."* (P3)
>
> *"Resistance to change. Which will be more from a psychological standpoint. They will not want to embrace change, which will be the biggest hurdle to overcome. For any system or process to be successful, there must be embracing of change and wanting to steer ahead, be positive, and be deadline driven. But if you are not going to have that embracing of change, then it is not going to be successful. The biggest challenge is resistance."* (P4)
>
> *"Most people would be nervous. I have been nervous, but at the same time it's challenging, exciting as well, as you are learning something new."* (P6)
>
> *"… nothing is perfect in the world. Even with technology, there are going to be glitches and people are going to be resistant because they are used to the old systems."* (P7)
>
> *"The only negative feeling that people will have been getting used to the change. One becomes negative when one really does not understand the need for change. For example, why do we change? And how are we going to benefit from this change?"* (P10)

The view of the participants was that many staff were trapped in a traditional mindset of manual processes and operations.

> *"… it goes with attitude and skills."* (P3)
>
> *"It is a life experience, and it is a mindset. Is the individual older? As the older you are, the less likely you are going to embrace technology. They like the old way of doing things, not everybody likes to have a new way of doing things."* (P4)

The participants believed age diversity was also a contributing factor, and older staff would not be able to adapt as quickly as younger staff. This could cause added anxieties, fears, and change-related challenges.

"... in terms of the age analysis, not everyone is going to be able to adapt fast. If you have a twenty-one-year-old and maybe a sixty-year-old, they will learn at different pace so that would be a type of frustration in terms of embracing technology." (P5)

"But then you get the older guys who are set in their ways. They prefer to write in a book, they do not like to be captured on the computer. There will be challenges with those types of people where they are set in their ways, they do not like to change. They do not want to adapt to technology of the future." (P8)

There was also the question of stigma for those staff who felt that they could not adapt to new systems, as noted by the participants.

"... make sure that people are aware of the stigma that says technology is expensive or that technology is coming to change things. It needs to be changed in people's minds for them to appreciate what technology brings to them. For example, if you give someone a scanner, you do not tell him what a scanner is for. You just say use this scanner. He does not understand. The first thing that goes through his mind is going to be fear." (FG2_3)

According to the view of the participants, there was the possibility of internal staff competition, where some staff would learn more quickly than others and this would create internal animosity or professional jealousy. There was also the perception that non-graduates would have to make more effort to cope with the changes and compete with the millennials and graduates in the workplace.

"... probably it also comes with age and being in a competitive environment. You may not be able to keep up with that type of technology; hence, that could be a threat. Also, working with your peers, where one can learn faster than the other, that could be frustrating." (P5)

5.5.1.2 Job-related fears

Job losses threaten the survival of families and extended families that are dependent on breadwinners. They impact negatively on poverty and society as more people become dependent on the government for survival. This places more burdens and strains on the economy of the country. Job-related fear was, logically, a very highly ranked challenge.

The fear of job loss was the highest ranked factor, as noted in the participants' responses. This was because people would naturally fear the loss of their jobs to the machines. In the current economy, with rife unemployment, it was not unrealistic for staff to feel that their jobs would become redundant because of the new technology. Some industries, such as banking, are already reducing staff due to automated machines instead of bank branches.

"… over the years we heard people and researchers indicate that most companies in the motor industry have lost their jobs. Thousands of jobs have been lost due to technology." (P7)

"There is a lot of fear when it comes to technology that people feel when the systems are in place, then there's a risk of job losses. When robots come in, then what happens to the people?" (P8)

"… they can lose their jobs and the people are going to suffer. If someone loses their job who is a breadwinner, their family, that depends on them, is going to suffer." (FG1_1)

According to the participants, there is a possibility that unemployment may lead to some becoming criminals to survive. Their criminal activities could subsequently lead to them being imprisoned when caught. These further strains the economy as it is the government that funds the correctional services departments.

"Sometimes it is a negative thing when there is an increase of technology as people are going to lose their jobs. Thereafter, some may resort to hi-jackings and will eventually end up in prison." (FG1_2)

"… it's going to affect jobs; most people are going to lose their jobs with more technology in the workplace. Everything will be programmed, and it can work from a phone like the banking applications. It is going to reduce the number of staff. This will lead to a high crime rate because people are going to think of other ways of surviving." (FG1_3)

"… the first challenge is that once you talk about technology, people think they will lose their jobs because of technology that is implemented. There will be no need for them." (FG2_1)

Apart from job loss, job satisfaction was also in question, as was highlighted by the participants. One of the participants referred to job satisfaction. As jobs evolve with the new 4IR technological advances, the workforce needs to be satisfied with their jobs. As mentioned, people were accustomed to, and satisfied with, existing manual processes. Now, with technology, they are forced out of their comfort zone and need to adapt. This could put added pressure on them and impact on their job satisfaction.

"… one thing that comes to mind is job satisfaction. It would probably be a question in the employee's mind if they have the necessary aptitude to complete the tasks." (P5)

"Getting to know how to use the new system, that will be an obstacle to people. They will become negative due to not understanding what to do with technology." (FG3_1)

5.5.1.3 Skills and learning

According to the participants, the current skills were a challenge. As mentioned under the theme of competencies, added skills were needed. Currently there was a deficiency as the process had traditionally been manual.

According to the participants, there was a lack of training. Inadequate training, with no structure, had been given on the new system. People wanted to know how the system works and how to get around system challenges. The quote below indicates that Participant One refers to inadequate training yet alludes to the fact that others would understand the system better; whereas Participant Nine is of the view that, although they have been trained, some will still have challenges; yet there will be support and assistance where required.

> *"I would say it is going to be inadequate training. Their peers or colleagues work faster than them or understand the system better than they do."* (P1)
>
> *"… everybody has been trained but you will still have problems with the system. People will have difficulty to get authorisations for certain transactions. But I am sure that there are always people to help."* (P9)

The participants felt that skills were also lacking, and this needed development.

> *"… it would be skills. Do people have the necessary skills to adapt to the new technology? Are they going to be able to use it? … the attitude that they apply with getting those skills must be aligned with new technology."* (P3)

The participants indicated that the learning process needed improvement. People needed to be given enough time to learn effectively at a suitable pace.

> *"… learn the processes, it would take time."* (P11)
>
> *"Getting to know how to use the new system will be an obstacle. People will become negative if they do not understand what needs to be done."* (FG3_1)
>
> *"… we will still have to learn how to use it and maybe that can take a long time depending on how I used to operate in my work."* (FG3_2)

One participant was of the view that, despite having the best systems, human error could still be a challenge. The fundamental challenge was resistance to change, which is a human phenomenon. Manual processes were more exposed to human errors and technology mitigated this risk.

> *"I think human error is going to be the number one challenge."* (P1)

5.5.1.4 Economics

The participants also noted that economic factors were an added challenge. The associated sub-themes are discussed below.

Participants noted that new technology was not available for 'free'. It comes with substantial costs. Hence, this needed to be properly assessed and budgets allocated. The costs could impact on staff and other aspects of the organisation.

> *"Are we not going to incur more costs to teach and train people? I think it is going to cost a lot to have people trained."* (P3)
>
> *"… the most negative thing about the system, when you hear the word technology, the first thing that comes to mind is money. This is going to cost money. This may automatically mean that I might lose my job to cover the cost for whatever technology the company needs."* (FG2_1)

In addition, participants were of the view that it needed to be established whether the 'hype' of the system was worth the costs; or if the system could save the organisation the amount of money, as projected.

> *"… that it is over-marketed as such, I think, presuming it is over-marketed in the sense that it seems to be the hot topic of today. Considering the technological change, it is to simplify the process and to streamline them for the workforce."* (P5)

5.5.2 Recommendations in terms of embracing this change

The participants noted various recommendations that could alleviate challenges and promote the implementation of the system. These are discussed below.

5.5.2.1 Leadership drive

A culture for technology implementation must start at leadership level, according to the participants. Leadership must create and drive such a culture. This must then be filtered down to various organisational levels. It must cut across all levels and all the way to ground level. However, it cannot be forceful, but should be more of an empowerment approach for all staff.

> *"… you have those skills to be a leader by knowing very well that you want to lead these people, as I want to achieve the company's objectives."* (P2)
>
> *"… with the necessary leadership, and the drive from the managers and the supervisors … You also need effective leadership. Individuals who are going to drive the change …"* (P5)

5.5.2.2 Communication

The participants were of the view that communication was key for implementing new technology. This was informed by the following: the participants suggested that communication must be driven from leadership and management level, down to ground level, and the leadership must ensure that everyone understands the implications of the new technology.

"I think that communication is the most vital mechanism that should be started from management right down to the staff, including all the operators. This is to make sure that everyone understands what cost this new technology is going to have, and how it is going to impact the company." (P1)

Communication can help everyone to gain a full understanding of the technology, as well as how it will benefit the organisation and staff. This can then promote and encourage alignment, as was highlighted by the participants.

"The more you can save for your company, the sustainability of your company augurs well for your future. Communication is vital in every aspect. People must know where they are coming from and where they are going to, and in which direction the company's mission and goals are. What we all here need is to be satisfied at the end of the day. It is a strategic plan that we need to fulfil." (P1)

The participants noted that awareness should be created as people often fear what they are not aware of. When awareness is created throughout the organisation, then people tend to become more accustomed to the new development/s. They can share ideas and concerns and raise questions openly.

"… start from there to create that awareness, creativity, and want to embrace change because the Fourth Industrial Revolution is here. It is just a matter of people changing their mindsets. Like with the implementation of Google, they did not do a very good job as 80% of the workforce did not know what was happening. But in the background, there were these tools been provided to staff but at that stage, they were too frustrated to go in and plug in and look at what it is. I think that the company is providing tools for the workforce, it is just that the employees must be made aware of it so that they can come across in a creative manner." (P4)

"… if they understand the objective and what to do in their workplaces, they should be able to overcome that obstacle and improve with the new system." (FG3_1)

It was the opinion of the participants that transparency is related to awareness. This means that management must be transparent from the start and not sugar-coat or camouflage the realities. All aspects of the system, including costs and impact, must be openly discussed.

"I think people should be made aware of the advantages that are going to be mutual to them and the company. This is how much we are going to save for the company. If we go this route, people are looking out there to other companies that are closing, the rate of unemployment and even looking at their own neighbours and family that are unemployed, hence they are aware of the impact. Awareness is most important in terms of the cost structure as well." (P1)

5.5.3 Culture

Organisational culture was another key recommendation that was raised by the participants. The organisation should initiate a culture of positive change towards new technology.

5.5.3.1 Mindset change

According to the participants, it is important to create a positive staff mindset to embrace technology. This is not difficult to do but requires open communication and knowledge exchange on a regular basis. The more people discuss and talk about the new technology, the easier their minds will be. Fostering a new attitude will also change mindsets and remove attitudinal barriers to embracing new technology.

> *"… mindset and attitude. They must embrace change and embrace technology and not see it as a hurdle and try to apply what happens at work at home, even when it comes to technology with simple things like telephone or computer."* (P4)
>
> *"… make them understand that this is going to make their lives better, easier rather than doing the work manually."* (P7)
>
> *"… people are always scared of change or taking on something new. The more they are informed, it would then put them at ease and give them the confidence to proceed and take it further. … proper mind-set …"* (P11)
>
> *"… people need to change their mind-set that they have when you refer to technology. When you talk about technology, … how certain devices are going to save time, increase speed of doing work and reduce the time spent on tasks."* (FG2_1)
>
> *"It should not hamper much in terms of your mind. You need to have knowledge about technology which is going to make things much simpler."* (FG3_1)

5.5.3.2 Passion and commitment

Cultural changes also involve building and fostering staff passion for, and commitment to, the new systems. Encouragement would assist in this aspect, as mentioned by the participants.

> *"… people are always scared of change or taking on something new. The more they are informed, it would then put them at ease and give them the confidence to proceed and take it further. … proper mindset …"* (P11)

5.5.3.3 Teamwork

The participants highlighted that the staff and management should foster team spirit, as this creates a sense of solidarity and belonging without excluding anyone. It creates a support system and brings a level of confidence created by team cohesion. There was confidence that the change management process and the challenges of transitioning into a technological environment, would be embraced. This level of confidence was crucial in effectively implementing technology and the change management process.

> *"They will embrace change … new technology will make it work ... they are going to embrace it." (FG3_2)*
>
> *"I know this team is very dynamic and will always follow through on a challenge that is to come. They will say bring on the new challenges.* (FG3_2)

5.5.3.4 Embrace the challenge

It should not be seen as a challenge, but more of an opportunity, according to the participants. Hence, people's mindsets should be geared to see opportunities in challenges.

> *"… in terms of new technology, we are always looking for new things. It gives us a challenge."* (FG3_1)
>
> *"… cell phones are always updating and upgrading and with technology in the workplace now, we are moving from a SAP point of view into a more dynamic EWM system. Should be for future reference, something good to look forward to."* (FG3_2)

5.5.4 Learning

Ongoing, empowering learning was supported by the participants. This was informed by the following.

5.5.4.1 Development opportunity

The participants indicated that the staff should see the technological change as an opportunity to develop new skills. This will not only assist them in their current jobs and roles but also in other aspects of their lives. It allows for continual growth and development.

> *"… the aim is to improve all individuals, to develop their skills for them to become better people in the near future."* (P2)
>
> *"…most of the people will need to improve their skills in technology. We are going to keep our jobs and we can still grow. For those who are working, they are in a better position as at the end of the month or the week they are getting money. But it is very difficult for those who are still looking for a job."* (FG1_1)

5.5.4.2 Training

Training was seen as pivotal in promoting a learning environment for new technology, as indicated by the participants. There should be ongoing workshops. Workshops would serve to promote knowledge; and educate, equip and address any challenges related to the new technology. This can lead to staff becoming empowered and able.

"I think our workforce is adequately equipped to take on these new training and education upgrades. … They want to learn more or go to more workshops." (P1)

"Things like workshops, programmes that can get the workers equipped on the floor so that when the system comes, we will be more advanced and able." (FG2_1)

"… they feel it's a threat towards them. I feel attending workshops or any programmes that can assist them to understand the changes in the workplace will be less scary." (FG2_2)

"Basically, it will be training until they understand it is for their best." (FG2_3)

Participants were of the view that training can also create much-needed awareness, and in turn promote understanding of the new technology. It can explain the background to the technology and how it works, its purpose, implications, and benefits. It can also eliminate reluctance and resistance to the system.

"… if the necessary training is provided and it makes us aware of how to work, then it should be easy." (P5)

"… they will need some training and some background about it." (P6)

"I think with proper training, we can overcome the challenges. Give them extra training as well and make them understand that this is going to make their lives better, and easy rather than doing a whole lot of work manually." (P7)

Device training was needed, as indicated by the participants. Since the new technology would use new devices such as scanners and other sophisticated devices appended to the system, staff needed training on how to use the devices. Previously manual processes would now require technological devices. By explaining to everyone, in a well-paced manner, people could understand and develop the skills to use the devices and not fear them.

"… they are going to need real training for those devices to remove the fear. Sometimes it makes you scared to use something that you do not know. If you are comfortable, it will have a positive impact on the implementation and productivity based on the training provided." (FG2_1)

"As much as I'm scared to try a new device, with understanding of the technology, workshops and training provided, I think it will be easier for people." (FG2_2)

"These are the benefits of the technology, and this is how the technology will work. Automatically you have changed their minds." (FG2_3)

Training in a live environment would be most beneficial, according to the participants. This is because the system would be used in a live environment. This would cater for the different scenarios that staff would encounter when using the system.

"I think that the skills that they are going to need will be provided by the training before the new system starts. We should not be taught while we are sitting down, we should do the physical

thing and see how it works. Getting the training and doing the practical, will give you the skills required." (P10)

The participants added that training can also allow information exchange on all facets and aspects of the system for everyone.

> *"With technology, everything is fast. It is quick and easy if you have information. People need to be taught, need to be trained, and they need to be exposed to information."* (FG2_1)

5.5.4.3 Mentorship

The participants noted that mentorship was also an effective method of learning. Therefore, mentors should be assigned to help staff with the new technology.

> *"… leadership. Individuals who are going to drive and be good mentors for the people. Also, to be able to bridge the gaps. So that is one of the important competencies."* (P5)

5.5.4.4 Ideas sharing

Allowing staff to share ideas on an ongoing basis would also serve as a key learning activity, according to the participants. This would allow them to express their opinions on the system and even make recommendations for improvements.

> *"I think involving them throughout the whole change to technology and having them around to share ideas in workshops will be productive."* (FG2_1)

5.5.4.5 School level

A broad recommendation (out of the scope of this study) was made by the participants, that it should become mandatory for technology training to be taught to all at schools. This would make it easier for students to eventually embrace technology in the workplace.

> *"The skills I think that are needed the most are computer skills. The government must implement computer science and programming at schools."* (FG1_1)
>
> *"As I mentioned at schools, they need to implement it in their studies so that you must understand and know what you are going to come across in the working environment."* (FG1_2)
>
> *"I think it is good, but we need to organise it at school first, so that when you finish schooling, you are going to know how to use the system at work, on the job."* (FG1_3)

5.5.5 Research

According to the participants, basic research could assist in the following ways.

5.5.5.1 Company analysis

According to the participants, a full analysis should be done in terms of how much time, money, and resources the technology shift will incur. This can then inform strategies for implementation.

> *"… every company, before they take on new technologies, must first do their research. For example, do you have enough staff, how much money is needed, are our people equipped after they are given enough training? There will be more complicated technology introduced in the workplace."* (P3)

5.5.5.2 Human capacity/need analysis

Participants noted that a specific focus must be placed on analysing human capacity and skills. Human beings will still be the driving force behind the implementation. Hence, it is important to establish factors such as human capacity; staff needs; staff mindset; and other factors related to staff and their requirements to adapt to new technology.

> *"… I feel like the companies need to do proper research before taking on new technology; to make sure that they understand the human minds, know how it works and are they going to adapt to the technology that you going to bring in or are you just going to incur more cost hiring new people while you still have your old staff."* (P3)
>
> *"… proper interviewing one-by-one and then seeing how each can adjust and adapt to change."* (P7)

Table 5.4. UTAUT factors of assessment supported by participants' responses

Variables	Participants' responses
Performance expectancy (PE)	*"…this is a company that have bought technology just to improve the skills of their employees and to improve the productivity in the workplace."* (P2) *"With technology, everything will be fast."* (FG2_1) *"I think that the business is making available the latest programs and enabling the staff to do their work more efficiently and effectively."* (P11)
Effort expectancy (EE)	"*…we have a capable team that is capable of handling any new challenge… to improve those individuals to develop their skills…"* (P2) *"We work with a strong team for quite a while and I have the utmost confidence in everybody to get the job done."* (P9) *"It is easy to access the information required."* (P2) *"… data extraction is completed in a shorter space of time."* (P4)
Social influence (SI)	*"Our team will definitely embrace technology."* (FG3_1) *"… there is a lot of fear when it comes to technology, that people feel when the systems are in place, then there is a risk of job losses."* (P7) *"We will embrace the new system."* (FG3_2)
Facilitating conditions (FC)	*"Once the processes were developed, we had an SOP to follow as to how the automated process works. That was discussed in the training session with the staff … the Argon team…"* (P12) *There are training and regular workshops in the problem areas. I think our workforce is adequately equipped to take on these new training and education upgrades."* (P1) *Technology impact on supply chain in increasing efficiencies through the automation of transactions and transparency which increases performance."* (P14)

Source: Author

Table 5.4 shows the pillars of assessment of behavioural intention and adoption of technology utilising the UTAUT framework which are performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC) (Ronaghi & Forouharfar, 2020; Venkatesh et al., 2003; Xian, 2017) and includes the responses from the participants associated with each pillar of assessment. The data is an indication of the user acceptance of technology.

5.6 Chapter summary

This chapter presented the results from the qualitative data generated from the interviews and the focus groups, as well as the themes emerging from using CAQDAS in this research study. Data were analysed based on a thematic analysis perspective. Descriptive themes emerged and were supported by extracts from the qualitative interviews and focus groups discussions. The themes that emerged were technology exposure and awareness; skills and competencies; challenges and recommendations; and system implementation: manual-to-automated through change management.

The first objective, examining how the leadership of the logistics company prepared for the transition from a manual to a systems-guided process at the study site in Durban, was addressed. Communication, resources, technology, and training were applied. Thereafter, the second objective of this study, which was to identify the challenges that the workforce at the logistics study site in Durban experienced in transitioning from a manual to a system-guided process, were achieved and addressed. The challenges identified were embracing change; culture; job security; skills and learning; economics; and communication. The third objective of the change management process was informed by the recommendations of the third and fourth themes, which was systems implementation: manual-to-automation. This included the impact on the workforce. The change was positive, and the system-guided process facilitated the management of short-dated inventory, communication, and training of the workforce, as well as transferability to other logistics sites within the organisation.

Chapter Six will discuss the findings of the fourth theme linked to change management and adoption of technology from a manual to an automated system-guided process in managing short-dated inventory.

CHAPTER SIX: RESULTS – TECHNOLOGICAL CHANGE

6.1 Introduction

The findings from the qualitative face-to-face interviews and focus groups on the first three themes linked to change management were detailed in the previous chapter. These were supported by direct quotes from the qualitative interviews. This chapter will discuss the fourth theme, which relates to change management from a technological perspective, from a manual to an automated system-guided process. The virtual interviews (Appendix J) that were conducted post the change to the system-guided process, and the themes that emerged after analysing the rich qualitative data generated, will be discussed.

Findings have been presented in descriptive themes to better understand the identified problem statement. Participants' feedback was utilised to confirm the pertinent themes and sub-themes. The results of an in-depth discussion on the transition from a manual to an automated system-guided process leveraging 4IR technology will be presented. Thereafter, the change management process for the effective adoption of 4IR digital technology in facilitating this transition from a manual to an automated systems-guided process will be discussed.

This contributed to the third objective of this study, which was to develop a framework for change that embraces technology and the human element at the logistics site in Durban, in embracing technological change to transition from a manual to a system-guided process. Finally, the chapter will conclude with a summary of the findings.

6.2 The manual process at the logistics study site

This study focused on automating the manual processes for handling short-dated products with under 60 days of SLED. The SOP of the manual process was summarised by Participants 12, 13 and 14, below.

> "*With the manual process, what needed to be done, was to physically inspect the warehouse for short-dated products, then to combine those into an order, remove those products, store them separately, consolidate them into storage bins for picking, pick the orders, and dispatch.*"(P12)
>
> *"Pickers and forklift drivers should go through the warehouse looking for short-dated stock manually. It was all done manually."* (P13)

"The old manual process was a cumbersome one in that we, the stakeholders that were involved, had to manually go through the stock with a fine-tooth comb in that they had to find the HU label with expiry dates and that was prone to confusion and errors. At that time, we needed to also communicate the expiry dates or the near-to expiry dates to the sales team for the order to be captured. Hence, the old manual process was indeed a cumbersome one." (P14)

6.3 Thematic analysis

Four themes that emerged from the data collected and three were discussed in Chapter Five. The fourth theme which is *'System implementation: manual-to-automated process'* is discussed in this chapter.

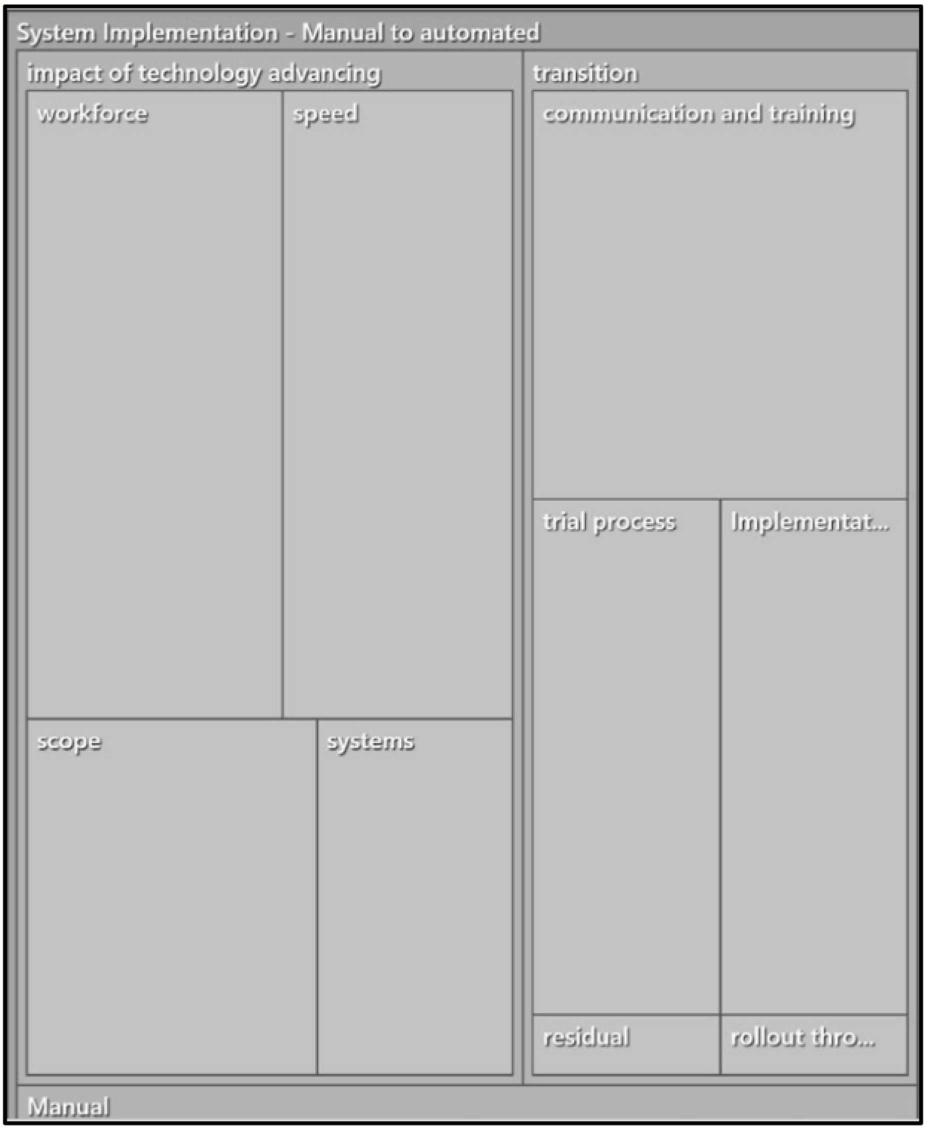


Figure 6.1. Systems implementation from manual to automated

Source: Author

In the transitioning from a manual to an automated system (Refer to Figure 6.1), the technology will impact the workforce (human dimension); efficiencies – the speed of execution; the scope of the system-guided process; and the change of systems. The effective transitioning must be facilitated by effective communication, training, trial processes and implementation. Once effective, the process should be able to be rolled out to other operating units.

6.4 System transitioning - manual to automated

This primary theme examined the concept of the actual system implementation from manual to automated, as highlighted by the participants at the study site. Opportunities emanated from the change management transition. These were empowerment of the workforce; up-skilling, reskilling, and development, which the organisation had provided for the workforce through formal training; informal training; and on-the-job training on a continual basis. Further opportunities that the participants identified were upgrading of businesses; increased profitability; reduction in crime and theft in businesses; empowerment of small and medium enterprises; tracking and tracing facilities; improved efficiencies; reduction in manual labour; gained experience; growth of the country's economy; and leveraging the benefits of digital technology.

> *"…the company has made vast strides in persuading employees to study and subsidise the studies. Training and regular workshops were conducted in the problem areas; hence, I think that our workforce is adequately equipped to take on these new training and education upgrades."* (P1)

6.4.1 Impact of technological advances

It was first important to establish the perception of participants in terms of the impact of technology advances on the workforce, and speed, scope and overall systems. Technological advances have an impact on speed and efficiency, which has been acknowledged as one of the main drivers of the digital technological industrial revolution. This should also result in cost efficiencies through the reduction of wastage, increased throughput, effective reporting, and shortened lead time.

> *"Technology is meant to be faster and more efficient… efficiencies coming through where you can monitor your workforce, the processes, are able to benchmark easier against the different functions in your organisation, and inter-organisation as well." (P1)*

> *"…I think that the new system will also save time, money, and losses - in rand value in terms of losses…it will bring a positive change. … maybe do not store a lot of products in your*

warehouse, use just-in-time because you will have more advanced technology. You will be able to meet that demand … improving continuously in the workplace." (P3)

"Firstly, technology is here to stay. And in terms of technology in the workplace, the impact is going to be great and significant, whereby processes will be streamlined, and efficiencies brought about. In terms of advancement, it is going to be an ongoing continuous process. The speed at which this is going to happen from origin is going to be quite fast, which will be impacting systems and procedures as well. I think it will make things simpler, faster, more efficient; and data extraction will be in a shorter space of time." (P4)

"The first thing that comes to mind is the modifications. In terms of technological change, it will bring about modifications in a positive way…" (P5)

"…it will have efficiency and we will be able to access reports…" (P8)

6.4.1.1 Workforce

The impact on the workforce was the highest ranked theme. This is logical, as technology will influence the staff, specifically how their tasks will be impacted. The participants acknowledged that there were benefits of technology in improving the business and the workforce. There needed to be a change in mindset which was facilitated through acquiring knowledge of the changes that technology affords the business environment.

"… technology is good for the business, individuals, and the communities. It needs to be changed in people's minds for them to appreciate what technology brings to them. Explain the benefits of the technology and how technology works. There will need to be a change in mindset. People need to be informed." (FG2_2)

6.4.1.2 Reduction of staff

This was the highest ranked aspect. This was also a re-emerging subtheme and seen in other themes. Participants felt that technology-driven tasks would minimise manual labour, which could imply a reduction in staff numbers. Examples were made of other organisations where technology replaced people, and this had a negative impact on staff morale. Participants illustrated the point of reduced labour when technology was introduced and implemented. It may have been in the trial phase; however, the impact on reduced manpower was evident, which would have impacted job losses as advanced technology reduces the requirements for labour.

"… the number of people required for a specific task may be reduced." (P4)

"... the negative aspect is going to be loss of jobs due to technology being a substitute for labour. Technology is more accurate. People will lose their jobs because of technology." (P7)

"... you do not like technology, but you must understand technology, as more jobs may come from technology. Technology is going to affect so many people." (FG1_1)

"From my side, technology is right. But on the other hand, it is not right because if I can make an example, I saw a truck from the municipality which was collecting the garbage bins. There are people generally standing behind the truck to take the bins and off-load into the truck. But I saw one of the truck's advertisements, it has something on the side of the truck. The driver stops, presses a button, and takes the bins into the truck. Those people that used to ride at the back of the truck, will lose their jobs." (FG1_2)

"I think, firstly, this whole change and systems introduced in the workplace, personally it scares me. It feels like a threat towards me. It is going to take away your job, it is going to do your job for you, and you are going to end up losing your job. You are going to be less productive, and the system will be the one that is operating almost everything." (FG2_1)

Table 6.1. Risk of job loses

Risk of job loses	
Workforce	**Management**
"Bearing in mind the unemployment rate." (P5)	"South Africa is going to be a challenge in terms of the economy." (P1)
"There is a lot of fear when it comes to technology that people feel when systems are in place, then there is a risk of job loses." (P7)	"…the biggest challenge is resistance to change." (P4)
"…most people are going to loses their jobs because of technology." (FG_1)	"There is fear when it comes to technology as people feel that when the new system is in plave, then there will be a risk of job losses." (P8)
"…I am scared because when the new system is in place, …I think that I am going to lose my job." (FG_2)	"…in the beginning, people will be scared of change." (P11)

Source: Author

Table 6.1 indicates that the workforce has a fear of job losses due to the adoption of technology whereas management does not share the same fear. 'P8', who is part of management, states that the workforce would fear job losses due to the adoption of technology in the workplace.

6.4.1.3 Skills

According to the participants, skills would need to be upgraded to cater for the new technology. This could have an impact on staff now needing, or being forced to learn, new skills. Anyone who did not learn new technological skills could be left behind.

"…in terms of competencies, much more is going to be required to understand the system and apply the system for data extraction and application." (P4)

"There is hope that they can learn more about the system. Maybe they can have other positions that will be created because of technology. … If you do not want to learn, there is going to be no positions in the company for you. The company is moving forward." (P7)

"…technology is always being upgraded and some people do not believe in improving themselves. Technology may need people who have science, maths and understand IT. We must shift the focus on the other things that are not going to be taken away by technology. We need to be more exposed to technology." (FG1_1)

6.4.1.4 Reluctance and fear

Due to staff reduction and job insecurities, there will naturally be a reluctance and fear for new technology (as outlined in other themes as well) by the participants.

"I think it is going to be met with some reluctance." (P1)

"Most people fear change. Change they do not understand. I think it is a lack of information about technology and the changes. If you do not have an idea how it is going to operate, you will always fear what you do not know. That is the problem that most people have." (FG2_1)

"Change is never good, but when you go through it, you can understand that it was for the best. If you do not know, or you are not willing to go through that change, you will never learn anything. Most people fear technology that is introduced in the workplace." (FG2_2)

6.4.1.5 Performance and productivity

Apart from their fears and reluctance, many participants saw it as positive. Technology could increase performance and productivity by increasing efficiency, saving time, and minimising manual labour. This could lead to more productive hours.

"People will see that you know that there is a lot more out there from a technology point of view. I think that the business, giving them the latest programs and enabling them to do their work more efficiently and effectively, should have a positive impact on the workforce." (P11)

"Productivity improves on its own. With regards to the information around you, it is not always limited, you can just go through the system and find out what you need to know. So that is being more productive, and less time required to do it. It improves productivity which contributes to profitability. The more productivity achieved, the more the economy will gain." (FG2_1)

"… my opinion of the new technology is that it will bring more productivity to the business as well as help the business to contribute more to the country's economy as well as socially. For

the company and for the workers, it will make everything very easy. And even the workers themselves, they will also learn more about the technologies that they were not going to get the chance to learn." (FG2_2)

"It is decreasing the time, making money by being productive. If the company is more productive, there are more sales which will make the company more profitable. Technology is good." (FG2_3)

"Improve performance and efficiency daily. It can affect the individual performances as well." (FG3_1)

6.4.1.6 Development and growth

According to the participants, learning new skills to embrace technology could be seen as an opportunity for added development and growth. Knowledge gain is always important, for both current and future job roles/opportunities, especially as technology is inevitable. It could also build motivation and confidence.

"… some people will be motivated because they want to learn and, as we go into the future, everyone needs to adapt to technology. We are no longer using manual systems; it is becoming more futuristic. I think people will want to learn to advance in the future as well." (P8)

"Definitely growth and knowledge of technology in South Africa. Not everybody has the privilege to be introduced to this system. The company has done a great job by introducing it to us. So, growth with technology." (P9)

"I think we will also get more experience. We will be learning new things. It is a gain for us as much as it is a gain for the company." (P10)

"Even in their private capacity as well, knowing that you have added something new that you are knowing technology and you have that wealth of knowledge going forward." (P11)

"I think it will give them more confidence as they are going to learn new things. That helps a person improve." (FG3_1)

"… give them more knowledge in working with technology." (FG3_2)

6.4.1.7 Enjoyment and ease

The participants' views were that technology could lead to ease in completing tasks by making processes simpler. This can, in turn, lead to more enjoyment of work tasks. For example, people can control processes from their computers, rather than manually.

"I think that the business is giving them the latest programs and enabling them to do their work more efficiently and effectively. It should have a positive impact on the workforce and the individuals." (P11)

"... with technology that has been introduced, the people being trained, and the skills that they have after being trained, they will use the new system, which makes things easier for them. Making the most of technology gives people more skills and more understanding." (FG2_1)

"... if you can go back to SAP, where we were just office bound with your desktop, to have a laptop now, I mean that's enjoyment. It teaches you responsibility." (FG3_1)

6.4.1.8 Culture change required

A change of culture may be needed because different roles and departments had their own culture. Furthermore, younger staff will be more at an advantage as they may be more technology orientated. Hence, different age groups should be considered. A unified culture regarding technology should be created.

"Where the culture, and the attitudes of the workforce are going to change. But I think it is going to be to a certain extent, whereby everyone must come together as a group. If you must pick out a forklift driver for example, who is our chief operator in the warehouse, and other distribution activities as well, you will notice that we have a different culture, and in terms of their qualifications. Nonetheless, people will eventually have to follow a system." (P1)

"... we have people from different backgrounds. Some people will have difficulty adjusting, but according to my knowledge, everybody will get going as most will have a new skill set, the necessary skills that can be used throughout the whole world." (P7)

6.4.2 Speed

The participants ranked speed very highly, as a subtheme. This was a logical argument as technology, and speed are often correlated.

6.4.2.1 Faster

Many participants affirmed that the new technology would make processes and tasks faster. Efficiency would increase, thereby increasing productivity.

"I think it will make things simpler, faster, and more efficient." (P4)

"... it is going to be rapid, going to be fast, and definitely make an impact." (P5)

"The positives are, going to increase efficiency. ... production would be faster." (P7)

"... there will be systems where we are faster, some will be quicker, depending on the system itself." (P8)

"Mostly where processes will improve to be more efficient. Efficiencies compared to what we used to do. ... the SAP program." (FG3_1)

6.4.2.2 Time

The view of the participants was that the system would save time, which can be seen as another commodity. According to the participants, time would be saved. Traditional manual labour took too much time and new technology would save on that. The system could allow for products to be accessed and tracked more easily at the click of a button.

"... you will have a bigger picture of what you have in the warehouse… Type search and it also saves you time. ...I think it will bring a positive change. Machines are more advanced to produce more products, it will save time." (P3)

"... my view is that with technology being introduced to people, it will be positive. If I recall, going back when we had no computers in my workplace, and no scanners, everything took more time to complete. They want you to go to a certain aisle, to a certain bin, we must go to the supervisor and ask him." (FG2_1)

"With technology that we have, you would not have a shortage of time. People that are wasting time or being away, can be tracked. With the system you can find whatever you want easily." (FG2_2)

In the view of the participants, time saved could contribute to more productivity.

"... you will be able to produce more in a short space of time compared to when we were using humans. Tasks that were taking two hours may now take one hour." (P3)

"... it has improved production and it limits the loss of time." (FG2_1)

Just-in-time processes could be implemented. Just-in-time is a key strategic aspect in supply chain and inventory management.

"... able to store less products in the warehouse, maybe use just-in-time because of more advanced technology, hence able to meet the demand." (P3)

6.4.2.3 Minimise manual

The minimising of manual labour in an automated system-guided process would contribute to speedy processes, as highlighted by the participants.

> *"... speed is of the essence. We are always used to the old cumbersome way of manual labour, so with new technology, I think people are going to see results, which means efficiency."* (P1)

> *"... speeding up processes, process flows of daily work. It will remove a lot of manual work and people will be available to take on more."* (P11)

6.4.2.4 Minimal mistakes

The new technology would also minimise mistakes. Mistakes can cost a lot of time, productivity, and money. The new system would eradicate this and contribute towards more speed and efficiency, which translates to productivity. The participants highlighted that technology was reliable and mitigated the risk of human errors. There were improved efficiencies which had a direct impact on increased productivity.

> *"... everything that was done manually, will be done with EWM. The results should be more accurate, and the speed should be faster than the manual process."* (P10)

> *"It will speed up all the processes and increase efficiency. Efficiencies will be better than when doing things manually. Working with a system-guided process, it will be difficult to make a mistake. The system or the scanners will flag it straight away and will prevent you from making a mistake."* (P9)

> *"... increase in speed. I think everything that technology is used for will be under control."* (FG1_1)

> *"I think technology is good in such a way that it mitigates mistakes. Technology mitigates losses, improves productivity, and it limits the loss of time."* (FG2_1)

6.4.2.5 Reports

The participants were of the view that reports will be able to be done a lot more quickly and easily.

> *"Depending on the processes, some processes might slow the business down, but it will have efficiencies where we will be able to generate reports."* (P8)

6.4.3 Scope

This theme examined the scope of the new technology. It was informed by the following inputs from the participants.

6.4.3.1 Ease of tasks

According to the participants, current manual tasks and processes would be made easier through transitioning to technology. The participants believed the tasks will become easier and simpler due to the reduction of complex manual processes. The workload could also decrease.

> *"I think it will be making things easier. More comfortable for people to be able to make things simpler."* (P6)
>
> *"This technology is going to improve compared to previous manual systems. With the scanning it will be easier."* (FG1_1)
>
> *"… technology minimises the workload."* (FG2_1)
>
> *"When you have traceable documents, or traceable systems that can track whatever you need, where to find a thing, the exact location, it makes your job easier."* (FG2_2)
>
> *"And I am just thinking that they are going to embrace technology because It is going to be simpler for them. Making one's life easier by working. Makes coming to work enjoyable and should be a good challenge."* (FG3_1)

Tracking of stock was seen as a tedious process. According to the participants, technology can improve this and make tracking a seamless process. Stock-taking will become a highly efficient process.

> *"Each product that will be coming into the warehouse will be scanned and each product that will be despatched in the warehouse will be scanned. Meaning that each transaction will be recorded on the system so that we can be able to trace each transaction. …we do not have to go back to checking all the documents looking for what happened on that day. …it is easy for us, especially when doing stock-taking. We do not have to request for all documents, we can just go on the system and type in the transaction date to trace all the history and information of those transactions."* (P2)

6.4.3.2 Monitoring

Another key aspect was that of monitoring. Monitoring entails ensuring that all stock and products are closely checked and accounted for. Traditionally, the manual process was long, large, and cumbersome. The new technology could now simplify this and make it manageable, faster, and easier.

> *"... monitor the work force and monitor the processes."* (P1)
>
> *"... monitoring of everything."* (P7)
>
> *"If something is system-guided, definitely the speed will pick up and everybody, like the forklift drivers and whoever is working on the system, can be monitored at any time."* (P9)
>
> *"... when you find a damaged product in the bin location, you have to go report to the stock clerk and they will block the bin and get the product palletised.".* (FG1_1)
>
> *"Things like computers make everything traceable. Employees can be monitored with technology. If there is a pallet lost or a product that is lost, you use the same equipment to trace everything."* (FG2_1)

6.4.3.3 Processes

All key and complex processes can be simplified – such is the role of technology. Processes can also be streamlined and measured for ideal results, as indicated by the participants.

> *"Technology is here to stay. Technology in the workplace, the impact is going to be great and significant, whereby processes will be streamlined, and efficiencies brought about."* (P4)
>
> *"... in terms of size, it also plays a huge role. You can do more than one thing with technology. You can combine many things at once and you get the results that you want."* (P10)
>
> *"I think the improvement is good and it improves a lot of things that we were struggling with before; for example, to maintain the stock, it is not easy for a person to see the dates. You may know that there is stock there but maybe it is of an older date that needs to go, but EWM will make it easy as it can tell you which stock that has been there for a long time that needs to be despatched. It improves the speed of working as the scanner tells you where to go, but people can make a mistake when giving instructions."* (FG1_1)

6.4.3.4 Forecasting

The view of the participants is that forecasting is also possible. The system will allow for statistics and results to be generated via reports which can assist in forecasting for the future.

"...be able to forecast better, for example, forecasting in December, I am going be needing more of a certain product, so you are using your just-in-time tool, because you are going be ordering in November for December requirements using technology" (P3)

6.4.3.5 Scanning

The scanning ability of the system will make product management a seamless process, as indicated by the participants.

"Looking at the warehouse that we are now in, you find it quite exciting how this system is going to be introduced. If you are looking at the system that we used to use, on the old SAP, compared to the changes that are coming through with the system EWM, it is quite exciting how things are going to operate. The idea of scanning a product within the warehouse, confirming it into the bin, invoicing, especially on the despatch as well, is quite exciting." (P2)

6.4.4 Systems

In terms of the new technology systems, per se, various technological considerations were mentioned by the participants at the study site.

6.4.4.1 Modifications

The participants believed the modifications to the system must be cognisant of positive developments in the organisation, and this must be communicated to staff.

"The first thing that comes to mind is the modifications. Hoping to bring about modifications in a positive way." (P5)

6.4.4.2 Keeping abreast and benchmarking

According to the participants, it is important to keep abreast of the latest technology and systems and this meant also looking at other organisations, locally and abroad. Benchmarking could also be done internally. The process of benchmarking was core, continual improvement.

"... you can be able to benchmark easier against the different functions in your organisations and inter-organisations as well. There is only one system, so we cannot have any exceptions to the rule." (P1)

"... the process we are going to have, is the same process as international processes. It will not be difficult for them to move to other companies and work on the new processes as well. So, I think that the new system and the system in the outside world, are the same systems. The system is going to help us and other organisations as well." (P7)

6.4.4.3 Information access

The participants were of the opinion that information access through the system would improve decision making processes.

"It is easy to access the information required." (P2)

"... data extraction in a shorter space of time." (P4)

"Now I just go to the PC, whether it's Excel, Microsoft, or the report must go onto PowerPoint. I open the file and store my information. It is working hundred per cent. And with people, and in my case, what scared me before is that I had no information whatsoever." (FG2_1)

6.4.4.4 Improvement

The system can be continually improved as time passes, to accommodate other processes. This should be an ongoing process, as suggested by the participants.

"... it will be improved, ... develop us and change us to become better people." (P2)

"And in terms of advancement, it is going to be an ongoing continuous process." (P4)

6.4.4.5 Costs

Whilst technology and systems can save time and costs, there should, however, be a balance between the cost of implementing the system and short- and long-term benefits. It was the view of the participants that the system must also deliver on what it is supposed to do in terms of cost saving.

"More costs will be incurred in implementing the new system. ... save on probably manpower. Previously, twenty people were used to count stock but now that EWM will be implemented, for example, one person can count the entire warehouse. The system that I was using before, it was more manual because you had to export whatever you had in the system and then you had to print that spread sheet and count manually. I think that the new system will also save time, money, and improve on losses. It is going to impact positively in accurate counting, time, and improving continuously in the workplace." (P3)

"... saves time and it saves cost." (P10)

6.4.5 Manual

The participants indicated that the traditional manual process was plagued by the following issues.

6.4.5.1 Manual tracking

The participants stated that there was lots of manual tracking, where staff had to manually go through the entire warehouse and search for short-dated stock/products. This entailed physical inspections and it was tedious and time consuming.

> *"... previously, the manual process meant that we had to manually find short-dated products and the picking of products was done manually. ... with the manual process, the warehouse had to be physically inspected for short-dated products."* (P12)
>
> *"Pickers and forklift drivers should go through the warehouse looking for short-dated stock manually."* (P13)
>
> *"... in that they had to find the HU label with expiry dates ..."* (P14)

6.4.5.2 Consolidation and picking

The participants confirmed that, thereafter, these needed to be physically consolidated.

> *"... consolidate them into an area for picking, where we can pick those orders and then despatch."* (P12)

6.4.5.3 Combine and remove

According to the participants, they then needed to be combined into an order and removed manually, which was a separate process.

> *"... to combine those into an order and be able to remove those products separately."* (P12)

6.4.5.4 Lengthy

Overall, the manual processes were lengthy and time consuming, as noted by the participants. They also required many staff and much physical labour to go through the warehouse manually.

> *"... trying to pick short-dated stock and by the time they realise it, good stock was picked instead of the short-dated stock. If we were still using that old manual system, it would have*

taken us longer to get the stock picked and I can tell you we would have ended up picking the good stock and not the short-dated stock." (P13)

"The old manual process was cumbersome in that the stakeholders that were involved had to manually go through the stock with a fine-tooth comb, so to speak." (P14)

6.4.6 Transition to automation

This important subtheme examined the actual transition from a manual process to an automated process, which was the focus of this study.

6.4.6.1 Trial process

According to the participants, there was a trial process, which meant applying the new processes in the working system. Based on the SOP, a testing exercise was conducted so that challenges could be analysed and addressed, as indicated by the participants.

"... once we received the SOP, we moved on to the testing phase where we made use of the SOP as instructed. The new processes were applied to find out if there are any complications or difficulties in using it. We had to find out if there are going to be any challenges using this process." (P12)

The participants confirmed that the staff were also trained on the location, picking and process during the testing phase.

"... where waves were created for picking, we had to train staff on the picking location and the process. The actual process..." (P14)

6.4.6.2 EWM processes

The new EWM processes included the following key processes, as outlined by the participants.

The system catered for storage and linking. There were different codes for storing. For example, short-dated stock was placed under ES01. It also ensured that short-dated stock was not mixed with correct stock (longer shelf life). Linking was done via the shipment process, based on dates.

"... orders had to be placed in a special storage location called ES01, where the short-dated stock was systematically placed. Also, the HU's (handling units) had the dates that the stock

was produced and the date that it expired. This stock was placed in a storage location called ES01 from where deliveries were extracted. The sales team had to link orders to the shipments according to the dates that were required, and these shipments were distributed into EWM. The action that the team leader had to take was to train staff on where the stock was placed into a storage location ES01, which was via a posting change to the stock type 'F3' on EWM. ... This was initially done at the source point so that the short-dated stock was not mixed with the fresh stock that we have in inventory. The orders department was requested to place two orders, namely one for the full pallet pick and a partial quantity of a product. The shipments were linked to the orders and then we had two full pallets of stock moved into ES01, one being a full pallet and one being ES01 break-bulk bin. ... The shipments were assigned to a staging lane and then a wave was created and released. A wave for picking this stock. The shipments were assigned, and the warehouse staff created a task for the picker to pick a certain quantity from the ES01 break-bulk, less than full pallets." (R14)

Orders are placed and released on the EWM system. The stock moves into an SAP storage location from finished goods (FW01) to expired stock (ES01). The system separates this accordingly, to ensure the correct stock is picked. The distribution process then allows for the picking process to commence. This picks the appropriate stock, based on the proper location according to the sales order quantities.

"Sales place an order for the products. Once the order is received, the order is released into EWM. ... from an orders point of view when stock is on EWM (shelf-life of 60 days), the stock moves into a SAP storage location from finished goods (FW01) to expired stock location (ES01 - shelf-life of 60 days). The order that is placed is captured in ES01 specifically for short-dated stocks (shelf-life of 60 days). ... When the order comes through it is created for short-dated stock types and will not allow good stock or other types of finished goods to be picked. It will only allow for short-dated stock as the order has been captured in ES01. … Once we receive the order, it is released and distributed on EWM, where it can be released for picking. Because the order is placed in ES01, it translates to a 'F3' stock requirement on EWM versus 'F2' which is for ordinary finished goods. The system looks for the 'F3' short-dated stock, and creates warehouse tasks for picking the stock from the location that it is in." (R12)

The EWM allows for systematic picking of stock and identified short-dated stock. Correct stock is also picked and placed into a staging lane for verification.

"... warehouse picking tasks are released systematically to pick stock for an order. It needed to be a fully system-driven process in the testing phase when we trialled it. We therefore

released the picking tasks, and the system did identify which stock was short-dated and that stock was picked. Thereafter, we created a warehouse task for a forklift driver to go and pick short-dated products. A break-bulk picker to go and pick short-dated products and stage in a staging lane. (P12)

"A warehouse task was created for a forklift to pick the full pallets from the ES01 full bin, the full pallet was picked by the forklift driver and the fine picking was scanned by the picker in the break bulk bin. He had to scan the source HU. As I mentioned before, the source HU has all the information of the production date and the expiry date which is vital. ... During the exercise the correct stock was picked successfully and was put into the staging lane where it was checked by the supervisor of outbound to ensure that the correct item had been picked. We also check the HU label to ensure that this was done successfully. Thereafter, the billing took place." (P14)

According to the participants, the EWM allows for all products to be captured with necessary details such as shelf-life and expiry dates.

"... with EWM all products are captured and received with their shelf-life expiry dates on the system. At any time, you can view the expiry dates on any products." (P12)

The EWM ensures that no errors are made during the process because it has mechanisms to ensure correctness and validity of items

"... No errors are made along the process. The ES01 break will delete the original HU and the stock is placed in it. The picker verifies that he is at the correct source bin and not picking fresh stock. This risk would have been the case in the old manual process." (P14)

6.4.7 Transitioning from manual to system-guided process

The participants noted that the actual transitioning into the EWM system certainly delivered various beneficial aspects, as listed, and described below.

6.4.6.2 Efficiency and performance

As stated in other themes, the actual implementation did increase efficiency and performance. This was especially so in the picking and sorting of stock in terms of short-dated and good stock. The manual process was too long and tedious, whilst the new system-guided process made it streamlined and efficient.

> *"… definitely much more efficient being system driven than the manual process."* (P12)

> *"… If we were still using that old manual system, it would have taken us longer to get the stock picked and I can tell you we would have ended up picking the good stock and not the short-dated stock. Now that we have the system, we did not let it go, everyone is still comfortable. It goes together from 'not letting up' and 'making it stick'. Even the sales representatives are getting used to the system and going to check all the stock that we have on the system, which is ES01; and then, get the customers to buy those instead of writing off the stock."* (P13)

> *"I think that technology impacts the supply chain, increasing efficieny through the automation of transactions and transparency."* (P14)

6.4.6.3 Tracking

Tracking of short-dated items became seamless and automatic, according to the participants at the study site.

> *"It helps keep you on track, you don't have a lot of short-dated stock in the warehouse or stocks you are unaware of in the warehouse."* (P12)

> *"Everyone is more comfortable. They don't have to ask anymore whether it is short-dated stock or not. They know automatically as it goes to the short-dated stock and does not go to the good stock."* (P13)

6.4.6.4 Systematic

The participants confirmed that the system offered a systematic approach to product tracking and sorting. In addition, it was not dependent on too many people for processes to continue; so even if some staff were absent, work could continue because the system was not labour intensive.

> *"With EWM, we can find products systematically and the information is available for picking the products. Create the orders and pick those products systematically."* (P12)

> *"I think the stakeholders involved had seen the difference. I also think the fact that they were the people initially involved in the manual process should see the difference with the new SOP in place. I must say that we need not wait for Mr X or Mr Y to be at work anymore, when we have the rest of the staff, forklift drivers for example to pick bulk pallets because we are now*

system guided. Essentially, the order will be picked, as I mentioned, because of the tasks that are eventually picked. Like in the old days, we were reliant on people to check the stock." (P14)

6.4.6.5 Ease and utilisation

The participants indicated that the system was relatively easy to use and allowed for multiple staff to utilise it.

> *"We have been making use of it effectively. Particularly, for our grocery products."* (P12)

> *"For the workforce as well, not only for the warehouse and the sales reps. Those that capture the orders, they know exactly, and do not say please send us your list. We want the stock that is short-dated so that the stock can be sold to the customers at a discounted price. They know they can go to the system and extract the stock list and identify stocks that are short-dated."* (P13)

6.4.6.6 Fit the supply chain model

The essence of a good supply chain model is ensuring that the right product is in inventory and that it finds its way to the right customer within the right time frame and condition, in an efficient service, and other related aspects. This system supported that and made the supply chain much more effective.

> *"The supply chain definition is to get the right stock, the right product to the right place, to the right customer, and in the right condition timeously to the customer. This process speaks to our supply chain ideology, and I think that the right stock that you send in the right condition to the customer speaks volumes of your service levels. Unlike the manual process, when you would get your customer service correct, but at times the customer would be agitated by receiving close-to expired, or already expired, stock due to human error."* (P14)

6.4.6.7 Eliminates errors

The participants noted that the system certainly eliminated errors from the start to the end of the process. This meant that the stock was not getting mixed up and no discrepancies were found. The customer would get the correct stock.

> *".. it saves a lot of effort and, apart from that, when doing other orders, you do not want to accidentally encounter short-dated stock, so this is a good housekeeping measure as well."* (P12)

> *"This automation does not allow for errors because it is done every step of the way, from source bin, the final staging lane, to the person that transports the product after checking it, and to the customer. There is no room for error."* (P14)

6.4.6.8 Customers and income

Due to the efficient nature of the system in finding short-dated stock, such stock can now be sold to customers at discount rates, thereby bringing in added income.

> *"The stock that is short-dated that the system identifies can be sold to the customers at a discounted price."* (P13)

6.4.6.9 Continuous process

Lastly, according to the participants, the transition into the new process should not just end after the system change has occurred. It should be an ongoing process. Communication and information must continue to promote understanding. Hence, this should not stop, but the system must always be communicated, and management must be transparent to staff.

> *"… encourage input of this process. There was some vital additional information that was also included. I think this did not have any major impact on the process, but it did add and make the stakeholders realise and understand that this process was transparent and was going to be successful in its implementation. Vital input came through from all parties and it did make a vital difference to the operations."* (P14)

Further discussions must be encouraged with staff so improvement can be tabled. As the system becomes more utilised, staff may discover issues and bottlenecks which should be brought to the attention of management. Staff can also convey more ideas for improvement.

> *"The proposed SOP was further discussed for input, any additional information, and identification of any bottlenecks. The team leader arranged further follow-up meetings to encourage input on this process and there was some vital additional information that was included."* (P14)

6.4.7 Communication and training

Communication and training were key enablers in the transitioning phase, as noted by the participants' feedback at the study site.

6.4.7.1 Communication changing the process from manual to a system-guided process

The methods of communication in changing the process from a manual to a system-guided process involved the following. Staff were communicated with about the system, and staff feedback was requested so that management could gain insight into staff concerns and ideas.

> *"... it was a case of communicating with the staff to find out how best we can improve the procedure of handling the change from a manual to a system-guided process. Using EWM to create a system-driven process enabled the staff to use that to their advantage and the advantages in handling the short-dated stock identification and control. The communication with them was to improve their ability to use those new features and get their feedback as to the usefulness of the new process."* (P12)

It was important to conceptualise the actual process for the staff, so they could get an idea how it would work and who was involved.

> *"... get the right vision, to communicate how we want the stock…This is how we want the storage locations… To be able to communicate for buy-in, this is when we communicated to the stock clerks on how we intend to have this started off, how it's going to help them, and having the stock picked and the time spent picking the stock."* (P13)

An effective way for managers to become knowledgeable so they could communicate correctly and properly to staff was to research the system thoroughly.

> *"…change is always not taken correctly. ... Before you communicate with anyone else you manage within your department. You must do your research first; when you go to the workforce you must have everything to inform the people. ... So, you must have all the ideas and jot it down before we get to them. We were more than willing to try it out. They were waiting for results."* (P13)

The participants highlighted that team leaders had to play an effective role in communication, ensuring that the information was reaching the right stakeholders.

> *"... this was a communication which the team leader had to enforce and train the various stakeholders. To make them understand and make this trial work."* (P14)

6.4.7.2 Training

The participants noted that training was helpful. Standard operating procedures (SOPs) were helpful in terms of communicating how the system operated, and training sessions had been built around this.

> *"Once the processes are developed, we have an SOP to follow as to how the automated process will work so that the training session with the staff was effective. We did a full exercise on training to handle this new system-driven process. ... we do have an SOP. ... it is being followed."* (P12)
>
> *"I think that when the various stakeholders realise that the business is going to change, as it is adjusting to global changes, so too will the various processes be changed. Initially reluctant, but the staff I think were amazed when the team leader went through the SOP."* (P14)

The training was done in a step-by-step manner, which facilitated better understanding.

> *"... went through the process step-by-step to make everyone understand how this works and how we are going to change from the manual process to a system-guided process."* (P14)

Training helped to overcome resistance and uncertainty.

> *"... being something new, perhaps a little bit of resistance in terms of uncertainty of how it will work but that was taken care of by the training once they fully understood the process."* (P12)
>
> *"... the staff coming from the old school were not excited about it, but the team leader had to communicate this to all the relevant stakeholders – the pickers, the pickers' supervisors, and the supervisors of the different departments. The managers had to encourage training in this regard as people don't want to change old habits as they feel that because it's working fine so why should we change."* (P14)

Training provided new knowledge about the system and the necessary know-how for the various devices.

> *"... the empowerment action was training that we had with our stock clerks, forklift drivers and supervisors. We had to guide them through during the training, starting from where the orders came through, on how they were going to make sure short-dated stock, and how they use the scanners. The forklift drivers were trained on picking from the ES01 storage location. From that training, we were creating short-term wins. Short-term wins were reinforced."* (P13)

Overall, training also built confidence in the use of the system.

> *"... the confidence levels after the training, in terms of fully understanding and realising that it is actually going to be to their benefit."* (P12)

6.4.7.3 Different departments that were involved in the communication and training

The following departments and job functions were involved in the communication and training, as was confirmed by the participants at the study site, Refer to Table 6.2.

Table 6.2. Departments and job functions at the logistics study site

Departments/Job Functions	Responses
Warehousing	*"... the warehousing department."* (R12) *"The warehouse department ... people that were picking orders."* (P13)
Forklift drivers	*"The forklift drivers."* (P12) *"... forklift drivers."* (P13)
Pickers	*"... the pickers."* (P13) *"... the pickers."* (P14)
Stock controllers	*"... stock controllers."* (P12) *"The stock clerks ..."* (P13)
Supervisors	*"The supervisors ..."* (P14)
Management team	*"... the management teams."* (P14)
Development team	*"... part of this was for the development, the Argon team."* (P12)
Despatch	*"... primary despatchers and secondary despatching departments."* (P12)

Source: Author

6.4.8 Rollout at other logistics sites

Participants agreed that the new systems should be rolled out at other logistics sites within the organisation.

6.4.8.1 Other sites

The sites within the logistics environment, where manual processes are still being used, can be included.

> *"… can see it being a great help to other sites, especially where things are being done manually and there are larger quantities of slow-moving products."* (P12)

6.4.8.2 Nationally

It can also be considered for national roll out to the group's logistics sites. This includes the manufacturing component of the business.

> *"I am absolutely confident; it has been working fine since we have implemented this at our distribution centre, and I am also confident we can roll this out nationally."* (P14)

6.4.9 Residual

The system-guided process needed to distinguish between a full pallet of product and less-than-full pallets of product, as noted by the participants at the study site. Also, sales orders had to be identified systematically as full pallets or break-bulk quantities. Amendments to the system were executed, which entailed the following.

6.4.9.1 Full pallets orders

The system had to cater for full pallets. This meant that the orders component had to be improved to include short-dated stock.

> *"What needs to be done is to have orders created when there is short-dated stock, which is driven by EWM, to have orders created, once orders received, release it for picking similar to any other order."* (P12)

> *"… not really an issue that we have been having on system, but you will have one short-dated pallet. From that break-bulk, there will be a full pallet. When the orders are placed, it will be for two or three different customers, as break-bulk pallets. Because the system is already set to the break-bulk in ES01 and full pallets as well, now we will know that this has been short-dated stock to the different customers."* (P13)

6.4.9.2 Partial pallets orders

The system also had to cater for partial pallets. This meant that the orders component had to be improved to include short-dated stock, as was highlighted by the participants.

"From that break-bulk, there will be a full pallet. When the orders are placed it will be for two or three different customers, as half pallets. The partial pickings done manually is an issue. Upgrade to move to a better system to make it work the way you want it to work." (P13)

6.5 Change management from a manual to a system-guided approach

The aim of the study was firstly to explore how to integrate technology in transitioning from a manual process to a system-guided process and secondly to ascertain the impact on the workforce of change management in a fast-moving consumer goods company in KwaZulu-Natal, South Africa. The thematic analysis has been completed and the change management process from a manual to a system-guided approach is discussed in more detail.

The internal reports included the Expired Stock Report, which confirmed that the value of the stock that had been scrapped during the 2019 financial year was over R1.4 million at this logistics company (Appendix E). Other internal reports that were consulted were the 'Internal Monthly KPI Report' (Appendix K) and the 'Internal Executive KPI Report' (Appendix L). These reports recorded the performance of the operational unit, and the focus was on eliminating expired stocks. A checklist that covered various elements in the following categories was used to guide the process: people (identify all relevant stakeholders and training); equipment; system readiness; communication; and reporting (Appendix M).

Table 6.3. Data from participants and internal monthly reports

Category	Participant 12	Participant 13	Participant 14	Monthly KPI
Manual process	*"... previously, the manual process meant that we had to manually find short-dated products and the picking of products was done manually. ... with the manual process, the warehouse had to be physically inspected for short-dated products."* (P12)	*"Pickers and forklift drivers should go through the warehouse looking for short-dated stock manually."* (P13)	*"... in that they had to us find the HU label with expiry dates ..."* (P14)	Total expired inventory scrapping for Durban 2019
Challenges faced in embracing change?	*"... being something new, there was resistance in terms of uncertainty of how it will work ..."* (P12)	*"... that I mean change is always something not taken correctly. ... before you communicate with anyone else you manage within your department."* (P13)	*"I think that when the various stake holders realise that the business was going to change, as it is adjusting to global changes, so too will the various processes be changed. Initially reluctant ..."* (P14)	**R1, 471, 601**
Competencies required by the workforce to embrace this change?	*"SAP-EWM, system knowledge, system guided process, picking instruction via scanners, use of scanners."* (P12)	*"Identifying orders for short-dated stock, operating the scanners, identifying ES01 storage location, and picking."* (P13)	*Identification of HUs that are short-dated, identify ES01 storage location, follow the system-guided process, EWM, use of scanners, and picking."* (P14)	Refer Appendix E

Source: Author

Table 6.3 presents the responses of the participants in the interviews, pertaining to the manual process, the challenges, and the required competencies of the workforce at this company. The 'Monthly KPI' column, which is the key performance indicator, confirms that products with a total rand value R1,471,601 was scrapped (Appendix E).

The monthly KPI CORD report (Appendix K) records the volume in kilograms of product scrapped. It is worth noting that the financial year runs from October to September. The table that is below the volume data in Appendix K is reflecting the 'Expired Product Value', which is the total rand value of products scrapped across the business for 2019.

6.5.1 System-guided process

A process was designed for transitioning from a manual to an automated system-guided process and was implemented to manage short-dated products within the operation. Short-dated products were defined as products that had less than 60 days SLED. All products that were classified as saleable products, which had more than 60 days of SLED, were available in storage location FW01 (finished warehouse 01 - identified as stock type F2 code on SAP - EWM) - (Refer to Table 6.4). A new storage section, ES01 (Expired Stocks 01 – identified as stock type F3 code on SAP - EWM), was created to separate the short-dated products (less than 60 days of SLED) from the good stock.

Table 6.4. Storage locations

Plant Code	Storage Location	Description
DK09	FW01	good stock (more than 60 days until shelf-life expiry date)
	ES01	short-dated stock (less than 60 days until shelf-life expiry date)
RD14	FW01	good stock (more than 60 days until shelf-life expiry date)
	ES01	short-dated stock (less than 60 days until shelf-life expiry date)
WD14	FW01	good stock (more than 60 days until shelf-life expiry date)
	ES01	short-dated stock (less than 60 days until shelf-life expiry date)

Source: Author (Internal documents – SAP report)

Table 6.4 shows the two different storage locations for the different categories of products that were identified using plant codes. The finished warehouse (FW01) stored products that had over 60 days of SLED. Expired stock (ES01) was products that had less than 60 days of SLED. The system had been programmed to move products from FW01 into ES01, once the SLED was 60 days or less for products that were stored on APR (adjustable pallet racking). This automated process allowed data visibility for ease of planning and decision-making in the broader business.

Plant	B...	Material	Material Description	BUn	Unrestrict	SLoc
DK09		35326	Bakemix:Muffin Vanil:12x500g:Sasko	KG	6.000	FW01

Figure 6.2. Stock list of plant code DK09 – FW01 (stock with more than 60 days SLED)

Source: Author (internal document – SAP ZMST report)

Figure 6.2 is a stock list on the internal SAP system that confirmed products in storage location FW01 (finished goods warehouse 01) with more than 60 days of SLED.

Plant	Bin	Material	Material Description	BUn	Unrestrict	SLoc
DK09		1099	Flour:Bread:Brown:4x5kg:Sasko	KG	20.000	ES01

Figure 6.3. Stock list of plant code DK09 – ES01 (Stock with less than 60 days SLED)

Source: Author (Internal document – SAP ZMST report)

Figure 6.3 is a stock list on the internal SAP system that confirmed products in storage location ES01 (expired stock 01) with less than 60 days of SLED. 'Material' refers to the product code and 'unrestricted' is the quantity in kilograms that is available to pick for sales orders.

Stock Overview

Owner	Cat	Document	Typ	Storage Bin	RB	PB	IA	Resource	Product	Product Short Description	ST
DK09			0A55	009.018.A					53674	Lentils:Brown:10x500g:Ubrand	F3
DK09			0A55	013.007.A					53673	Peas:Split:Green:10x500g:Ubrand	F3
RD14			0A11	002.030.D					30830	Sultana:Golden:Ind:1x15kg:Safari	F3
RD14			0A11	002.050.E					55041	Rusks:W/Wheat:1x24x500g:PNP	F3
RD14			0A11	002.053.D					55041	Rusks:W/Wheat:1x24x500g:PNP	F3
RD14			0A11	002.054.E					55041	Rusks:W/Wheat:1x24x500g:PNP	F3
RD14			0A11	003.005.D					55041	Rusks:W/Wheat:1x24x500g:PNP	F3
RD14			0A11	003.010.C					54413	Bar:Oats & Nuts:1x20x40g:Bokomo	F3
RD14			0A11	003.048.C					55041	Rusks:W/Wheat:1x24x500g:PNP	F3
RD14			0A11	004.015.C					49948	Juice:Cranberry Cooler:6x1.25L:LF:SP	F3
DK09			0A11	004.028.C					53673	Peas:Split:Green:10x500g:Ubrand	F3
DK09			0A11	005.016.C					53673	Peas:Split:Green:10x500g:Ubrand	F3

Figure 6.4. Stock overview of 'F3' stock type

Source: Author (Internal document – SAP-EWM report)

Figure 6.4 reflects the automated process that was executed daily to go through all the products and automatically change the status of the stock type of any product with a shelf-life of less than 60 days from code ‘F2’ (FW01 storage location) to code ‘F3’ (ES01 storage location).

This was done through an automatic posting change from one storage location to another on the SAP enterprise resource planning (ERP) system. The above process was automated for all products stored on adjustable pallet racking (APR) which complied with the parameters set for products that were defined as short-dated products that had less than 60 days of SLED. It was changed systematically to code ‘F3’ stock type in its current location and remained in that bin location until it was required for picking for an ES01 sales order.

There was a difference with products that were stored in bulk-bin locations, where an intervention was required from the inventory controllers on site. The warehouse co-ordinator had to create the warehouse task to move the stock from stock type ‘F2’, which was in the bulk storage, to storage type ‘F3’, which instructed the operators to move the product from the bulk storage bin into the bin location of ES01 FULL. This was done systematically with transaction SCWM/ADHU in extended warehouse management (EWM) - (Refer to Figure 6.5).

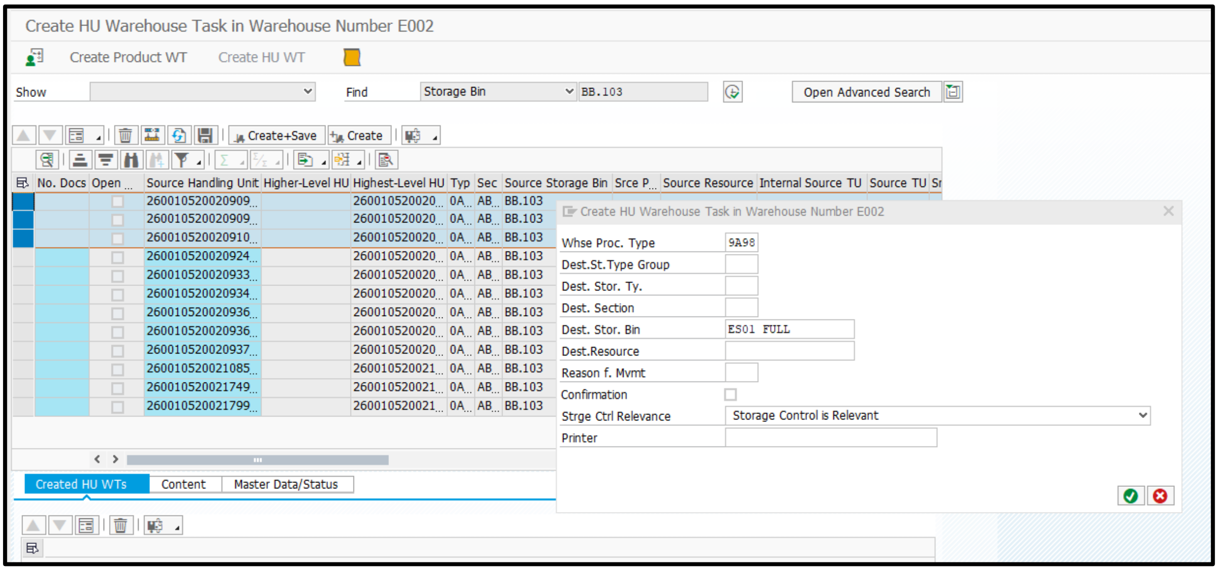


Figure 6.5. Create HU warehouse task

Source: Author (Internal report – SAP – EWM report)

Figure 6.5 is transaction SCWM/ADHU on EWM to move products that had less than 60 days SLED from the bulk bin in the warehouse into the designated ES01 FULL bin for short-dated product.

The co-ordinator had to highlight the short-dated handling units and create warehouse tasks to the ES01 FULL bin designated for short-dated products. Those systematic tasks would direct the forklift operator to the bulk bin, but only allow him to scan the short-dated handling units (HU's). If an incorrect HU was scanned for removal, the system would reflect an error. When the order wave was released, the warehouse tasks would reflect on the operator's scanner, as shown in Figure 6.6.

Warehouse Task

Document	WhsePrcTpe	WT	Whse Order	Dest. Handling Unit	Queue	Product	Product Description	SrceTgtQty	DestActQty	Unit	SrceTgtQty	Dest.Qty	Activity	Status	Source Bin	Dest.Bin	Ex
	2A10	1499841	737622	260010520010971749	IO.FLT	21846	Soupmix:10x500g:Imbo	750	150	KG	150	750	PICK	C		633.OUT	16
	2A10	1499842	737623	160010520005447498	OUT.APF.B	21846	Soupmix:10x500g:Imbo	150	30	KG	30	150	PICK	C		633.OUT	16
118042	2A10	1499830	737623	160010520005447498	OUT.APF.B	21846	Soupmix:10x500g:Imbo	150	30	KG	30	150	PICK	C	ES01 BREAK		16
118043	2A10	1499831	737622	260010520010971749	IO.FLT	21846	Soupmix:10x500g:Imbo	750	150	KG	150	750	PICK	C	ES01 FULL		16

Figure 6.6. Warehouse task for removal of short-dated product

Source: Author (Internal report – SAP – EWM report)

Figure 6.6 is the task the forklift operator would receive on the operator's scanner. This created task instructed the operator to go to ES01 Full and to pick up a full pallet of inventory.

This list of short-dated products in ES01 location on SAP, which would include product in APR, ES01 BREAK and ES01 FULL, was then exported onto a Microsoft excel spreadsheet and sent to the sales teams to create the sales orders at discounted prices, after engagement with the customer, and confirming the price mandate received from the sales manager. to ensure that the orders were executed correctly for these short-dated stocks, the orders were captured on the ES01 storage location, as detailed above. Refer to Figure 6.7 for an overview of the sales order on ES01.

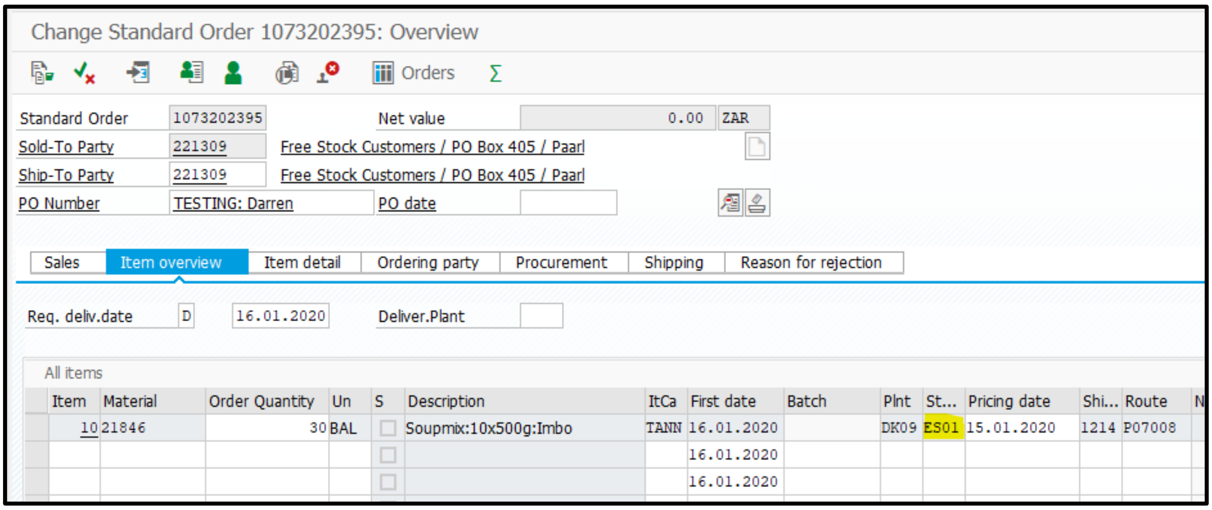


Figure 6.7. Sales order captured on ES01 storage location (break bulk, less than a full pallet)

Source: Author (internal document – SAP report)

Figure 6.7 is an overview of the order that was captured on storage location ES01 for the short-dated stock. The order quantity was for less than a full pallet, which was classified as break bulk, which meant fine picking; hence the workforce pickers executed this task.

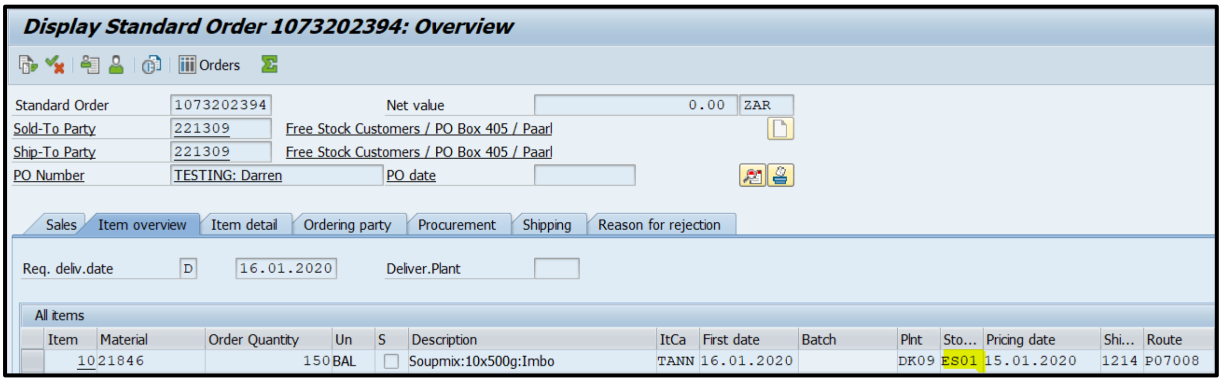


Figure 6.8. Sales order captured on ES01 storage location (full pallet)

Source: Author (internal document – SAP report)

Figure 6.8 is an overview of the order that was captured on storage location ES01 for the short-dated stock. The order quantity was for a full pallet, which meant that the reach truck operator picked up the full pallet of product from the APR and placed it into a pick-and-drop zone. Thereafter, a forklift driver moved the product into the staging lane for final checking.

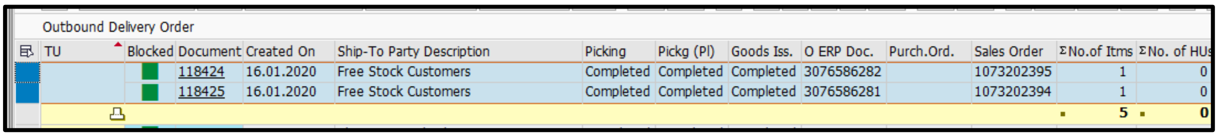


Figure 6.9. Outbound delivery order

Source: Author (Internal document – SAP report)

Figure 6.9 shows the transport planning (which meant that the order was linked to a route and transporter for delivery) for the two sales orders for the short-dated products reflected in Figure 6.8 (sales order of ES01 BREAK, less than a full pallet) and Figure 6.9 (sales order of ES01 FULL, full pallet of product), above, which were then distributed to EWM for picking up and staging the orders.

Thereafter, a stock clerk followed up on these orders and released the picking waves which identified the 'F3' stock type, which was the short-dated stock, and created the warehouse tasks for the picker, the forklift driver, and the reach truck driver to pick the stock and stage it in the allocated staging lane. The order in Figure 6.8 sales order of ES01 BREAK (less than a full pallet) did not execute as planned, which was reflected in point 8 of 'Annexure H'. The report and the changes made to correct the automated system-guided process are discussed. The order for the full pallet of product in Figure 6.9 was executed effectively as the system was designed and planned for execution. This confirmed the comments from the participants in the individual qualitative interviews and qualitative focus group interviews that they were confident that the team would implement the changes effectively.

> *"…we have the skills; we can change the way the process has been run. …we have a capable team that can handle any new challenge that is coming through and also the aim of this is to improve those individuals to develop their skills for them to become better people in the near future."* (P2)
>
> *"Our team here will definitely embrace technology."* (FG3_1)

The creation of an atmosphere for change started with the researcher arranging the interviews with the participants from the logistics company who had knowledge of, and experience with, the manual process of managing short-dated stock. From the data it was evident that there were concerns about technology being introduced. One of the main concerns was the fear of job losses: "*… you are going to end up losing your job…"* (FG2_1). Other emotions were also evident, for example, "*...it is overwhelming, and it is scary at the same time not knowing how I am going to be able to use technology…"* (P3). Some participants were confident: *"...the passion to accept this new technology and to give it a chance."* (P11)

An urgent need (Hackman, 2017) was to program the system with the parameters to identify stock that had 60 days until shelf-life expiry, and then systematically move this identified stock into the ES01 storage location. Bulk bin demarcation for ES01 stock had to be identified physically and those bin locations had to be uploaded onto the ERP system; as well as ensuring that the scanners had been tested and were ready to receive the sales orders picking tasks, and to train the staff. The sales order team focussed on capturing the orders for short-dated stock on the correct storage location, which is ES01, and not defaulting to the normal FW01 storage location, which is the main location for all sales orders.

The team could only consist of people that were in the employ of the company; but it was important to have knowledgeable and motivational leaders who could inspire the workforce to embrace the change (Appelbaum et al., 2012). A systems co-ordinator facilitates the communication; training; demonstration; systems preparation; and execution of the system-guided process. The systems co-ordinator was supported by the inventory co-ordinator who understood the system and processes and had a good rapport with the workforce. Additional support came from the secondary distribution manager who had thorough knowledge of the manual process and understood the systems and process. This manager also commanded the respect of the workforce.

People from the different departments had to be included in the teams. The departments involved were sales; administration; distribution; IT/systems; and warehousing. The break-bulk team was made up of pickers and a picking supervisor. Their task was to execute case picking sales orders with arm mounted terminals (scanners). The bulk picking team was made up of forklift drivers whose task was to pick full pallet orders using handheld terminals (HHT) (scanners). The third team created the picking waves; released the picking waves; conducted post pick audits and final checks of orders picked; billed the sales orders and loaded the sales orders on vehicles for deliveries to customers. This team comprised stock controllers, billing clerks, checkers, and forklift drivers. The forklift drivers also had to replenish inventory into picking bin locations when stocks were depleted and had to load completed orders that were staged onto vehicles for deliveries. Other stakeholders were the sales team who obtained the sales orders from customers, and the sales order clerks who captured the sales orders onto the SAP ERP system for execution.

The vision (Teixeira et al., 2017) was to have an automated process that would efficiently manage short-dated inventory, create visibility and allow the management team to make decisions to mitigate inventory scrapping at the end of the product life cycle. The researcher communicated this through the interview process. The company communicated this through the management team on site with their respective departments. An external service provider, who had used the ‘train the trainer’ approach since 2018 at other units, trained the systems co-ordinator. The co-ordinator was knowledgeable about the SOPs, systems, and processes.

A week of training was conducted by the systems co-ordinator, supported by the inventory co-ordinator and the distribution manager. The training entailed understanding the EWM system; the ES01 storage location; the separate physical bin locations of bulk and break-bulk inventory; verification of the HU labels; reprinting of the HU labels if they were damaged or unclear; encoding the picking task on the AMT and HHT scanners; executing of the picking in the appropriate bin location; staging the orders picked; confirming the picked orders in the staging location; and final checking of the completed order. There were different levels of training, as the bulk and break-bulk picking were two different processes and locations. The forklift drivers picked and replenished bulk bins, and the reach truck operators replenished break-bulk picking bins. The administration entailed extracting reports from the ES01 location, creating and releasing picking waves, and billing the completed sales orders.

All the above actions empowered the workforce to transition from a manual to a system-guided approach. Thereafter, it was about immediate, quick wins. There was an emphasis on the need to follow each step, consecutively and in order. Without doing this it would be difficult to achieve positive results, as the progression might not feel natural, but could appear to be mechanical, laboured or forced (Hackman, 2017). After the communication and training of the identified team, the team leader began implementing the transition from a manual to an automated system-guided process of short-dated stock sales orders for execution.

> *"We have taken the departments through that were involved in the meeting and the training to get the right vision, we communicated how we want the stock… how we want the storage locations… this is when we communicated for buy-in, … how it is going to help them and having the stock picked and the time spent picking the stock. And the empowerment action was training that we had with our stock clerks, forklift drivers and when the training was being done, we had to guide them through starting from where the orders come through and ensuring short-dated stock is picked. The forklift drivers went to ES01 storage to pick and then from that training, we created the short-term wins."* (P13)

Instituting effective, standard operating procedures and adequately training the workforce, which was key to policy implementation, has been effective (Kuo & Chen, 2019). This was finalised after input from the team and the subsequent execution of the two sales orders, referred to in Figure 6.7: the sales order of ES01 BREAK (less than a full pallet) and in Figure 6.8: the sales order of ES01 FULL (full pallet of product).

The final step in the change management process was to ensure the sustainability of the changes. Changed behaviour must be encouraged into the new way of working in the organisation (Kotter, 1995). There was buy-in from the team as they experienced the automated system-guided process and could compare it to their previously tedious manual process.

6.5.2 Finding of the system-guided process

The following was extracted from the *Report* (Appendix H), under the section 'Notes from the training session': Point 8.

> "*The fine picking appeared correctly on the picker's scanner. However, it requested the picker to scan the source HU (handling unit) and not the source bin. This will need to be changed so that ES01 BREAK will delete the original HU (handling unit) when stock is placed in it and*

the picker verifies that the picker is at the correct source bin as it happens in a 0A55 bin type" (Appendix H).

There had to be changes made on the system to distinguish between break-bulk (fine picking – less than full pallets of product) and bulk (full pallets of product) within the ES01 storage location to automate the process of fine picking (less than full pallet orders) and eliminate the error experienced in the process while executing the changes.

There had to be two storage bins created within the ES01 storage location (Refer to Figure 6.10, Storage Bin) which had a physical demarcation in the warehouse. These bins were used for all short-dated pallets from a bulk storage bin (full pallets of products) which had to be removed and stored separately from the good stock (product with more than 60 days of SLED). The second bin allowed for partial quantities, which were less than a full pallet of product, to be picked up.

ES01 BREAK: This bin location was designed for the picker to pick up partial quantities (less than a full pallet) with a stock type code of 'F3' (short-dated product with less than 60 days of SLED), as per the customer's order quantity of short-dated products.

ES01 FULL: This bin location allowed storage of full pallets with a stock type code of 'F3' (short-dated product with less than 60 days of SLED). It did not allow break bulk picking. Only full pallets removed for bulk storage were moved into this bin location for bulk picking up for sales orders that had full pallet quantities.

Storage Bin

Storage Bin	Typ	Section	BT
ES01 BREAK	7A41	AG05	G005
ES01 FULL	7A40	AG05	G005

Figure 6.10. Storage Bin location on SAP ERP system

Source: Author (Internal document – SAP report)

Figure 6.10 reflects the ES01 storage location for the short-dated products which had less than 60 days SLED. There was a difference between the two bins created for sales orders with less than full pallet quantities (ES01 BREAK), and sales orders for full pallets of product (ES01 FULL).

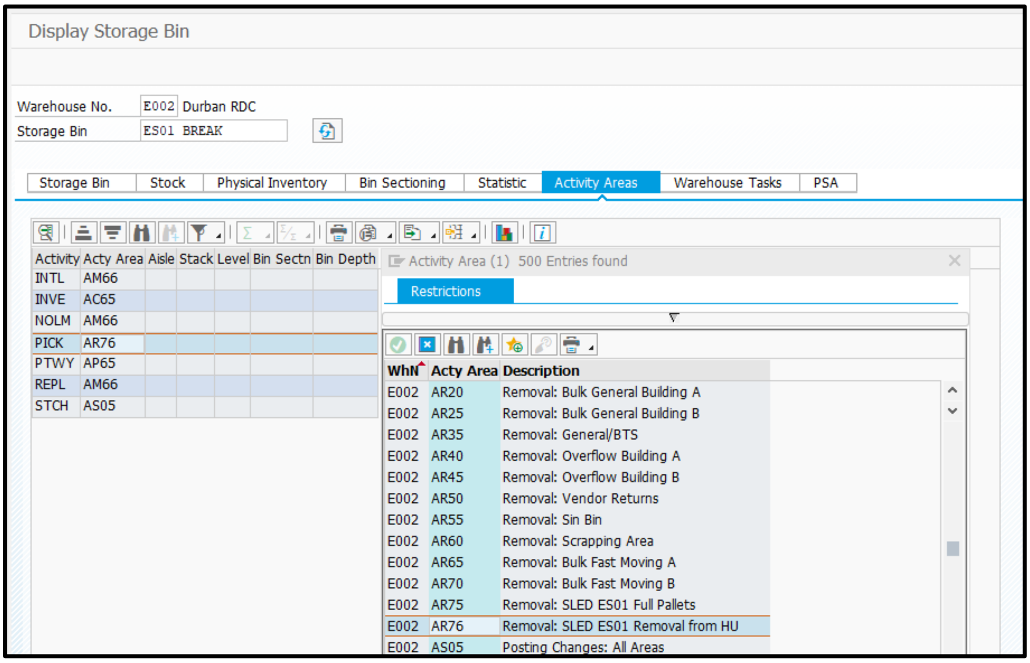


Figure 6.11. ES01 BREAK activity area

Source: Author (internal document: SAP – EWM report)

Figure 6.11 illustrates the change that needed to be made to ES01 BREAK's activity area to include the AR76 activity area which removed the product from the handling unit (HU). This had to be done on the systems master data to allow the workflow to delete the HU of the full pallet systematically and to allow the workflow to scan the source bin and the baler bar code (individual product) instead.

Once this differentiation between ES01 BREAK and ES01 FULL (Refer to Figure 6.10. storage bin) had been created on the SAP-EWM system, the activity area needed to be configured for the break bulk or fine picking workflow. The activity area AR76 (Refer to Figure 6.11, ES01 break activity area) was assigned to ES01 BREAK, which triggered an automated action removing products linked to the pallet HU barcode.

After these amendments were executed systematically on the master data, the order (Refer to Figure 6.7, sales order of ES01 BREAK) for the quantity that was less than a full pallet, which was a fine picking process, was then again executed systematically. The fine picking appeared correctly on the picker's arm mounted scanner (Refer to Figure 6.12, systematic fine picking instruction on arm mounted terminal). This time the request, received automatically, was to scan the source bin in ES01 BREAK linked to activity area AR76 (Refer to Figure 6.11, ES01 BREAK activity area). Therefore, the original HU of the pallet was deleted systematically and a new HU label with a system generated bar code was generated systematically. This then allowed the picker to scan the baler bar code of the individual product.

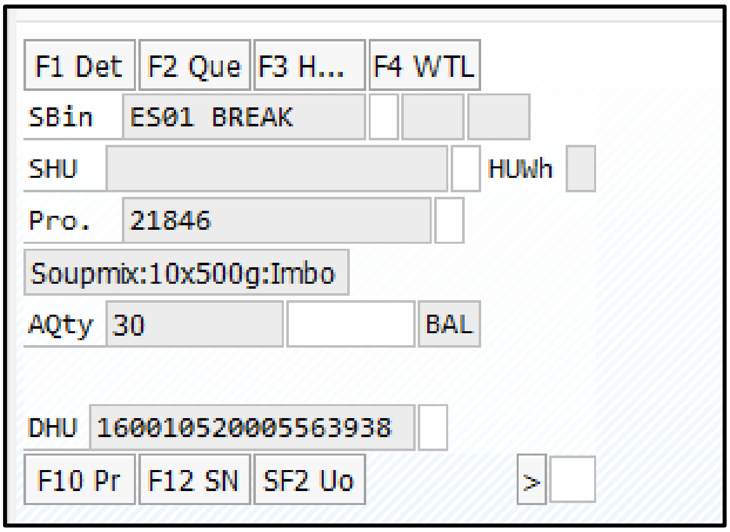


Figure 6.12. Systematic fine picking instruction on the arm-mounted terminal (AMT)

Source: Author (internal document: SAP – EWM report)

Figure 6.12 illustrates an electronic task that the fine picker (break-bulk) received on an arm-mounted terminal (AMT) to execute the assigned task to complete the order (Refer to Figure 6.7, sales order of ES01 BREAK) for the thirty bales of soup mix from ES01 BREAK bin and to stage these in the destination bin confirmed as DHU 160010520005563938.

Thereafter, the picker verified the correct source bin by scanning the source bin bar code. The correct product was picked up, and the product barcode was scanned. The correct quantities were picked, verified, and staged in the allocated staging bin. Products for this specific order were then staged for the final post pick audit process, where the quantities of the order were verified against the source document and subsequently made available for loading onto the vehicle for that specific route. This effectively completed the process of transitioning from a manual process to an automated system-guided process for short-dated products of customers’ orders.

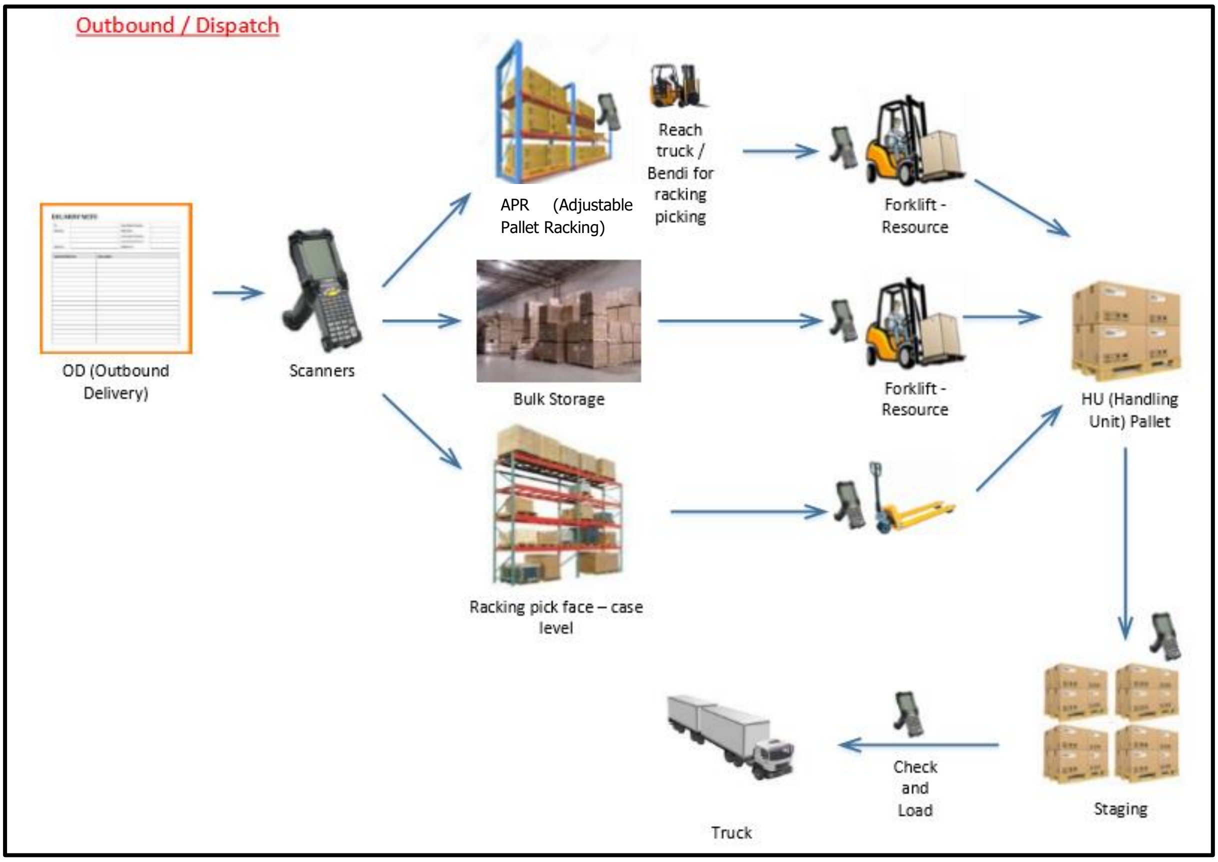


Figure 6.13. Outbound process of ES01 sales orders

Source: Author

Figure 6.13 illustrates the process flow of an ES01 storage location sales order for short-dated products with less than 60 days of SLED. The outbound delivery tasks were assigned automatically through the scanners to a reach truck operator if it involved full pallet quantities from the APR; or a forklift operator if it was a full pallet quantity from bulk storage; or to a picker operating a pallet jack or ride-on pallet truck for less than full pallet quantities from the racking pick face. These pallets of products were moved into an assigned staging bin and subsequently checked, which was the post pick audit process, and loaded onto vehicles for delivery.

6.5.3 Other logistics sites

Feedback from the participants was very encouraging and positive. The implemented process was being used effectively and there was positive feedback from the workforce. The automated system-guided process to manage the process of short-dated products was effective and created excitement in the workforce.

> *"We have been making use of it effectively. I would say it was positive feedback.* (P12)

"It was successful. I mean everyone is more comfortable." (P13)

"… the process followed and was successful. The staff was very excited, all stakeholders were excited." (P14)

This automated process, driven by 4IR technology, to manage the entire process of short-dated stock, was transferred to two mega beverage operations in Gauteng (Refer to Figure 6.14 for an example of short-dated product in the ES01 storage location) and the Western Cape (Refer to Figure 6.15 for an example of short-dated product in the ES01 storage location). It was also transferred to three other regional distribution centres (RDCs) in Gauteng, the Western Cape and Gqeberha (Refer to Figure 6.16 for an example of product in the ES01 storage location of the RDC in Gauteng operations).

Plant	B…	Material	Material Description	BUn	Unrestrict	SLoc
RB03		4716	D:Juice:Orange:4x6x200ml:Ceres	L	9.600	ES01

Figure 6.14. Stock list of beverages in Gauteng in ES01 storage location for short-dated stock

Source: Author (internal document – SAP ZMST report)

Figure 6.14 confirms the use of the ES01 storage location for short-dated products at the beverage's operations in Gauteng.

Plant	B…	Material	Material Description	BUn	Unrestrict	SLoc
RJ01		40701	Conc:Ginger Beer:12x1L:Wild Island	L	12.000	ES01

Figure 6.15. Stock list of beverage operations in the Western Cape with ES01 storage location for short-dated stock

Source: Author (internal document – SAP ZMST report)

Figure 6.15 confirms the use of ES01 storage location at the beverage's operations in the Western Cape for short-dated products.

Plant	B…	Material	Material Description	BUn	Unrestrict	SLoc
DG07		20070	Stampkoring:10x500g:Imbo	KG	750.000	ES01

Figure 6.16. Stock list of a regional distribution centre in Gauteng with ES01 storage location for short-dated stock

Source: Author (internal document – SAP ZMST report)

Figure 6.16 confirms the use of the ES01 storage location at one of the regional distribution centre operations in Gauteng for short-dated products. The themes that were identified in this section were: 4IR technology; transformational emotions; up-skilling and reskilling; transitional challenges; and change management opportunities.

6.5.4 Identified challenges with the change management in transitioning

One of the themes that emanated from the data collected was ‘challenges. Resistance and reluctance from staff were the key challenges. This was because staff were accustomed to a traditional, manual way of working. Hence, the introduction of new technology created a sense of anxiety about adjusting to the ‘new normal’. People were also attached to older methods and were afraid they would not have the knowledge and abilities to operate new systems.

> “*Definitely resistance for change.”* (R4)
>
> *“That’s the challenge that the company may have to face in changing people’s mind because people don’t adjust so easily to change. People need to be guided step-by-step to get them to be on the same page with these changes.”* (R2)

The staff mindset was fixed on traditional, manual processes and operations.

> “*It is mind set.”* (R4)

Age diversity was also a contributing aspect, and older staff would not be able to adapt as easily as younger staff. This caused added anxieties, fears, and change-related challenges.

> “*But then you get the older people who are set in their ways. They do not want to adapt to technology as they are used to manual processes.”* (R8)

There was also the aspect of stigma for those staff who felt that they could not adapt to new systems.

> *“It needs to be changed in people’s minds in order for them to appreciate what technology brings to them.”* (FG2_2)

Job-related fears were, logically, a very highly ranked challenge. This was because people naturally fear the loss of their jobs due to the introduction of technology. In the current economy of rampant unemployment, it is not uncommon for staff to feel that their jobs will become redundant with the adoption of new technology.

> *"... there is a lot of fear when it comes to technology, that people feel when systems are in place, then there is a risk of job losses."* (R7)

Issues raised by the participants were that they were fearful of the change. There was limited understanding of the changes and technology. They were anxious about skills enhancement; not being equipped to deal with change; people's mindset; and the need to apply their minds and skills to testing scenarios.

> "*I was scared because I was not exposed to technology."* (FG1_2)
>
> "*… changing is scary."* (R10)
>
> "*I only have limited understanding."* (R7)
>
> *"Changes in developing the skills within the company and also improving the production and improving the employees as well in the company."* (R2)
>
> *"Here in South Africa, it is going to be a challenge in terms of the economy…"* (R1)
>
> *"That is the challenge that the company will have to face, is to change people's minds."* (R2)
>
> *"... Non-graduates will be reluctant to embrace technology."* (R4)
>
> *"... real life scenarios and SOPs will ensure that the candidates are ready to embrace change in order for technology to work and be successful."* (R4)
>
> *"... training for the new system."* (FG2_1)

People were accustomed to, and satisfied with, existing manual processes. Hence, with the introduction of technology, they were out of their comfort zones and needed to adapt. This added pressure on them and impacted on their job satisfaction.

> *"... what comes to mind is job satisfaction. Employees would probably question if they had the aptitude to adapt to technology and complete tasks."* (R5)

Challenges with changing the process included capturing the sales orders on the new ES01 storage location, as the default setting on the SAP system was the FW01 storage location. Other bin locations in the warehouse had to be set up and configured for break-bulk (case per product) and bulk (full pallet) picking. This then needed to be configured on the system, which is covered in Section 6.4.1.6 and Figure 6.12. Another challenge with the break-bulk picking was that the system directed the picker to scan the barcode of the product and not the bin location. The system had to be changed so that the product barcode was not scanned when picking less than full pallets (picking in cases); and for the picking to scan the bin location so that the system can update the inventory automatically once scanned.

The change management process in transitioning from a manual to system guided process was executed. Communication was filtered to all stakeholders through the relevant management teams. The system; technology; administration; physical bin locations; resource allocation; training; and practical sessions were prepared in readiness for the change.

> *"Once we received the SOP, we moved on to the testing phase where we made use of the SOP to try the new process and to figure out what complications or difficulties that may be experienced. ... communicated with the staff to find out how best we can improve the procedure… Once the processes were developed, we had the SOP to follow on how the automated process would work and began the training sessions with the staff. We did a full exercise on training on how to handle this new system-driven process. We went through the process step-by-step to make everyone understand how this works and how we are going to change from the manual process to an automated process."* (R12)

> *"… get the right vision, must communicate how we want the stock…This is how we want the storage locations… Communicated with the staff for buy-in. Communicated with the staff on how we intend to have this started off, how it is going to help them and having the stock picked up and the time spent picking the stock. Communicate with and manage within your department."* (R13)

> *"The proposed SOP was further discussed for input or additional information or any bottlenecks. The team leader arranged follow-up meetings. We encouraged input from the staff."* (R14)

> *"… we had to train staff on the picking location and the process."* (R14)

> *".. train staff on the stock that was to be placed into a storage location ES01."* (R14)

> *"And the empowering action now was training that we had with our staff. When doing the training we had to guide them through starting, from where the orders come through, on how they were going to make sure that it was short-dated stock, how they were going to use the scanners and how they were going to use the ES01 storage pick location. From that training we were creating short-term wins after each successful transaction.'* (R13)

Most of the issues that were raised were addressed through communication; training; practical sessions; engaging with staff and management; and the SOP, which was finalised after the system challenges were resolved through appropriate configurations. The consequences of the change to a system-guided process were the technological, systems and process improvements; and the upskilling and empowering of the workforce at the company being studied. Changing the behaviour of the workforce regarding the new system-guided process was positive and supported the buy-in from the staff, thereby contributing to a successful change management process. All staff retained their jobs and there was no risk of anyone losing their jobs because of the transitioning from a manual to an automated process. Improved efficiencies meant that the time for completing each task was shorter, so more tasks could be executed.

From the company's perspective, the results were visibility of inventory with less than 60 days shelf-life, which enables the sales team to make a concerted effort to sell the product. There will be an impact on forecast accuracy, as the short-dated inventory is in a separate storage location which will not influence replenishment, or impact on customer service levels. The reduction in scrapped inventory mitigates inventory loss and reduces wastage. Since the process has been rolled out to other logistics sites within the organisation, as discussed in Section 6.4.2, there is a positive benefit to these business metrics.

> *"There is much more efficiency in the system-driven than manual process."* (R14)
>
> *"... we are still keeping it moving, everyone is still comfortable."* (R13)
>
> *"... technology impacts the supply chain by increasing efficiencies through the automation of transactions and creates transparency. All industries need to increase performance."* (R14)
>
> *"This automation does not allow for error from source bin, final staging lane, the person that transports your product, checks it, and to the customer. There is little room for error in the system.'* (R14)
>
> *Stakeholders involved have seen the difference with the new SOP in place as they were the people initially involved in the manual process."* (R14)
>
> *"The supply chain is about getting the right stock, to the right place, to the right customer and in the right condition timeously. This positively impacts service levels."* (R14)
>
> *"... being something new, there was a little bit of resistance in terms of uncertainty of how it will work but that was taken care of by the training once they fully understood the process."* (R12)

"The confidence levels increased after the training as they understood the new process and realising that it is going to be to their benefit." (R12)

Fortunately, in the transition to the system-guided process of managing short-dated inventory, there were no job losses, which was the concern of most of the participants. Although the changes were successful, all negative emotions cannot be dealt with as there are some people who take longer than others to be convinced of the new process and to fully adapt to the change, as well as those who still have concerns about job security. Not all participants will be satisfied with the new way of working as it is productivity driven and allows visible performance tracking for each user.

6.6 Summary of the automated process compared to the manual process

A comparison of the manual process of managing short-dated inventory and the automated process is contained in Table 6.5. Table 6.5 gives an overview of the differences between the previous manual process at the logistics study site, and the automated system-guided process. There was real time visibility of inventory. Inbound products into the warehouse had a digital label (barcode, QR code, RFID) (Krasnov, Sergeev, Mukhanova, & Grushkin, 2017). This enabled machine-to-machine (M2M) communication of data, with reference to dimensions as well as to the mass of the products, which is now accessible on the warehouse management system (Borisoglebskaya et al., 2019). Having visible data shared in real time is imperative for modern supply chain networks and logistics management (Capri & Lehmacher, 2021). There is improved accuracy with the automated system. Manually operated systems lack productivity in comparison to automated systems (Bortolini et al., 2021).

Table 6.5. Summary of the manual and automated process

Manual Process	Automated Process
Physical check of SLED	System visibility of SLED
Decision taken when info received after physical checks	Decisions made quicker as real time visibility of data
Sales order captured in FW01 storage location	Sales order captured in ES01 storage location
Manual checks and processes	Systems generated tasks and workflow
Human error exposure due to manual workflow	Improved accuracy level as workflow is automated
Multiple manual checking process, thereafter hand-over to the transporter for delivery	Post pickup audit to transfer responsibility to transporter for delivery to the customer

Source: Author

Table 6.6. Improved system-guided inventory management

Expired stock	2017	2018	2019	2020 Total	Var %	Var
Durban	-R2,290,515	-R2,325,614	-R1,471,610	-R560,555	-61.9%	R911,055

Source: Author

Table 6.6 illustrates the improved system-guided management of short-dated inventory. Scrapping of expired stocks has reduced from R1, 471, 610 to R 560, 555. Contributing R911, 055 compared to the previous financial year to the profitability of the company.

6.7 Chapter summary

This chapter highlighted the fourth theme that emerged from the data collected. Thereafter, the manual process at the logistics study site in managing short-dated inventory was discussed. The theme of 'system transitioning – manual to automated', which relates to the transitioning from a manual process to an automated system-guided process in managing short-dated inventory leveraging 4IR digital technology, was discussed in detail. Subsequently, the challenges experienced were discussed, followed by an assessment of the effectiveness of the change management process. The chapter concluded with a summary of the manual process compared to the automated process.

This contributed to the third objective of this study, which was to develop a framework for change that embraces technology and the human element at a logistics site in Durban, in order to transition from a manual to a system-guided process and embrace technological change.

Table 6.7. Overview of chapters

Chapter	1	Introduction
Chapter	2	Change Management
Chapter	3	Technological Change
Chapter	4	Research Methodology
Chapter	5	Findings – Change Management
Chapter	6	Findings – Technological change
Chapter	**7**	**Discussion of findings**
Chapter	8	Conclusion and recommendations

Source: Author

Chapter Seven, which is the discussion chapter, will discuss in more detail the findings generated from Chapters Five and Six, using the method of triangulation. The chapter will also include the application of Kotter's change management framework in transitioning from a manual to automated system-guided process, leveraging 4IR digital technology.

CHAPTER SEVEN: DISCUSSION OF FINDINGS

7.1 Introduction

The findings from the system-guided change management process and the themes that emerged from the data collected, were detailed in the previous chapters. These were supported by direct quotes from the qualitative interviews conducted. This chapter will discuss the findings and the themes that emerged after analysing the rich qualitative data generated using CAQDAS. Furthermore, the primary data obtained will be triangulated with the data relevant to the literature reviewed in Chapter Two on change management frameworks, in Chapter Three on technological change, and secondary data.

An in-depth discussion of the results of the fourth theme, which relates to change management and technological change in the transitioning from a manual to an automated system-guided process leveraging technology, will be presented. Thereafter, the motivation for an adapted Change Management Framework for the effective implementation of digital technology in facilitating the transition from a manual to an automated systems-guided process will be discussed. This addresses the third objective of this study. Thereafter, the chapter will conclude with the summary of the findings discussed.

7.2 Change management from a manual to a system-guided process

The aim of the study was firstly to explore how to integrate technology in transitioning from a manual process to a system-guided process and secondly to ascertain the impact on the workforce of change management in a fast-moving consumer goods company in KwaZulu-Natal, South Africa. Inasmuch as there is an increased level of digital technology and automated systems, influenced by the 4IR, there are systems that utilise manual labour and based on human skills, such as cognitive and problem-solving abilities which are still irreplaceable (Bortolini et al., 2021; Fast-Berglund et al., 2013; Fletcher et al., 2020). Notwithstanding these factors, as well as flexibility, manually operated systems are less productive in comparison to automated systems (Bortolini et al., 2021).

Ergonomically conducive working environments also contribute to the attainability of productivity targets. If the environment is not optimally aligned, productivity is impacted negatively due to musculoskeletal disorders, as well as other human-related factors such as stress and absenteeism. Manually driven warehousing processes involve activities in the various phases, such as picking of products, movement within the designed layout of the facility, staging of the picked product and other activities. Previous studies have ascertained that the picking activities take up a greater portion of the time. Hence, efficient execution of these activities impacts positively on the completion of the process, as well as on the workforce's operating conditions, which has a related impact on efficiency, and ergonomically on performance (Bortolini, Ferrari, Gamberi, Pilati & Faccio, 2017).

With a view to improving performance, whilst maintaining flexibility, the next-generation designs encourage automated processes as well as collaboration in order to have more skilled manual operators (Bortolini et al., 2020). The introduction of technology assists in migrating from a manual process to a system-guided process. The application of the UTAUT model indicates user behaviour intention to embrace new technology (Andwika & Witjaksono, 2020; Ronaghi & Forouharfar, 2020; Sarfaraz, 2017; Sreeram & Madhav, 2022). At the company in this research, it was apparent from the data collected that the user behavioural indication was positive in embracing technology and in transitioning from a manual to a system guided process.

Performance expectancy (PE), which is dealing with the user's expectation, is an indication that the user is likely to adapt to technology (Andwika & Witjaksono, 2020; Ronaghi & Forouharfar, 2020; Sarfaraz, 2017). Effort expectancy (EE) is the users' perceived ease of use and influences their embrace of technology (Andwika & Witjaksono, 2020; Ronaghi & Forouharfar, 2020; Sarfaraz, 2017). Social influence (SI) is an individual's perception of the acceptance or non-acceptance of technology usage by others (Andwika & Witjaksono, 2020; Pederson & Ling, 2002; Ronaghi & Forouharfar, 2020; Sarfaraz, 2017). Facilitating conditions (FC) indicate the level of confidence that the user has in the technical and organisational support for the new technology being introduced into the business (Andwika & Witjaksono, 2020; Ronaghi & Forouharfar, 2020; Sarfaraz, 2017).

It was an inherent need to redesign the configuration, for self-adaptability, and for collaboration with systems utilising digitalisation and automated processes (Chryssolouris et al., 2009; Di Orio, Cândido & Barata, 2014; Faccio, Bottin, & Rosati, 2019). It was clear that there was an urgency to expedite the acquisition of a workforce highly skilled in the digital technological requirements of the manual processes of the future and to design and to make these available to the rest of the industry (Bortolini et al., 2021).

The research objectives were as follows:

To determine how the logistics company in Durban, South Africa, prepared for transitioning from a manual to a system-guided process.

To examine the challenges faced in transitioning from a manual to a system-guided process at the logistics site in Durban, South Africa.

To develop a framework for change that embraces technology and the human element at the logistics site in Durban, South Africa, in transitioning from a manual to a system-guided process.

Change management supported and encouraged behaviour adaptability as the research process progressed. The choice of this method was premised on it supporting the generation of collaborative data. A key benefit of this method was the ability of applied research to assist in the development of theory from execution (Tardivo et al., 2021). Technology that is applicable in the workplace should be sufficiently factored into the cognitive abilities when embarking on the design of functional processes, especially for the workforce (Sippli et al., 2021). The SOP guided the change management transitioning from the manual operated process to the automated system-guided process. Automated processes are workflows which are self-controlled utilising technology and software (Lehmacher, 2021). There were challenges experienced by the team in the picking of break bulk (less than full pallet orders), and this required some troubleshooting.

In transitioning to the automated system-guided process for managing short-dated inventory, there had to be changes made on the system to distinguish between break bulk (fine picking, less than full pallets of product) and bulk (full pallet of product) within the ES01 (expired stock) storage location to automate the process of fine picking up (less than full pallet orders) in order to eliminate the error experienced in the process while executing the changes. This system's error inhibited any further action, so the picking up process could not be completed, which ultimately resulted in the order not being completed.

Two storage bins had to be created within the ES01 storage location which had a physical demarcation in the warehouse. One bin was used for all short-dated inventory pallets removed from a bulk storage bin (full pallets of products) and stored separately from the good stock (product with more than 60 days of SLED). The second bin allowed for partial quantities, which were less than a full pallet of product, to be picked up. The SLED should always be considered, particularly for fast moving consumer goods (FMCG) (Shmatko, Barykin, Sergeev & Thirakulwanich, 2021).

The reconfiguration of the system, which needed the break bulk process to be amended, was undertaken in the EWM system, and the process was accordingly amended. The SOP was also subsequently amended. Once the changes were confirmed, the process was reactivated. The workforce was empowered after trouble-shooting the challenges encountered and thereafter they completed the process effectively after the appropriate changes were implemented. The workforce was involved and contributed to streamlining the processes to effectively change the process of managing the short-dated inventory from a manual to an automated system-guided process (Mehra, 2006).

Change management was utilised effectively in this study and the primary focus was on the applied intervention to transition from the manually operated process of managing short-dated products, from a sales, warehouse, and distribution perspective to a technology-driven automated system-guided process. This allowed the workforce to engage and collaborate at the study site, and simultaneously created knowledge about the process (Pollack & Pollack, 2015). The effectiveness of the implemented change resulted in the transferability of the automated system-guided process in managing short-dated inventory to other logistic sites, nationally, within the organisation. The inherent themes that emerged from the data collection were relevant and applicable.

7.3 Change management strategy

Organisations with effective implementation were the companies that used change management frameworks (Motwani, Mirchandani, Madan & Gunasekaran, 2002). At the logistics study site, no change management framework was utilised. The transformation process was the framework used to control the change processes and included workers, groups and the company migrating from the existing systems and processes to the identified, changed, and improved systems and processes. This was achieved through new re-engineered processes and individual behaviour changes (Filicetti, 2007; Kotter, 2011).

Tactical and functioning transformation remains ongoing for competitiveness. A two-way approach from management to the shop floor, and vice versa, is crucial. Defined and structured objectives will assist the transformation process. The converse would be detrimental to the implementation of change management. There has to be sufficient awareness and knowledge-sharing at the various levels in the organisation to direct their execution of transformation (Galli, 2018).

The intended purpose of change is to improve the quality of work, processes, and the work environment (Erlingsdottir et al., 2018). Change management is a planned and deliberate approach to transform a company from its current state to a future state. Companies have no alternative but to embrace change to remain competitive in their trading environment (Bekmukhambetova, 2021).

Some argue that Lewin's model does not consider the aspect of power when it comes to organisational conflict (Bekmukhambetova, 2021; Dawson, 1994). A further criticism has been that Lewin's model supports the top-down management style as opposed to the bottom-up approach (Bekmukhambetova, 2021; Dawson, 1994). It is argued that Lewin's model loses its impact when the three steps are simply to 'plan, implement, and review' (Bekmukhambetova, 2021).

With reference to the ADKAR Model, the criticism is that the focus is on the people change aspect and not on the change itself (Bekmukhambetova, 2021; Hiatt, 2013). This model is said to be more suited to integration of the management concepts in the process of change management (Siddiqui, 2017).

In the McKinsey 7 S Framework, each step is interrelated with, and interdependent on, the other steps, which increases the risk of the transition being unsuccessful. Additionally, it is viewed as a complex change management model (Belyh, 2019; Galli, 2018). Nudge is recommended for changes of administrative controls and safety-related behavioural prioritisation (Prabowo & Syaifullah 2021).

The criticism of Bridges' Transition Framework is that, while the management team is dealing with the new beginnings, the workforce could still be in the first phase, which is ending the old way of work that needs to be changed (Cameron & Green, 2019). This can be frustrating and difficult to handle for the management team, which happens with this approach to change (Bridges, 1991).

Kotter's Change Management Framework (Kotter, 1996) was relevant for effective management of the change envisaged. As a result, using qualitative research, Kotter's eight-step framework (Kotter, 1996) can be applied in changing the processes. Kotter's eight-step model can be the theoretical framework that underpins change management (Chappell et al., 2016). This will be discussed in the logistical reorganisation of this study by following the model systematically and in sequence (Kotter, 1996).

Effective implementation of change management was fully supported by management and the workforce, which was pivotal in managing the change (Appelbaum et al., 2012). This study discusses Kotter's eight-step framework, which is frequently applied due to the model, being adaptable to company design and able to take into account the various responses from the workforce (Kotter, 2012; Schein, 2004; Small et al., 2016).

Kotter's (1996) model has been designed to achieve the strategic intent of the organisation (Rajan & Ganesan, 2017). It is a model that assists stakeholders who are not familiar with change management to become involved (Kang et al., 2020). Adopting the model further assists in motivating the workforce and stimulating the staff, more especially when the model is applied effectively, and the workforce has a sense of importance by being a part of the change management transition. Also, a cultural shift in support of accepting change is encouraged (Crouse, 2021).

Thus, Kotter's Change Management Model (1996) will be discussed in the context of the fourth theme, which is: 'system implementation: manual to automated' and associated sub-themes which are detailed in Figure 7.1. The third objective of this study is to recommend a framework for change that embraces technology and the human element at the logistics site in Durban, South Africa, in transitioning from a manual to a system-guided process.

Themes	Sub-theme	System-guided process	Outcome
4. System Implementation - Manual to automated	4.1 Impact of technology advancing	Embracing of technological change	Acquired knowledge and executed
	4.2 Manual process	Workforce empowerment through upskilling and development	Training/Communication/Execution
	4.3 Transition to automation	Ability to problem solve when encountered issues with break-bulk picking	Understanding of the problem
	4.3.1 Trial process	System changes to enable break-bulk picking	System configuration changes
	4.3.2 Implementation	Execution of picking after challenges experienced	Started the process again
	4.3.3 Communication and training	Completed the process up to staging and loading of sales order	Successful after system changes
	4.3.4 Rollout throughout the group	Amendment of SOP after resolving challenges on picking	SOP amended with changes
	4.3.5 Residual (Bulk/break-bulk Picking)	System-guided process differentiates and creates work tasks for picking	Effective system-guided process

Figure 7.1. Theme four: systems implementation - manual to automated process

Source: Author

Figure 7.1 highlights the fourth theme and the associated sub-themes that emerged from the data collected. The impact of moving from a manual process to the automated process is listed under 'system-guided process' and the outcomes derived from the process transitioning.

First phase: Create an atmosphere conducive to transitioning from a manual to a system-guided process

7.3.1 Increased urgency

Logistics entails the movement of products from one location to another pre-determined location. A warehouse facilitates the temporary storage of products before they are loaded onto vehicles and transported to customers (Firouzi, Farahani, Weinberger, DePace & Aliee, 2020). There has been criticism of this step as others who utilised the model had difficulty in maintaining urgency for the course of the implementation (Dolansky, Hitch, Piña & Boxer, 2013), on account of different stakeholders' requirements for individual attention (Baloh et al., 2018). In this study context, there has always been a sense of urgency in the FMCG environment, with lead times of between 48 and 72 hours in servicing the customers. In essence, if any transformation was protracted and delayed, it would have an adverse business impact as service delivery commitments have to be executed timeously. The workforce was included in the communication, and training, which included up-skilling and reskilling of the staff that participated in transitioning from a manually operated process to an automated system-guided process, leveraging 4IR digital technology.

7.3.2 Organise a guiding team for the strategic change management

A team leader can achieve efficiency and targeted outputs if the workforce is managed effectively. To be effective, a team leader needs the ability to lead, to communicate and to manage staff (Ng, 2011; Ribeiro & Gomes, 2016). Having a team of engaged workforce members is important for effective change management. This is covered in Kotter's framework (1996): 'build the guiding team' (Step 2) (Wentworth et al., 2018). The team leader was a highly skilled team member who has the confidence of the workforce as he has a sound understanding and experience of the manual process, systems knowledge, and practical experience.

Other high-level support with operational experience came from the secondary distribution manager. She is a member of the skills development and employment equity committee. As an experienced warehouse operator, she was the third high level participant in this study. Operational participants had experience of the manual processes and could provide quality support to the organising team to guide the change management process effectively. These were members of the trade union, and some were shop stewards (representatives of the trade union). Some were also members of the skills development and employment equity committees. They were the team leader and delegates at the logistics study site who could be trusted and had credibility in inspiring the team (Teixeira et al., 2017). A highly motivated and inspiring team was at the forefront of the change management process at the logistics study site (Appelbaum et al., 2012). Data collected from the participants confirmed that all operational staff that was included were involved in the process flow and included the supervisors and managers.

7.3.3 Obtain the correct strategic vision

There was a three-fold implication in creating a vision: it gave clarity on the course ahead; it encouraged individuals to be a part of the change process, although it may have been uncomfortable for them individually; and it assisted the co-ordination of the various stakeholders with speed and efficiency

(Hackman, 2017). The aims and objectives were clearly stated and communicated to the participating team. This assisted in reducing the complexity of the workflow, assisted with the motivation of the various role players, and gave structure to all stakeholders. From the study's perspective, this step should precede steps one and two. The threefold implication, giving direction, including individuals and co-ordinating, supported the motivation to move this step ahead of the other two.

Second phase: Engage and enable the workforce to change

7.3.4 Communicate with, and obtain the buy-in of, the workforce

Effective and concise communication that stated the aims and objectives clearly was delivered by the team leader (Mørk et al., 2018) and this stimulated eagerness in those directly and indirectly involved, managing their expectations and creating excitement for the changing future (Teixeira et al., 2017). It was the researcher and team leader who informed the people of the objectives of the changes and the process to follow (Hackman, 2017). This communication was as crucial as the change itself (Gupta, 2020), and the team leader was able to explain the changes effectively and outline a vision of the end state of the new process. The advantages of the effective implementation of the automated system-guided process were easy to understand, and it was evident that the workforce understood the aim and objective and co-operated fully to ensure that the implementation was effective.

The leaders were determined, and they influenced the outcome of the transformation, whether effective or not. The workforce and not the framework are the change, and they must be convinced of the reason for, and tangibility of, change. Therefore, the critical element was the effective communication of the reasons for transformation to the workforce so that they could become involved in the process of transformation (Galli, 2018).

From the data collected, there was a lot of emphasis on communication. Hence, it stands to reason that communication, which is a vital component, should be the first step in the change management process. The participants confirmed that the company had communicated. This confirms that the company and the management team were communicating and engaging the workforce about the changes from a manual to a system-guided process of managing short-dated inventory.

7.3.5 The workforce should be empowered for action

Kotter emphasised the need for appropriate training to be provided as a critical step (Hackman, 2017). The team was upskilled and reskilled according to the SOP. They were able to engage with the problem and communicate when they encountered the issue of the break bulk (less than full pallet) picking up of the sales order. Their level of empowerment encouraged feedback and they made suggestions for improvements (Mørk et al., 2018), which included the changes to the SOP (Appendix G), after which improvements were made on the system and the process involving the picking up of break bulk was resolved. This was emphasised by the participants.

Although the participants referred to training a lot in the data that was collected, it was confirmed that the company was empowering their employees on an ongoing basis. It was also highlighted that, from the company perspective, from recruitment, there is ongoing engagement with the workforce for upskilling and reskilling.

7.3.6 Create quick wins in adopting technology

In a short space of time, there were quick wins that were capitalised on and what was critical was that these were highlighted and effectively communicated, thereby ensuring continuity of momentum in the changing processes (Hackman, 2017). After the communication with, and training of, the identified team, the team leader set up the transition from a manually operated process to an automated system-guided process to execute sales orders for short-dated stock. Tangible achievements in the change processes were highlighted and applauded. The sales order for the short-dated inventory was captured effectively in the ES01 (expired stock) storage location, for the first time during the process. Also, once the sales order went through the planning process and was released for picking up, the tasks were received successfully on the AMT and HHT by the pickers and forklift operators. Recognition of these achievements assisted in reinforcing the changes.

The sales order for the short-dated product out of ES01 FULL was executed effectively. This gave the team the confidence that the changes in the process from a manual to an automated system-guided process were implemented effectively and that they had successfully achieved the objectives. The resilience shown during the change process impacted positively on changing behaviour, which was reinforced (Kuo & Chen, 2019). This encouraged and motivated the workforce to adopt new technology to transition from a manual to system-guide process; and they were excited about the changed process.

The break-bulk picking process was not successful on the first attempt, as there needed to be system changes for the tasks to be communicated both from a picking and bin location. This meant that, after the required changes had been made on the system, the process needed to be started again to ensure that the process flow was completed. There had to be changes made on the system to distinguish between break-bulk (fine picking – less than full pallets of product) and bulk (full pallet of product) in the ES01 storage location to automate the process of fine picking (less than full pallet orders) and eliminate the error experienced in the process while executing the changes.

After these amendments were executed systematically on the master data, the order for the quantity that was less than a full pallet, which was a fine picking process, was then executed again systematically. The fine picking appeared correctly on the picker's arm-mounted scanner. This time the request, received automatically, was to scan the source bin in ES01 BREAK. Therefore, the original HU of the pallet was deleted systematically and a new HU label with a system generated bar code was generated systematically. This allowed the picker to scan the baler bar code of the individual product. Thereafter, the picker verified the correct source bin by scanning the source bin bar code. The correct product was picked up, and the product barcode was scanned. The correct quantities were picked up, verified and staged in the allocated staging bin. Products for this specific order were then staged for the final post-pick audit process where the quantities of the order were verified against the source document and subsequently made available for loading onto the vehicle for that specific route. This effectively completed the process of the system-guided process for short-dated products of customers' orders.

It is recommended that Kolb's experiential learning cycle (Kolb, 1975) be utilised after Step Six of Kotter's Change Management Framework (Kotter, 1996). This is a four-stage cycle of: experience (taking in sensory data); reflection of the experience (data processing); analysing and arriving at findings (planning an action); and applying the actions required (Kolb, 1975; Kolb & Fry, 1974; McLeod, 2017; Wallace, 2019). Including Kolb's experiential learning cycle at this strategic point will assist the change management process with the challenges experienced and testing and retesting the process change.

Third phase: Embedded and sustained automated system-guided change process

7.3.7 Not allowing the new process to be altered

The effective application of the amended SOP (Appendix I) and the adequately trained workforce were key to the process being effective (Kuo & Chen, 2019). Through training and development, which entailed reskilling and up-skilling, the workforce's knowledge and attitudes were influenced, as was the transformation of the process for managing short-dated inventory at the logistics study site (Kuo & Chen, 2019). The approved SOP (Appendix I) was adhered too operationally and was uploaded on a central database for ease of access by the workforce.

7.3.8 Changes become permanent

To facilitate the sustainability of the changes, the changed behaviour in the new way of working was encouraged (Kotter, 1995); and the amendment of the SOP (Appendix I) included the participation of the team. Ultimately, the new way of doing things was reinforced and confirmed within the policy and procedure (Kuo & Chen, 2019). There was buy-in from the team as they were deeply involved in the transitioning from a manually operated process to an automated system-guided process, and could experience, and assess, the automated process compared to their previously tedious manual process. Also, the SOP (Appendix I) was updated to incorporate the technical changes that were necessary to drive the process.

7.4 Challenges of change management

Communication and training were two sub-themes that were identified by the participants. Addressing the challenge of communication, which is Step Four, should be moved up to Step One: c*ommunicate with and obtain the buy-in of the workforce*. The communication from management to the workforce was done continually, which kept the workforce informed of the changes and processes.

Training was a sub-theme that the participants emphasised. However, the data suggests that human emotions in reaction to change were more important than the availability of training. The company has been focusing on training and development of staff and training was also provided for the change process and new technology.

A challenge was experienced with the break-bulk (case) picking, so the process could not be completed and needed to be corrected. System changes were made, and the operators were shown how to decode the tasks. The process was restarted and completed after the changes had been made.

7.5 Addressing the research aim, objectives, and questions

The aim of the study was firstly to explore how to integrate technology in transitioning from a manual process to a system-guided process and secondly to ascertain the impact on the workforce of change management in a fast-moving consumer goods company in KwaZulu-Natal, South Africa. The data was analysed thematically, and four themes emerged, which were discussed in Chapters Five and Six. Kotter's Change Management Model was discussed in the context of the fourth theme, which was: 'System Implementation: manual to automated process'. It was recommended that the sequence of Steps One to Four be changed and to include Kolb's experiential learning cycle after Step Six. This supported the integration of technology and the human dimension in transitioning from a manual process to a system-guided process at the study company.

The effective transitioning from the previously manual process to an automated system-guided process was analysed with reference to the steps in Kotter's Change Management Framework, thereby fulfilling the aim of this study which was to integrate technology and people in transitioning to an automated process.

7.5.1 Objectives and research questions of the study

This study had three objectives, which were to determine how the logistics company prepared for the transitioning from a manual to a system-guided process; to examine the challenges faced in transitioning from a manual to a system-guided; and to develop a framework for change that embraces technology and the human element at the logistics site in Durban, South Africa, in transitioning from a manual to a system-guided process.

7.5.1.1 To determine how the logistics company prepared for the transitioning from a manual to a system-guided process

The company prepared through communication and made human and technological resources available. They supported the training and development of the staff and had had the SOP formalised and approved.

7.5.1.2 To examine the challenges faced in transitioning from a manual to a system-guided Process

The challenges experienced, from the perspective of the company and the employees, were resistance and reluctance from staff; changing people's mindset to embrace technology; staff fears of job losses;

people being accustomed to, and satisfied with, prior manual processes; and maintaining the organisational culture. There was also a challenge with the break-bulk picking that needed process review and changes to the system and SOP. This meant amendments needed to be made and the workforce upskilled to align with these changes. These challenges were dealt with satisfactorily which is indicated by the participants' feedback.

7.5.1.3 A change management framework to integrate technology and the human element

The third objective was to develop a change management framework to integrate technology and the human element. It was stated that, essentially, developing the vision, communicating the vision, and creating a guiding team ensured the effectiveness of the change management process (Chappell et al., 2016). By applying Kotter's framework to thematic analysis, this study adapted the change management model.

Figure 7.2 shows the steps of Kotter's Change Management Model and the recommendation to rearrange the order of some of the steps, as supported by the data of this study. Communication has been moved to Step One, which the participants emphasised during data collection. This is followed by communicating the strategic vision and then forming a guiding team. Once these steps have been completed, the urgency for the change will make sense. After successful implementation, the Kolb experiential learning framework should be applied to test and retest the changed process. This will assist with addressing the challenges encountered, before moving on to Steps Six and Seven to conclude the process.

Step	Existing	Recommended
	First phase – Create atmosphere	
1	Increased urgency	Communicate with and obtain the buy-in of the workforce
2	Organise a guiding team for the strategic change management	Obtain the correct strategic vision
3	Obtain the correct strategic vision	Organise a guiding team for the strategic change management
	Second phase - Engage and enable the workforce to change	
4	Communicate with and obtain the buy-in of the workforce	Increased urgency
5	The workforce should be empowered for action	The workforce should be empowered for action
6	Create quick wins in adopting technology	Create quick wins in adopting technology
		Kolb experiential learning cycle (Kolb, 1975)
	Third phase – Embedded and sustained automated system-guided change process	
7	Not allowing the new process to be altered	Not allowing the new process to be altered
8	Changes made to stick	Changes made to stick

Figure 7.2. Recommended sequence of steps – Kotter's Change Management Model (1996)

Source: Author

7.6 Chapter summary

Chapter Seven discussed the findings of the fourth theme that emerged from the data generated from the primary data collected. The thematic analysis was discussed in the context of Kotter's eight-step Change Management Model with comments from the study's perspective in transitioning to a system-guided process. The Change Management Framework, which was facilitated by a step-by-step guide, was discussed in depth and the benefits of utilising Kotter's Change Management Model were discussed. Thereafter, challenges of change management were discussed.

The aim, objectives and research questions were discussed with quotations from the participants cited to show that the study's aim, and objectives have been fulfilled. The change management framework was discussed with the rearrangement of the steps and including of Kolb's experiential learning cycle after Step Six.

Chapter Eight, which is the last chapter, will summarise the entire thesis and will elaborate on the pertinent points and salient themes of this thesis. Key findings that have a direct correlation with the key research questions will be discussed. Recommendations will follow thereafter, as well as recommendations for future research.

CHAPTER EIGHT: CONCLUSIONS AND RECOMMENDATIONS

8.1 Introduction

As the final chapter of the thesis, Chapter Eight will present a summary of the study findings. Theoretical and practical recommendations will be provided for future research. The chapter will start by addressing the key research questions, followed by the contribution of this research.

As stated in Chapter One, the DBA degree requires a substantial thesis that is premised on a research project to solve a business problem (Carr, 2021). In this study, thematic analysis of the data collected was undertaken to address a practical business problem. This research was aimed at presenting a framework in transitioning from a manual process to a system-guided process in a FMCG company in KwaZulu-Natal, South Africa.

It is important to note that no literature or prior research was found to recommend a change management framework, particularly in transitioning from a manual process to an automated system-guided process, leveraging digital technology of the 4IR, in the logistics operations sector (Hausberg et al., 2018; van Hoek et al., 2010). The researcher attempted to maintain the anonymity of the organisation, as far as practically possible, due to the strategic nature of the research and to prevent competitors from gaining insight into strategic decisions made within the organisation.

The academic significance of this research is that Kotter's (adapted) eight-step Change Management Framework (Kotter, 1996) integrated with the UTAUT framework and Kolb's experiential learning cycle could be utilised to underpin the technological transformation, based on the 4IR, in the logistics operations sector, in transitioning from a manual process to an automated system-guided process at the study site.

8.2 Key research questions

There were three key research questions, which are discussed below in detail. They were discussed using the framework of the four themes (Mills, 2021) (Refer to Figure 8.1: themes emanating from the qualitative data collected) that emerged from the data generated in the qualitative face-to-face interviews and the qualitative focus group interviews.

Figure 8.1 lists the four themes that emerged from the qualitative data generated in the face-to-face interviews and the focus group interviews.

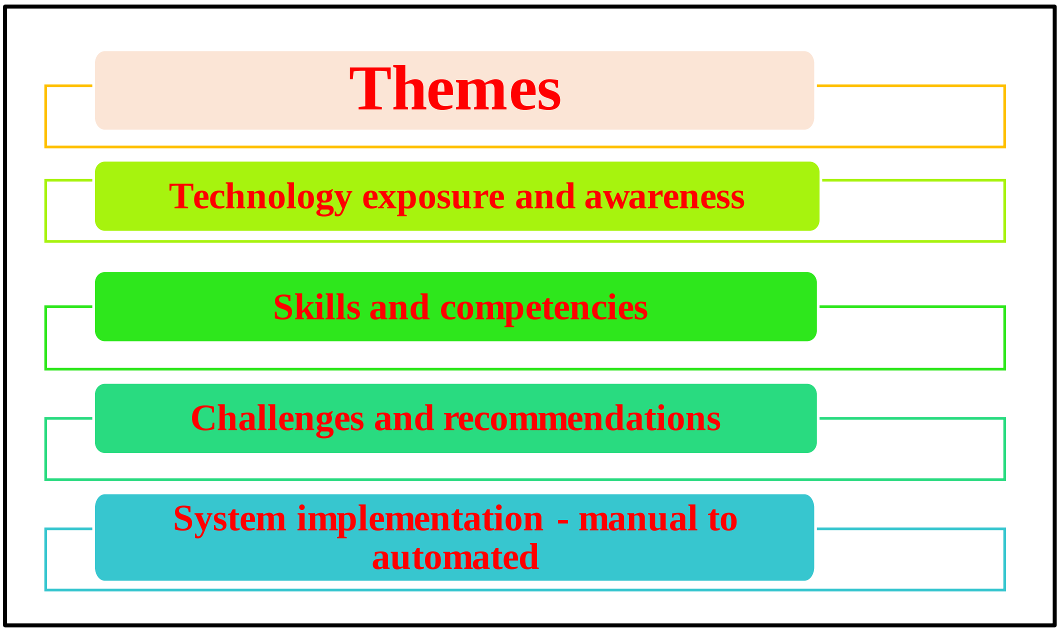


Figure 8.1. Themes inherent in the qualitative data generated

Source: Author

8.2.1 How did the company prepare for the transition from a manual to a system-guided process at the logistics study site in Durban, KwaZulu-Natal, South Africa?

They needed the ability to learn, to embrace change and, to trouble-shoot; and they needed to develop emotional intelligence. Creativity is said to be one of the top three skills required by workers as the 4IR brings new products, technologies, and new ways of working. Hence, creativity was needed to obtain optimal results from these changes (Adegbite & Adeosun, 2021; Gray, 2016). One of the core skills requirements in the 4IR is EI, which did not feature in the list of skills required; but this will be a skill that is required by the workforce (Adegbite & Adeosun, 2021; Gray, 2016). Among the top three skills that will be needed by workers is creativity. Interestingly, EI has become one of the priority skills required by the workforce to be effective in Industry 4.0 (i4.0), or 4IR (Adegbite & Adeosun, 2021; Gray, 2016). The 4IR has necessitated flexibility and emotional proficiency. It requires the ability to readjust appropriately, and a willingness for ongoing learning and productive interaction with the different role players (Lozza, 2017).

8.2.1.1 Technology exposure and awareness

The workforce had to be reskilled and up-skilled on the SAP ES01 (expired stock 01) storage location, on SAP-EWM - ES01 BREAK (picking up less-than-full pallets of product); and on ES01 FULL (full pallets of product) storage locations to receive the automated task for the ES01 BREAK on the AMT.

8.2.1.2 Skills and competencies

The workforce needed to be trained to handle the new process, the SOP, the SAP-EWM, and the system changes, and to develop their skill set to execute the new processes. The company made the resources available.

8.2.1.3 Challenges and recommendations

The initial challenge was to accept the need to make the changes. The subsequent challenge was to obtain buy-in and to change the behaviour to align with the new vision. There was also a challenge experienced with the break bulk order that needed redesigning, which was subsequently achieved. The workforce needed the ability to view these challenges in perspective and to realise that they were surmountable. They needed the ability to deal with the emotions of resistance, concern, and apprehension at the outset; to buy-in to the vision and to change their behaviour to align to the new vision to effect the change.

8.2.1.4 System implementation: manual to automated

The company identified opportunities for the staff to be re-skilled and upskilled to improve their skill sets. Also, the ability to identify what they would achieve improved their knowledge of technology, systems, and processes. Workforce reskilling and up-skilling is ongoing due to the advances in technology, collectively known as '4IR' (Rüßmann et al., 2015). The ability to troubleshoot and to contribute to a solution to the challenges they had encountered was important.

8.2.2 What are the challenges experienced at the logistics study site in Durban, KwaZulu-Natal, South Africa, faced in transitioning from a manual to a system-guided process?

They needed to unlearn the processes of the manual system, and learn the new SOP, processes, and system. There was a need for a change in behaviour and to adapt to the vision and to the new way of working.

8.2.2.1 Technology exposure and awareness

The workforce faced the challenges of been re-skilled and up-skilled on the SAP ES01 (expired stock 01) storage location, and on the EWM ES01 BREAK (picking up less-than-full pallet quantities which is break bulk), and ES01 FULL (full pallets of product) storage locations by receiving an automated task for the ES01 BREAK on the AMT.

8.2.2.2 Skills and competencies

The workforce needed to be trained to handle the new process, the SOP, and the SAP-EWM system changes.

8.2.2.3 Challenges and recommendations

The initial challenge was accepting the changes. The subsequent challenge was obtaining buy-in and changing behaviour to align with the new vision. Thereafter, the challenge experienced was with the break bulk order which needed system and process redesigning, which was subsequently achieved. There were feelings of resistance, concern, and apprehension at the outset. The team leader had the challenge of obtaining buy-in and of ensuring that the workforce's change in behaviour was aligned to the new process of transitioning from a manual to an automated system-guided process.

8.2.2.4 System implementation: manual to automated

The challenge to reskill and up-skill the workforce was achieved. Their knowledge of technology, systems and processes was improved. They acquired the ability to trouble-shoot and to contribute to the solution of the challenge that was encountered.

8.2.3 What framework can be developed to facilitate effective change that embraces technology and the workforce at the study site in Durban, KwaZulu-Natal, South Africa?

The ability to redesign the system architecture and process flow contributed to the effectiveness of the implementation. Also, the workforce was reskilled and up-skilled through training on the job, applying the SOP, troubleshooting, and effecting the appropriate change in process to ensure the break bulk sales order for the short-dated stock was effectively executed. This attested to their developed competencies.

8.2.3.1 Technology exposure and awareness

The workforce was effectively reskilled and up-skilled on the SAP ES01 (Expired stock 01) storage location, and on the EWM ES01 BREAK (picking up less-than-full pallets) and ES01 FULL (picking up of full pallets of products) storage locations, receiving the automated task for the ES01 BREAK on the AMT. The transition to an automated system-guided approach was effective and transferred to other operations within the company nationally in South Africa (Appendix F).

8.2.3.2 Skills and competencies

The workforce was trained to handle the new process, the SOP, and the system changes (Appendix I).

8.2.3.3 Challenges and recommendations

The initial challenge was accepting the changes. The subsequent challenge was obtaining buy-in and changing behaviour to align with the new vision. Thereafter, the challenge was experienced with the break bulk order which needed redesigning. This was subsequently addressed. In essence, the step-by-step guide of the adapted model contributed to overcoming these challenges. There was excitement occasioned by the effective implementation and confidence that this process was transferable to other sites (Appendix F).

8.2.3.4 System implementation: manual to automated

The workforce had been reskilled and up-skilled, hence increasing their level of competence. They had an improved knowledge of technology, systems, and processes. Their ability to troubleshoot and to contribute to the solution had also been enhanced.

8.3 Contribution of the research

The problem statement included the manual process in managing short-dated inventory; the scrapping of inventory wastage, which impacts on the profitability of the company; and the environmental impact of food wastage. The aim of the study was to present a framework in transitioning from a manual process to a system-guided process in a fast-moving consumer goods company in KwaZulu-Natal, South Africa. There is a huge concern about education and labour in Africa and about not being prepared for the changes that will be pivotal in transitioning into 4IR (Reyneke, 2019).

The main contribution of this study was to develop a change management framework to embrace technological changes within the logistics company when transitioning from a manual to an automated system-guided process leveraging 4IR digital technology. This study has made this meaningful contribution by recommending an adapted version of Kotter's eight-step Change Management Framework (Kotter, 1996) and integrating the UTAUT framework (Venkatesh et al., 2003) and Kolb's experiential learning cycle framework (Kolb, 1975). This came after discussing the thematic analysis of participants' responses regarding transitioning from a manual to an automated system-guided process in managing short-dated inventory at the study site in Durban, KwaZulu-Natal.

The fourth theme, ‘System implementation: manual to automated’ was discussed and analysed by applying Kotter’s framework to the completed thematic analysis. The data informed the change in sequence of Steps One to Four. Figure 8.2 lists the steps of Kotter’s Change Management Model with the rearranged sequence of some of the steps supported by the data of this study. Communication has been moved to Step One, which the participants emphasised in data collection. The UTAUT model must thereafter be applied to ascertain the performance expectancy, effort expectancy, social influence, and facilitating conditions to adopt technology. Communicating the strategic vision and then forming a guiding team follows. Once these steps are completed, urgency of change follows. Hence, the first phase would be ‘engage and create atmosphere’, and the second phase would be ‘enable the workforce to change. After some success (quick wins) in what was applied, the Kolb experiential learning framework should be applied to test and retest the changed process. This will assist with addressing the challenges encountered; thereafter moving on to Steps Six and Seven to complete the process.

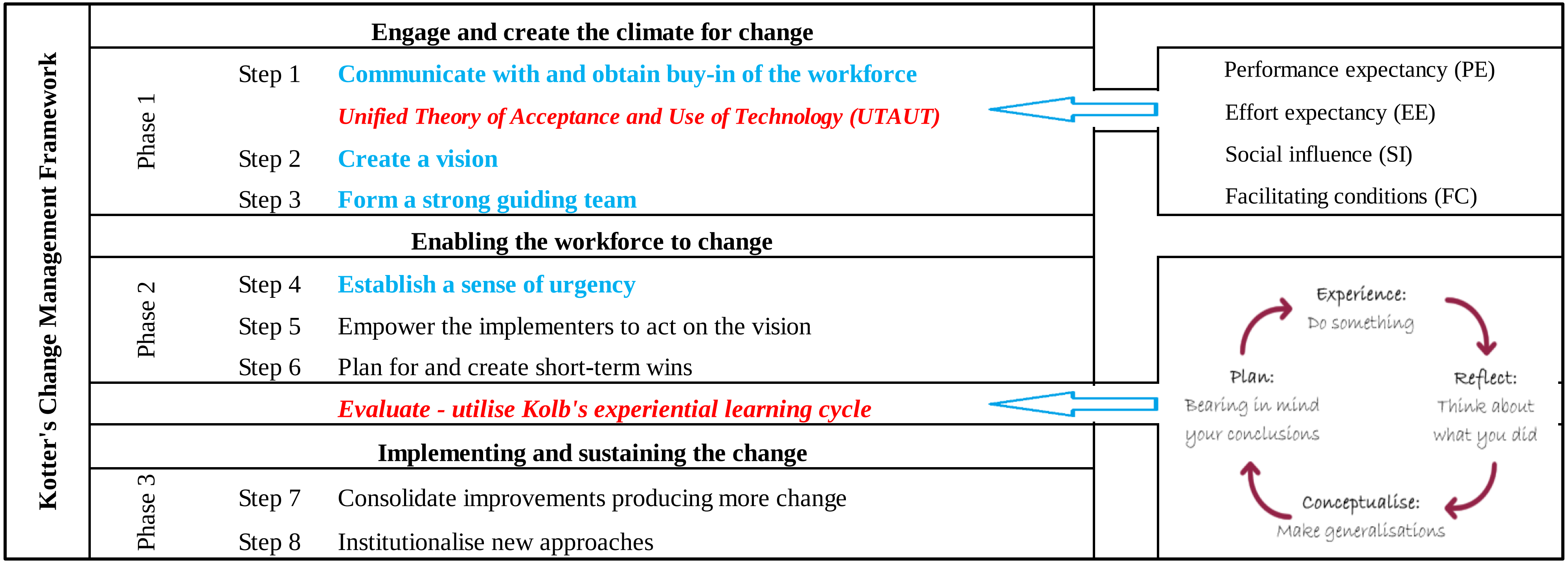


Figure 8.2. Logistics Change Management Framework

Source: Author

8.3.1 Theoretical contribution

From a theoretical perspective, and after discussing other models and critiquing this model, this study, undertaken at a logistics operation, has confirmed that an adapted version of Kotter's eight-step Change Management Framework (Kotter, 1996) was applicable and relevant to the logistics operational environment. This research has provided insight into the effectiveness of the adapted eight-step Change Management Framework (Kotter, 1996) in transitioning from a manual to an automated system-guided process at the logistics study site. This framework was popular and has been thoroughly researched for transformation in the workplace (Wentworth et al., 2018).

In applying Kotter's Change Management Model to the thematic analysis in the discussion in Chapter Seven, the sequence of the first four steps has been rearranged (Refer Figure 8.2). This was informed by the data collected from the participants. Communication from management to the workforce, and communication of the strategic vision and impending changes, contribute to a positive, engaged culture and team cohesion, which creates the right atmosphere for engagement and change. This facilitates the need for urgency and supports the change management process.

In the application of the Unified Theory of Acceptance and Use of Technology (UTAUT) model after Step One, performance expectancy (PE) is dealing with the user's expectation, which is an indication whether the user is likely to adapt to the technology (Andwika & Witjaksono, 2020; Ronaghi & Forouharfar, 2020; Sarfaraz, 2017). Effort expectancy (EE) refers to the users' perceived ease of use and influences whether they embrace technology (Andwika & Witjaksono, 2020; Ronaghi & Forouharfar, 2020; Sarfaraz, 2017). Social influence (SI) is an individual's perception of the acceptance or non-acceptance of technology usage by others (Andwika & Witjaksono, 2020; Pederson & Ling, 2002; Ronaghi & Forouharfar, 2020; Sarfaraz, 2017). Facilitating conditions (FC) indicate the level of confidence that the user has in the technical support and organisational support of the new technology being introduced into the business. Facilitating control is influenced by the perception of behavioural control, facilitating conditions, and compatibility (Andwika & Witjaksono, 2020; Ronaghi & Forouharfar, 2020; Sarfaraz, 2017).

The integration of the Kolb's learning cycle (Kolb, 1975; Kolb & Fry, 1974; McLeod, 2017; Wallace, 2019) after Step Six in Kotter's model (Kotter, 1996) was informed by the challenges experienced with the transitioning to the automated process, as the system had not been configured, from its inception, to handle the nuances of break-bulk picking. Integrating Kolb's learning cycle adds value to dealing with these challenges and facilitates testing and retesting of the changes made. It entails the four-stage cycle of experience (taking in sensory data); reflection of the experience (data processing); analysing and arriving at findings (planning an action); and implementation of the actions (Kolb, 1975; Kolb & Fry, 1974; McLeod, 2017; Wallace, 2019). Thereafter, executing Steps Seven and Eight of the change management framework should proceed, ultimately achieving the aims and objectives of the planned change management.

8.3.2 Policy contribution

This study could inform relevant policy debates in South Africa about the logistics sector, given its importance in the economy. The integration of technology and the workforce at the study site did not result in job losses, which is positive for the people, company, and the economy. For the company, the contribution to policy is that the SOP has been amended and adopted. A positive contribution to the skills development policy has been made as the workforce has new and improved technological skills; and employment policy is concerned with unemployment and job security. Technology adoption should not necessarily result in job losses, but where reduced manpower is required, there could be redeployment of manpower to other areas or to positions created as a result of technological adoption.

8.3.3 Methodological contribution

The face-to-face interviews and focus groups were used concurrently. Inclusion and exclusion factors were applied. For the interviews, the general administrator, and supervisory and management level employees, who had experience in the manual process from an administrative, control, and management perspective were selected. Excluded were those who had practical (hands-on) experience. The focus group participants included forklift operators; reach truck operators; stock clerks; and supervisors who had practical experience of the manual process in the execution of daily tasks. Also, the warehouse operational staff are more comfortable engaging in a group rather than one-on-one, so more suited to the focus group participation for data generation.

Further interviews were conducted after transitioning from the manual to automated process, which generated rich qualitative data. Data from these interviews contributed to the aims and objectives, and in answering the research questions of the study. The concerns raised by the participants in the initial interviews and focus groups, with reference to organisational culture, emotions, communication, training, and challenges, were contextualised and addressed.

8.3.4 Practice/managerial contribution

The contribution from the leadership and management team, with their practical approach, supported the workforce in transitioning from a manual to an automated system-guided approach in managing short-dated inventory. There was engagement with the workforce and input was solicited, so they were included in the change process, which resulted in increased confidence levels in application and troubleshooting ability when problems were encountered. The organisational culture was supported and maintained. As no jobs were at risk, it encouraged the embracing of technological change which dealt with the emotions of fear and resistance.

8.3.5 Contextual contribution

One of the inherent fears that the participants cited was that of job losses. This was highlighted in the third theme, challenges. The fear of job loss was the highest-ranking factor, as noted from the participants' responses. In the current economy of rife unemployment, it is not uncommon for staff to feel that their jobs will become redundant through the adoption of new technology. Some industries, such as banking, have already reduced staff in branches, which are being replaced by automated machines. The unemployment rate in South Africa, as confirmed in the first quarter of 2021, was at 32.6% (Stats SA, 2021).

From 12 -16 July, 2021, South Africa experienced unprecedented social unrest and KwaZulu-Natal was one of the hardest hit (Makoni, 2021). The supply chain was severely disrupted, and this impacted the economy significantly. Businesses were brought to a standstill over this period, and the subsequent impact on businesses led to some companies downsizing, others closing down, and others suffering loss of revenue (Makoni, 2021). This contributed to an increase in unemployment and a disruption in the organisations and the economy.

In essence, it stands to reason that job losses were the highest ranked concern. It was, therefore, fortunate that with the adoption of technology in moving from a manual to an automated process, the logistics company experienced no job losses.

8.4 Recommendations for change management

The recommendations reflect mainly the challenges that have been indicated by the participants and which were discussed above. Furthermore, there were recurring themes (Mills, 2021) in the data generated in the qualitative interviews and focus groups, which were discussed in Chapters Five and

Six. The fourth theme of the thematic analysis was discussed in the context of Kotter's Change Management Model, and Steps One-to-Four were rearranged as informed by the data.

Engaging with the workforce and creating an atmosphere for change is crucial in having an organisational climate that is conducive, and a workforce that will be receptive, in embracing the transitional process. Communication was actioned and the buy-in of the workforce was successfully obtained at the study site. Simplified communication to facilitate behavioural changes was important. The logistics company should remove any barriers and align the architecture of processes as well as organisational structure in keeping with the vision.

The vision of the change management process was confirmed to give direction to the transformation efforts and strategy in accomplishing the objectives. Having everyone aligned and engaged, by using effective, available ways of communicating, is important. The company must reiterate on an ongoing basis the desired outcome aligned to the vision and strategy of the organisation.

The change management framework requires the organisation to bring together a powerful team to spearhead the transformation. The attention of the leadership should be drawn to the fact that they should show their excitement and demonstrate their commitment, as well as fostering togetherness within the teams to achieve the business objectives.

The organisation needed to be enabled. This should also be apparent in the data collection methods utilised. Creating the urgency in effecting the change was the initial activity at the study site. The organisation had to ensure that the communication across the business was mandated with urgent action, and the management team had to communicate and institute action with the designated teams, accordingly.

After feedback and suggestions, the process had to be redesigned to improve the process flow in the automated system-guided process for the break-bulk pick up at the study site (Appendix H). The workforce was empowered, through communication, training, and implementing the change in process from a manual to an automated system-guided process. The team was involved and engaged in the amendment of the SOP and the redesigned process. These amendments are detailed in Section 6.5.2.

Applauding the immediate quick wins that the team achieved was a crucial motivator. Kotter emphasised the need for following each step, in order and consecutively, as it would be difficult to achieve positive results otherwise (Kotter, 1996). Tangible achievements in changed processes should be highlighted and applauded. Recognition of these achievements will assist in reinforcing the changes. The logistics company should conduct an evaluation of the implemented actions utilising Kolb's experiential learning cycle (Wallace, 2019).

The third phase in the change management process was the implementation and sustainability of the change. The effective SOP and an adequately trained workforce were key to policy implementation being effective (Appendices H & I). Through training and development, the workforce's knowledge and attitudes influenced the transformation within the company and in each member. Some systems architecture changes were made to ensure that the changes were effective. The SOP was finalised after input from the team, amendments to the systems design, and subsequent execution (Appendix I).

The final step in Kotter's Change Management Framework (Kotter, 1996) is to facilitate sustainability of the changes. The changed behaviour must be encouraged and incorporated into the new way of working in the organisation. There was buy-in from the team at the logistics study site as they experienced the automated process and compared it to their previously tedious manual process, of which they had experience.

The effectiveness of the change management process at the logistics study site was evidenced in the changed behaviour of the workforce in embracing the vision and objectives of the study in transitioning from a manual process to a system-guided process, leveraged from the digital technology of the 4IR, in managing short-dated inventory.

8.5 Recommendations for future research

The literature has confirmed that the supply chain is vital in an organisation's operation. Improved and informed decision-making requires accessibility to information instantly, which is limited by legacy technology, hence restricting end-to-end transparency. There has been a disruption in traditional systems and processes which are replaced by digital technology, which has the potential to overhaul the entire supply chain management. In the short term (five-to-ten years), a very real possibility exists, as pointed out earlier, that supply chain functions will become obsolete, replaced by advanced technology which may optimally manage the complete process, as well as reducing any physical input (Lyall et al., 2018). This research has traced a key part of the operation, changing from a manual to an automated system-guided process. However, there is still a need for future research that can build on the processes utilised in this research.

Reverse logistics is a possible focus area in future research. Reverse logistics is the process of routing products from the organisation's various customers to a consolidation hub, or back to the original delivery point, in order to recover their value and to minimise their environmental impact (Capri & Lehmacher, 2021). Logistics organisations may need to set up a specific return logistics network and create consolidated return centres to facilitate reverse logistical flows. This will have an impact on the cost and management of products. Reverse logistics will still need to be planned and monitored; hence automation is needed for the reverse logistics processes.

Proof of delivery (POD) automation and real time visibility will also enable the organisation to have visibility on requests for credits, rejection of products, failed deliveries and any other discrepancies in real time. This will impact the organisation's debt collection.

In this study, one of the literature chapters covered the technological changes underpinned by the 4IR. Future research could look at future digitalisation through the perspective of the Fifth Industrial Revolution (5IR). Further research is also needed into the post-COVID-19 environment's digital technology evolution. All these studies should encompass change management in moving from their current state to a future way of working.

8.6 Limitations and delimitations of the research

There are limitations to most research and this research was no exception. The researcher had no control over the limitations in this study (Theofanidis & Fountouki, 2018). Evidently all studies have limitations even if they are not well articulated and researched (Theofanidis & Fountouki, 2018). Due to the focus being on only one facet of the business process, which was short-dated inventory management, the limitations are the following: Financial resources were limited, so the researcher could not engage external research agents and fieldworkers for the collection of data. The researcher collected the data in compliance with the ethical guidelines. The researcher could not extend the scope to include reverse logistics, which could possibly be a contributor to short-dated products being returned. This process is still manual, and its contribution could not be established in this study. The scope of the research was limited to short-dated inventory management. COVID-19 protocols restricted access to the site and did not allow face-to-face interviews; hence the researcher had to conduct the last three through Google Hangout Meeting. This was a study of a logistics company in Durban from a qualitative research perspective. The focus of the study was on change management from a manual to a system-guided process.

8.7 Conclusion

The aim of the study was firstly to present a framework in transitioning from a manual process to a system-guided process in a fast-moving consumer goods company in KwaZulu-Natal, South Africa. This was achieved through thematic analysis of the data collected utilising CAQDAS (Dalkin et al., 2021; Kalpokas & Radivojevic, 2022) and Kotter's eight-step Change Management Framework (Kotter, 1996), with the rearrangement of Steps One-to-Four and the integration of the UTAUT model (Venkatesh et al., 2003) and Kolb learning cycle (Kolb, 1975). The application of the UTAUT model indicated user behavioural intention to embrace new technology (Andwika & Witjaksono, 2020; Ronaghi & Forouharfar, 2020; Sarfaraz, 2017; Sreeram & Madhav, 2022).

The first objective was to determine how the logistics company prepared for the transitioning from a manual to a system-guided process. The company prepared through communication, and availability of human and technological resources. They supported the training and development of the staff, as well as having the SOP formalised and approved.

The second objective was to examine the challenges faced in transitioning from a manual to a system-guided process. The challenges experienced from the perspective of the company and employees were resistance and reluctance from staff; changing people's mindset to embrace technology; staff fear of job losses; people being accustomed to, and satisfied with, prior manual processes; and maintaining the organisational culture. There was also a challenge with the break-bulk picking that needed process review and changes to the system and SOP. This meant amendments needed to be made and the workforce upskilled to align with these changes.

The third objective was to develop a change management framework to integrate technology and the human element. In applying Kotter's framework to the thematic analysis, this study adapted the change management model by rearranging Steps One-to-Four. Communication has been moved to Step One. The UTAUT model should thereafter be applied in the adoption of technology. Communicating the strategic vision and then forming a guiding team follows. Once these steps are completed, urgency of change will make sense as the Fourth Step. Steps Five and Six follow. After achieving some success in what was applied, the Kolb experiential learning framework should be used to test and retest the changed process. This will assist with addressing the challenges encountered; thereafter moving on to Steps Six and Seven to complete the process.

There is limited literature on transitioning from a manual to an automated process in logistics operations; hence further research is required from a change management perspective (Hausberg et al., 2018; van Hoek et al., 2010). As this was a single case study, the results may not be generalised, hence the need for further research. Also, broader stakeholder involvement is required, given the trade union influence in the labour market, as well as engagement with business in South Africa. Some sites could be more resistant to change than others, which may possibly require trade union intervention.

REFERENCES

Ali, M. A., Mahmood, A., Zafar, U. & Nazimt, M. (2021). The power of ADKAR change model in innovative technology acceptance under the moderating effect of culture and open innovation. *LogForum*, *17*(4), 485-502.

Abbas, S. A. (2018). Entrepreneurship and information technology businesses in economic crisis. *Entrepreneurship and Sustainability Issues, Entrepreneurship and Sustainability Center*, *5*(3), 682-692.

Abbey, E., Adu-Danso, E. & Aryeetey, E. (2020). Research Universities' Multiple Responses to COVID-19. *University World News, The Global Window on Higher Education,* (595), 1-7.

Abdel-Basset, M., Manogaran, G. & Mohamed, M. (2018). Internet of Things (IoT) and its impact on supply chain: A framework for building smart, secure, and efficient systems. *Future Generation Computer Systems, 86*(1), 614–628.

Abdel-Fattah, H. (2020). Emotional Intelligence and Emotional Stability in Crises. *Journal of Psychiatry and Psychiatric Disorders, 4*(2), 56-62.

Abe, E. N., Abe, I. I. & Adisa, O. (2021). Future of Work: Skill Obsolescence, Acquisition of New Skills, and Upskilling in the 4IR. In *Future of Work, Work-Family Satisfaction, and Employee Well-Being in the Fourth Industrial Revolution* (pp. 217-231): IGI Global: Hershey, PA, USA.

Adams, J., Hayes, J. & Hopson, B. (1976). Transition–Understanding and Managing Personal Change. *London: Martin Robertson*.

Adegbite, W. M. & Adeosun, O. T. (2021). Fourth Industrial Revolution Skillsets and Employability Readiness for Future Jobs. *Global Journal of Social Sciences Studies, 7*(1), 35-49.

Adler, P. A. & Adler, P. (1994). Observational techniques. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of Qualitative Research* (pp. 377–392). Thousand Oaks, California: Sage Publications, Inc.

Adom, D., Yeboah, A. & Ankrah, A. K. (2016). Constructivism philosophical paradigm: Implication for research, teaching and learning. *Global Journal of Arts Humanities and Social Sciences, 4*(10), 1-9.

Agarwal, S., Punn, N. S., Sonbhadra, S. K., Tanveer, M., Nagabhushan, P., Pandian, K. K. & Saxena, P. (2020). Unleashing the power of disruptive and emerging technologies amid COVID-19: A detailed review. *arXiv preprint arXiv:2005.11507*.

Ageron, B., Bentahar, O. & Gunasekaran, A. (2020). *Digital supply chain: challenges and future directions*. Supply Chain Forum: An International Journal, Taylor & Francis.

Ahmad, S. F., Ibrahim, M. & Nadeemet, A. H. (2021). Impact of Ethics, Stress and Trust on Change Management in Public Sector Organization. *Gomal University Journal of Research, **37***(1), 43-54.

Ajzen, I. & Fishbein, M. (1980). *Understanding attitudes and predicting social behaviour*. Englewood Cliffs, NJ: Prentice Hall.

Alpander, G. G. & Lee, C. R. (1995). Culture, strategy and teamwork: the keys to organizational change. *Journal of Management Development, 14*(8), 4-18.

Al-Talib, M., Melhem, W. Y., Anosike, A. I., Garza Reyes, J. A., Nadeem, S. P. & Kumar, A. (2020). Achieving resilience in the supply chain by applying IoT technology. *Procedia CIRP, 91*(1), 752–757.

Altheide, D. L. & Johnson, J. M. (1994). Criteria for assessing interpretive validity in qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of Qualitative Research* (pp. 485–499). Thousad Oaks, California: Sage Publications, Inc.

AlYahmady, H. H. & Alabri, S. S. (2013). Using NVivo for data analysis in qualitative research. *International Interdisciplinary Journal of Education, 1*(1032), 1-6.

Amanda Istiqomah, N., Fara Sansabilla, P., Himawan, D. & Rifni, M. (2020). The Implementation of Barcode on Warehouse Management System for Warehouse Efficiency. *Journal of Physics: Conference Series, 1573*(1), *012038.*

Amin, H., Hamid, M. R. A., Lada, S. & Anis, Z. (2008). The adoption of mobile banking in Malaysia: The case of Bank Islam Malaysia Berhad (BIMB). *International Journal of Business and Society*, *9*(2), 43-53.

Androniceanu, A. (2017). Hospital management based on the relationship between doctors and patients. *Revista Administratie si Management Public (RAMP)*(29), 41-53.

Andwika, V. R. & Witjaksono, R. W. (2020). Analysis of user acceptance of ERP system on after sales function using unified theory of acceptance and use of technology (UTAUT) model. *International Journal of Advances in Data and Information Systems*, *1*(1), 26-33.

Antwi, S. K. & Hamza, K. (2015). Qualitative and quantitative research paradigms in business research: A philosophical reflection. *European Journal of Business and Management*, *7*(3), 217-225.

Apolonio, S. D. & Norona, M. I. (2021). Automating Inventory Management in Distribution Centers of a Leading Fast Moving Consumer Goods (FMCG) Industry Player in the Beverage Market: A Supply Chain 4.0 Journey. *Proceedings of the Second Asia Pacific International Conference on Industrial Engineering and Operations Management Surakarta, Indonesia*, September 14-16.

Appelbaum, S. H., Habashy, S., Malo, J. L. & Shafiq, H. (2012). Back to the future: revisiting Kotter's 1996 change model. *Journal of Management Development, 31*(8), 764 - 782.

Aranyossy, M., Blaskovics, B. & Horváth, Á. A. (2018). How universal are IT project success and failure factors? Evidence from Hungary. Information Systems Management, 35(1), 15-28.

Ariestyadi, R. & Taufik, T. A. (2020). *Change Management Strategy with ADKAR Model in E-Catalogue System Implementation*. The 2nd International Conference on Management of Technology, Innovation, and Project, 2020.

Baena, F., Guarin, A., Mora, J., Sauza, J. & Retat, S. (2017). Learning factory: The path to industry 4.0. *Procedia Manufacturing, 9*(1), 73-80.

Bakker, A. B. & Demerouti, E. (2017). Job demands–resources theory: taking stock and looking forward. *Journal of Occupational Health Psychology*, *22*(3), 273.

Bales, S. & Sare, L. (2017). Refining strategy: a second bid at critical interpretive synthesis for collection building. *Qualitative and Quantitative Methods in Libraries, 3*(1), 141-151.

Baloh, J., Zhu, X. & Ward, M. M. (2018). Implementing team huddles in small rural hospitals: How does the Kotter model of change apply? *Journal of Nursing Management*, *26*(5), 571-578.

Banerjee, Y., Tuffnell, C. & Alkhadragy, R. (2019). Mento's change model in teaching competency-based medical education. *BMC Medical Education, 19*(1), 1-18.

Beck & Libert. (2017). The Rise of AI Makes Emotional Intelligence More Important. *Harvard Business Review*, *1*(15), 1-5.

Bayiz Ahmad, A., Liu, B. & Saleem Butt, A. (2020). Predictors and outcomes of change recipient proactivity in public organizations of the Kurdistan region of Iraq. *International Public Management Journal, 23*(6), 823-851.

Beer, M. & Nohria, N. (2000). Cracking the code of change. *HBR's 10 Must Reads on Change, 78*(3), 133-141.

Bekmukhambetova, A. (2021). Comparative Analysis of Change Management Models Based on an Exploratory Literature Review. Corvinus University of Budapest, *Doctoral School of Business and Management*, *1*(10), 98-110.

Belyh, A. (2019). Major Approaches & Models of Change Management. *Cleverism.com*. *1*(1), 1-7.

Berg, A. & Welander Hansson, U. (2000). Dementia care nurses' experiences of systematic clinical group supervision and supervised planned nursing care. *Journal of Nursing Management, 8*(6), 357-368.

Bhatti, A. Akram, H., Basit, H. M., Khan, A. U., Raza, S. M. & Naqvi, M. B. (2020). E-commerce trends during COVID-19 Pandemic. *International Journal of Future Generation Communication and Networking*, *13*(2), 1449-1452.

Bhorat, Naidoo, Yu & Derek. (2014). *Trade unions in an emerging economy: The case of South Africa.* WIDER Working Paper, *2014/055*(1), 1-24, The United Nations University World Institute for Development Economics Research (UNU-WIDER), Helsinki.

Bock, T. & Sergeant, J. (2002). Small sample market research. *International Journal of Market Research*, *44*(2), 1-7.

Boddy, C. & Roland. (2016). Sample size for qualitative research. *Qualitative Market Research: An International Journal, 19*(4), 426-432.

Borisoglebskaya, L. N., Provotorova, E. N., Sergeev, S. M. & Khudyakov, A. P. (2019, May). *Automated storage and retrieval system for Industry 4.0 concept*. In IOP Conference Series: Materials Science and Engineering, *537*(3), 032036. Vancouver, BC: IOP Publishing.

Bortolini, M., Faccio, M., Galizia, F. G., Gamberi, M. & Pilati, F. (2020). Design, engineering and testing of an innovative adaptive automation assembly system. *Assembly Automation, 40*(3), 531-540.

Bortolini, M., Faccio, M., Galizia, F. G., Gamberi, M. & Pilati, F. (2021). Adaptive Automation Assembly Systems in the Industry 4.0 Era: A Reference Framework and Full–Scale Prototype. *Applied Sciences, 11*(3), 1256.

Bortolini, M., Ferrari, E., Gamberi, M., Pilati, F. & Faccio, M. (2017). Assembly system design in the Industry 4.0 era: a general framework. *IFAC-PapersOnLine, 50*(1), 5700-5705.

Bostrom, N. (2014). *Superintelligence: Paths, dangers, and strategies.* Oxford, UK: Oxford University Press.

Bowen, G. A. (2005). Preparing a qualitative research-based dissertation: Lessons learned. *The Qualitative Report*, *10*(2), 208-222.

Bowker, J. (2019). *IT upgrade partly to blame for Shoprite earnings shocker.* Johannesburg: Sasfin Securities. Retrieved 15 January 2021, from: https://techcentral.co.za/it-upgrade-partly-to-blame-for-shoprite-earnings-shocker/178133/.

Brettel, M., Friederichsen, N., Keller, M. & Rosenberg, M. (2014). How virtualization, decentralization and network building change the manufacturing landscape: An Industry 4.0 Perspective. *International Journal of Mechanical, Industrial Science and Engineering, 8*(1), 37-44.

Bridges, W. (2003). *Principal influence: Sustaining a vision for powerful new forms of learning using technology*. Los Angeles: University of California.

Bridges, W. & Mitchell, S. (2000). Leading transition: A new model for change. *Leader to leader, 16*(3), 30-36.

Brinch, M. & Stentoft, J. (2017). Digital Supply Chains: Still More “Wannabe” than Practice. *DILF Orientering, 54*(2), 22-28.

Brisson-Banks, C. V. (2010). Managing change and transitions: a comparison of different models and their commonalities. *Library Management, 31*(5), 241-252.

Brougham, D. & Haar, J. (2018). Smart technology, artificial intelligence, robotics, and algorithms (STARA): Employees’ perceptions of our future workplace. *Journal of Management & Organization*, *24*(2), 239-257.

Brown, I., Cajee, Z., Davies, D. & Stroebel, S. (2003). Cell phone banking: predictors of adoption in South Africa—an exploratory study. *International journal of information management*, *23*(5), 381-394.

Brynjolfsson, E. & McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies.* New York, NY: WW Norton & Company.

Bu, F. & Wang, X. (2019). A smart agriculture IoT system based on deep reinforcement learning. *Future Generation Computer Systems*, *99*, 500-507.

Bucciarelli, L. (2015). A review of innovation and change management: stage model and power influences. *Universal Journal of Management, 3*(1), 36-42.

Bujang, A., Naho, A. & Awang, N. (2019). The Agpplication Of Information And Communication Technology (ICT) In Teaching And Learning. *ILKKM Journal of Medical and Health Sciences, 1*(2), 1-5.

Burke, W. W. (2011). A perspective on the field of organization development and change: The Zeigarnik effect. *The Journal of Applied Behavioral Science, 47*(2), 143-167.

Burnes, B. (2004). Kurt Lewin and the planned approach to change: a re-appraisal. Journal of management studies, 41(6), 977-1002.

Burrell, G. & Morgan, G. (1979). Two dimensions: Four paradigms. *Sociological Paradigms and Organizational Analysis*, (pp. 21-37). Ashgate, England: Heinemann.

Butler, M. (2018). *The implications of having an industrial revolution in one generation.* Retrieved 21 May 2018, from: https://www.fin24.com/Finweek/ Featured/the-implications-of-having-an-industrial-revolution-in-one-generation- 20180409.

Büyüközkan, G. & Göçer, F. (2018). Digital Supply Chain: Literature review and a proposed framework for future research. *Computers in Industry*, *97*(1), 157-177.

Cacioppo, J. T. & Gardner, W. L. (1999). Emotion. *Annual Review of Psychology, 50*(1), 191-214.

Calegari, M. F., Sibley, R. E. & Turner, M. E. (2015). A roadmap for using Kotter's organizational change model to build faculty engagement in accreditation. *Academy of Educational Leadership Journal, 19*(3), 31.

Callahan, J. S., Kiker, D. S. & Cross, T. (2003). Does method matter? A meta-analysis of the effects of training method on older learner training performance. *Journal of Management*, *29*(5), 663-680.

Cameron, E. & Green, M. (2015). *Making sense of change management: a complete guide to the models, tools and techniques of organizational change* (4th ed.). London: Kogan Page.

Cameron, E. & Green, M. (2019). Making sense of change management: A complete guide to the models, tools and techniques of organizational change. Kogan Page Publishers.

Capri, A. & Lehmacher, W. (2021). *How COVID-19 accelerated the shift towards TradeTech.* Retrieved 15 January 2021, from: https://www.weforum.org/agenda/2021/01/how-covid-19-has-accelerated-the-shift-towards-tradetech/.

Carey, G. & Crammond, B. (2015). Action on the social determinants of health: views from inside the policy process. *Social Science & Medicine, 128*(1), 134-141.

Carr, S. (2021). Transitioning the team: Supporting distance supervised Doctor of Business Administration students through collaborative online workshops. *Journal of Open, Flexible and Distance Learning, 25*(1), 13-21.

Carvalho, A. M., Sampaio, P., Rebentisch, E., Carvalho, J. Á. & Saraiva, P. (2019). Operational excellence, organisational culture and agility: the missing link? *Total Quality Management & Business Excellence, 30*(13-14), 1495-1514.

Caulfield, J. L. & Brenner, E. F. (2020). Resolving complex community problems: Applying collective leadership and Kotter's change model to wicked problems within social system networks. *Nonprofit Management and Leadership, 30*(3), 509-524.

Chandel, N. & Sharma, P. (2022). Leveraging learning interventions for talent development: an inductive approach. *Cardiometry, 1*(22), 313-322.

Chappell, S., Pescud, M., Waterworth, P., Shilton, T., Roche, D., Ledger, M. & Rosenberg, M. (2016). Exploring the process of implementing healthy workplace initiatives: mapping to Kotter's leading change model. *Journal of Occupational and Environmental Medicine, 58*(10), 341-348.

Cheah, C. M., Teo, A. C., Sim, J. J., Oon, K. H. & Tan, B. I. (2011). Factors affecting Malaysian mobile banking adoption: An empirical analysis. *International Journal of Network and Mobile Technologies, 2*(3), 149-160.

Child, J. (2005). Organization: Contemporary Principles and Practice. Oxford: Blackwell.

Christ, T. (2013). The worldview matrix as a strategy when designing mixed methods research. *International Journal of Multiple Research 7*(1), 110-118.

Chryssolouris, G., Mavrikios, D., Papakostas, N., Mourtzis, D., Michalos, G. & Georgoulias, K. (2009). Digital manufacturing: history, perspectives, and outlook. *Proceedings of the Institution of Mechanical Engineers, Part B: Journal of Engineering Manufacture, 223*(5), 451-462.

Chui, M., Manyika, J. & Miremadi, M. (2015). Four fundamentals of workplace automation. *McKinsey Quarterly, 29*(3), 1-9.

Cichosz, M., Wallenburg, C. M. & Knemeyer, A. M. (2020). Digital transformation at logistics service providers: barriers, success factors and leading practices. *The International Journal of Logistics Management, 31*(2), 209-238.

Clancy, T. (2018). Systems thinking: Three system archetypes every manager should know. *IEEE Engineering Management Review, 46*(2), 32-41.

Cloutier, C. & Ravasi, D. (2021). Using tables to enhance trustworthiness in qualitative research. *Strategic Organization, 19*(1), 113-133.

Cohen, D. S. (2005). *The heart of change field guide: Tools and tactics for leading change in your organization*: Boston, Massachusetts: Harvard Business Press.

Cohen, W. M. & Levinthal, D. A. (2000). *Absorptive capacity: A new perspective on learning and innovation strategic learning in a knowledge economy*. Amsterdam, Netherlands: Elsevier.

Cole, M. S., Harris, S. G. & Bernerth, J. B. (2006). Exploring the implications of vision, appropriateness, and execution of organizational change. *Leadership & Organization Development Journal, 27*(5), 352-367.

Collis, J. & Hussey, R. (2003). *Business Research*. New York, NY: Palgrave Macmillan.

Colman, A. M. (2015). *A dictionary of psychology.* New York, NY: Oxford University Press.

Comins, L. (2018). Labour Management system shifts risk from client to service provider. *Freight and Trading Weekly, 2279*(18), 1-20.

Coopers, P. (2019). *Shoprite Holdings SENS Year End 2019*. Cape Town: Pricewaterhouse Coopers Incorporated. Retrieved 15 January 2021, from: https://www.google.com/search?rlz=1C1GCEB_enZA923ZA923&sxsrf=AOaemvI5SX7ApMNpliLpZ1DceYf3rbpKnA:1641629057114&q=Coopers,+P.+(2019).+Shoprite+Holdings+SENS+Year+End+2019.+Cape+Town:+Pricewaterhousecoopers+Incorporated.&spell=1&sa=X&ved=2ahUKEwil9LTm2KH1AhWlolwKHTrjANcQBSgAegQIARAy&biw=1536&bih=722&dpr=1.25.

Corejova, T. & Chinoracky, R. (2021). Assessing the Potential for Digital Transformation. *Sustainability*, *13*(19), 1-15.

Costa, R., Silva, F. & Campilho, R. (2017). A novel concept of agile assembly machine for sets applied in the automotive industry. *The International Journal of Advanced Manufacturing Technology, 91*(9), 4043-4054.

Cowan, D. T., Fitzpatrick, J. M., Roberts, J. D. & While, A. E. (2004). Measuring the knowledge and attitudes of health care staff toward older people: Sensitivity of measurement instruments. *Educational Gerontology, 30*(3), 237-254.

Crabtree, R. (2018). *So Many "Things" to Contemplate.* APICS Magazine. Retrived 23 June 2018, from: http://www.apics.org/apics-for-individuals/apics-magazine-home/magazine-detail-page/2018/05/03/internet-of-things-supply-chain?utm_medium=email&utm_source=SCMNow_06222018&utm_campaign=SCM%20Now.

Creasy, T. (2018). *An introduction guide to change management.* Vol. 2, Retrieved 2 April 2018, from Prosci: www.prosci.com.

Creswell, J. W. (2003). *Research Design–Qualitative, Quantitative and Mixed Methods Aproaches.* Thousand Oaks CA: Sage Publications.

Creswell, J. W. (2013). *Qualitative Inquiry and Research Design: Choosing from five approaches* (3rd ed.). California: Sage.

Creswell, J. W. & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches.* New York, NY: Sage publications.

Creswell, J. W., Klassen, A. C., Plano Clark, V. L. & Smith, K. C. (2011). Best practices for mixed methods research in the health sciences. *Bethesda (Maryland): National Institutes of Health, 1*(1), 541-545.

Creswell, J. W. & Poth, C. N. (2016). *Qualitative inquiry and research design: Choosing among five approaches.* New York, NY: Sage publications.

Crotty, M. (1998). *The foundations of social research: Meaning and perspective in the research process*. New York, NY: Sage publications.

Cummings, S., Bridgman, T. & Brown, K. G. (2016). Unfreezing change as three steps: Rethinking Kurt Lewin's legacy for change management. Human relations, 69(1), 33-60.

Dalkin, S., Forster, N., Hodgson, P., Lhussier, M. & Carr, S. (2021). Using computer assisted qualitative data analysis software (CAQDAS; NVivo) to assist in the complex process of realist theory generation, refinement and testing. *International Journal of Social Research Methodology, 24*(1), 123-134.

Dallasega, P., Rauch, E. & Linder, C. (2018). Industry 4.0 as an enabler of proximity for construction supply chains: A systematic literature review. *Computers in Industry, 99*(1), 205-225.

Dalmarco, G., Ramalho, F. R., Barros, A. C. & Soares, A. L. (2019). Providing Industry 4.0 technologies: the case of a production technology cluster. *The Journal of High Technology Management Research, 30*(2), 100355.

Dasgupta, S., Paul, R. I. K. & Fuloria, S. (2011). Factors affecting behavioral intentions towards mobile banking usage: Empirical evidence from India. *Romanian journal of marketing*, *3*(1), 6-28.

Daugherty, P., Banerjee, P., Negm, W. & Alter, A.E. (2015). *Driving unconventional growth through the industrial internet of things.* Retrived 14 April 2020, from Accenture technology: https://www.accenture.com/chen/_acnmedia/Accenture/next-gen/reassembling-industry/pdf/Accenture-DrivingUnconventional-Growth-through-IIoT.pdf.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, *13*(3), 319-340.

Davis, F.D. (1993). User acceptance of information technology: system characteristics, user perceptions and behavioural impacts. *International Journal of Man-Machine Studies, 38*(3), 475-487.

Davies, R. (2015). Industry 4.0 Digitalisation for productivity and growth. *European Parliamentary Research Service*, *568*(337), 1-10.

Davis, F.D., Bagozzi, R.P. & Warshaw, P.R. (1989). User acceptance of computer technology: a comparison of two theoretical models. *Management Science, 35*(8), 982-1003.

Dawson, P. M. (1994). *Organizational change: A processual approach*. Paul Chapman Publishing.

Day, D. V. (2007). Developing Leadership Talent: A Guide to Succession Planning and Leadership Development: Guidelines for Effective Talent Management. *Research Collection Lee Kong Chian School Of Business, Singapore Management University, pp. 13-68.*

Deborah, O. K. (2018). Lewin's Theory of Change: Applicability of its Principles in a Contemporary Organization. *Journal of Strategic Management*, *2*(5), 1-11.

De Pater, I. E., Van Vianen, A. E., Bechtoldt, M. N. & Klehe, U. C. (2009). Employees' Challenging Job Experiences and Supervisors' evaluations of promotability. *Personnel Psychology, 62*(2), 297-325.

de Sousa Jabbour, A. B. L., Jabbour, C. J. C., Godinho Filho, M. & Roubaud, D. (2018). Industry 4.0 and the circular economy: a proposed research agenda and original roadmap for sustainable operations. *Annals of Operations Research, 270*(1-2), 273-286.

Deepika, D. (2016). Impact of Leader’s Emotional Intelligence and Transformational Behavior on Perceived Leadership Effectiveness: A Multiple Source View. *Business Perspectives and Research, 4*(1), 27-40.

DeRue, D. S. & Wellman, N. (2009). Developing leaders via experience: the role of developmental challenge, learning orientation, and feedback availability. *Journal of Applied Psychology, 94*(4), 859.

Dewhurst, M. & Willmott, P. (2014). Manager and machine: The new leadership equation. *McKinsey Quarterly, 4*(3), 76-86.

Diedrich, K. (2017) Framework for Digitalized Proactive Supply Chain Risk Management. In: Kersten, W., Blecker, T. & Ringle, C. M. (eds): Digitalization in Supply Chain Management and Logistics - Smart and Digital Solutions for an Industry 4.0 Environment. Proceedings of the Hamburg International Conference of Logistics. Berlin, epubli GmbH.

Di Orio, G., Cândido, G. & Barata, J. (2014). Self-learning production systems: A new production paradigm. *Sustainable Design and Manufacturing*, *14*(115), 887-898.

Dobroszek, J., Mourao, P. & Grzesiak, L. (2019). Identification of the similarities and differences of logistics controller, manager and specialist: A study based on a content analysis. *The International Journal of Logistics Management, 30*(1), 261-283.

Dodgson, J. E. (2019). Reflexivity in Qualitative Research. *Journal of Human Lactation, 35*(2), 220-222.

Dolansky, M. A., Hitch, J. A., Piña, I. L. & Boxer, R. S. (2013). Improving heart failure disease management in skilled nursing facilities: lessons learned. *Clinical Nursing Research, 22*(4), 432-447.

Dong, Y., Seo, M. G. & Bartol, K. M. (2014). No pain, no gain: An affect-based model of developmental job experience and the buffering effects of emotional intelligence. *Academy of Management Journal, 57*(4), 1056-1077.

Drucker, P. F. (1998). *The coming of the new organization*. *Teoksessa: Harvard Business Review on Knowledge Management*. Boston, MA: Harvard Business.

Du Plessis, M., Wakelin, Z. & Nel, P. (2015). The influence of emotional intelligence and trust on servant leadership. *SA Journal of Industrial Psychology, 41*(1), 01-09.

Dwivedi, Y. K., Rana, N. P., Chen, H. & Williams, M. D. (2011, September). A Meta-analysis of the Unified Theory of Acceptance and Use of Technology (UTAUT). In *IFIP international working conference on governance and sustainability in information systems-managing the transfer and diffusion of it* (pp. 155-170). Springer, Berlin, Heidelberg.

Dźwigoł, H. & Dźwigoł-Barosz, M. (2018). Scientific research methodology in management sciences. *Financial and Credit Activity: Problems of Theory and Practice, 2*(25), 424-437.

Eisner, E. (1998). *The Enlightened Eye: Qualitative inquiry and the enhancement of educational practice.* Upper Saddle River, New Jersey: Prentice Hall.

El-Dirani, A., Hussein, M. M. & Hejase, H J. (2019). The Role of Human Resources in Change Management: An Exploratory Study in Lebanon. *The Journal of Middle East and North Africa Sciences, 5*(6), 1-13.

Ellsbury, D. L., Clark, R. H., Ursprung, R., Handler, D. L., Dodd, E. D. & Spitzer, A. R. (2016). A multifaceted approach to improving outcomes in the NICU: the Pediatrix 100 000 Babies Campaign. *Pediatrics, 137*(4), e20150389.

Eriksson, Y. & Fundin, A. (2018). Visual management for a dynamic strategic change. Journal of Organizational Change Management, 31(3), 712-727.

Erlingsdottir, G., Ersson, A., Borell, J. & Rydenfält, C. (2018). Driving for successful change processes in healthcare by putting staff at the wheel. Journal of health organization and management, 32(1), 69-84.

Etikan, I., Musa, S. A. & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics, 5*(1), 1-4.

Evans, M. (2015). Trade unions as human rights organizations. *Journal of Human Rights Practice, 7*(3), 466-483.

Faccio, M., Bottin, M. & Rosati, G. (2019). Collaborative and traditional robotic assembly: a comparison model. *The International Journal of Advanced Manufacturing Technology, 102*(5), 1355-1372.

FAO (Food and Agriculture Organization of the United Nations). (2011). Global food losses and food waste: extent, causes and prevention. Rome. Available at: https://www.fao.org/3/i2697e/i2697e.pdf [Accessed 28/09/2022].

FAO (Food and Agriculture Organization of the United Nations). (2015). Healthy soils are the basis for healthy food production. Available at: http://www.fao.org/soils-2015/News/news-detail/en/c/277682/ [Accessed 28/09/2022].

Fast-Berglund, Å., Fässberg, T., Hellman, F., Davidsson, A. & Stahre, J. (2013). Relations between complexity, quality and cognitive automation in mixed-model assembly. *Journal of Manufacturing Systems, 32*(3), 449-455.

Fatorachian, H. & Kazemi, H. (2018). A critical investigation of Industry 4.0 in manufacturing: theoretical operationalisation framework. *Production Planning & Control, 29*(8), 633-644.

Fewster-Thuente, L. & Batteson, T. J. (2018). Kolb's experiential learning theory as a theoretical underpinning for interprofessional education. *Journal of allied health, 47*(1), 3-8.

Filicetti, J. (2007). *PMO and Project Management Dictionary.* Retrieved 9 January 2020, from The Project Management Hut: http://www.pmhut.com/pmo-and-projectmanagement-dictionary.

Firouzi, F., Farahani, B., Weinberger, M., DePace, G. & Aliee, F. S. (2020). IoT Fundamentals: Definitions, Architectures, Challenges, and Promises. In *Intelligent Internet of Things* (pp. 3-50). Springer: Berlin/Heidelberg, Germany.

Fletcher, S. R., Johnson, T., Adlon, T., Larreina, J., Casla, P., Parigot, L. & del Mar Otero, M. (2020). Adaptive automation assembly: Identifying system requirements for technical efficiency and worker satisfaction. *Computers & Industrial Engineering*, *139*(1), 105772.

Ford, M. (2013). Could artificial intelligence create an unemployment crisis? *Communications of the ACM*, *56*(7), 37-39.

Frey, C. B. & Osborne, M. A. (2017). The future of employment: how susceptible are jobs to computerisation? *Technological Forecasting and Social Change, 114*(1), 254-280.

Furnham, A. (2000). Work in 2020: Prognostications about the world of work 20 years into the millennium. *Journal of Managerial Psychology*, *15*(3), 242-254.

Fusch, P. I. & Ness, L. R. (2015). Are we there yet? Data saturation in qualitative research. *The Qualitative Report, 20*(9), 1408-1416.

Gall, M. D., Gall, J. P., Borg, W. R. & Mendel, P. C. (2007). *A guide for preparing a thesis or dissertation proposal in education, for Gall, Gall, and Borg. 'Educational Research: An Introduction and Applying Educational Research'*. Boston, MA: Pearson Education.

Gallay, O., Korpela, K., Tapio, N. & Nurminen, J. K. (2017). A peer-to-peer platform for decentralized logistics. In *Proceedings of the Hamburg International Conference of Logistics (HICL)* (pp. 19-34). epubli.

Galli, B. J. (2018). Change management models: A comparative analysis and concerns. *IEEE Engineering Management Review*, *46*(3), 124-132.

Ganzarain, J. & Errasti, N. (2016). Three stage maturity model in SME's toward industry 4.0. *Journal of Industrial Engineering and Management (JIEM), 9*(5), 1119-1128.

Gerwel Proches, C. (2020). Order in disorder. *University of KwaZulu-Natal, PressRelease.php* (StoryID 290408).

Gharaibeh, M. K., Arshad, M. R. M. & Gharaibh, N. K. (2018). Using the UTAUT2 model to determine factors affecting adoption of mobile banking services: A qualitative approach. *International Journal of Interactive Mobile Technologies*, *12*(4), 123-137.

Glaser, B. & Strauss, A. (1967). *The Discovery of Grounded Theory: Strategies for Qualitative Research*. Chicago: Aldine.

Gnimpieba, Z. D. R., Nait-Sidi-Moh, A., Durand, D. & Fortin, J. (2015). Using Internet of Things Technologies for a Collaborative Supply Chain: Application to Tracking of Pallets and Containers. *Procedia Computer Science, 56*(1), 550–557.

Goleman, D. (1998). *Working with emotional intelligence.* New York, NY: Bantam Books.

Goleman, D. (2001). Emotional intelligence: Issues in paradigm building. *The Emotionally Intelligent Workplace*, *13*(1), 26.

Graneheim, U. H., Lindgren, B. M. & Lundman, B. (2017). Methodological challenges in qualitative content analysis: A discussion paper. *Nurse Education Today, 56*(1), 29-34.

Graneheim, U. H. & Lundman, B. (2004). Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. *Nurse Education Today, 24*(2), 105-112.

Gray, A. (2016). *The 10 skills you need to thrive in the Fourth Industrial Revolution.* Paper presented at the World Economic Forum. Obtenida el. Retrieved 19 May 2018, from: https://www.weforum.org/agenda/2016/01/the-10-skills-you-need-to-thrive-in-the-fourth-industrial-revolution/.

Greener, S. (2008). *Business research methods.* Frederiksberg, Denmark: Ventus Publishing ApS.

Gröger, C. (2018). Building an Industry 4.0 Analytics Platform. *Datenbank-Spektrum, 18*(1), 5-14.

Grote, G., Weyer, J. & Stanton, N. A. (2014). Beyond human-centred automation–concepts for human–machine interaction in multi-layered networks. *Ergonomics, 57*(3), 289-294.

Guba, E. G. (1981). Criteria for assessing the trustworthiness of naturalistic inquiries. *Educational Resources Information Center Annual Review Paper, 29*(2), 75-91.

Guba, E.G. & Lincoln, Y.S. (1989). Fourth Generation Evaluation. Newbury Park, CA: Sage.

Guérin, A., Lebel, D., Hall, K. & Bussières, J. F. (2015). Change management in pharmacy: a simulation game and pharmacy leaders' rating of 35 barriers to change. *International Journal of Pharmacy Practice, 23*(6), 439-446.

Guest, G., Bunce, A. & Johnson, L. (2006). How many interviews are enough? An experiment with data saturation and variability. *Field Methods, 18*(1), 59-82.

Gunasekaran, A., Subramanian, N. & Papadopoulos, T. (2017). Information technology for competitive advantage within logistics and supply chains: A review. *Transportation Research Part E: Logistics and Transportation Review*, *99*(1), 14-33.

Gupta, D. (2020). 5 Change Management Strategy Failures to Learn From. *Whatfix,* Retrieved 28 June 2021, from: https://whatfix.com/blog/5-change-management-strategy-failures-to-learn-from/.

Hackman, T. (2017). Leading change in action: Reorganizing an academic library department using Kotter's eight stage change model. *Library Leadership and Management, 31*(2), 1-27.

Haddud, A. & Khare, A. (2020). Digitalizing supply chains potential benefits and impact on lean operations. *International Journal of Lean Six Sigma*, *11*(4), 731-765.

Hai, D M (ed). (1986). *Organizational Behavior: Experiences and cases*. West Publishing, St Paul, MN.

Hamdo, S. S. (2021). Change Management Models: A Comparative Review. *Unpublished PhD thesis. Istanbul: Istanbul Okan University*. Accessed 8 March 2023, from: https://www.researchgate.net/publication/353390486_Change_Management_Models_A_Com parat ive_Review

Hamilton, J. (2020). *How to Manage Workplace Disruption During the COVID-19 Pandemic.* Retrieved 1 June 2020, from: https://www.immoafrica.net/news/manage-workplace-disruption-during-covid-19-pandemic/?utm_source=emailoctopus&utm_medium=email&utm_campaign=sunday_scoop.

Hampden-Turner, C. (1990). *Creating Corporate Culture*. Addison-Wesley, Reading, MA.

Hardy, J., Veinot, T. C., Yan, X., Berrocal, V. J., Clarke, P., Goodspeed, R. & Vydiswaran, V. V. (2018). User acceptance of location-tracking technologies in health research: implications for study design and data quality. *Journal of biomedical informatics*, *79*(1), 7-19.

Hausberg, J., Liere-Netheler, K., Packmohr, S., Pakura, S. & Vogelsang, K. (2018), “Digital transformation in business research: a systematic literature review and analysis”, *DRUID18 Conference*, Copenhagen Business School, Copenhagen.

Hayward, S. (2021). *The Agile Leader: How to Create an Agile Business in the Digital Age (2nd ed.).* United States: Kogan Page Publishers.

He, L., Xue, M. & Gu, B. (2020). Internet-of-things enabled supply chain planning and coordination with big data services: Certain theoretic implications. *Journal of Management Science and Engineering*, *5*(1), 1-22.

Hedley, N. & Crotty, A. (2019). Shoprite earnings take knock on non-SA operations. *Retailers News, 16*(1), 13540.

Heinrich W. F. & Green, P. M. (2020). Remixing approaches to experiential learning, design, and assessment. *Journal of Experiential Education*, *43*(2), 205-223.

Hendry, C. (1996). Understanding and creating whole organizational change through learning theory. *Human relations*, *49*(5), 621-641.

Hennink, M., Hutter, I. & Bailey, A. (2020). *Qualitative research methods*. London: SAGE Publications Limited.

Hermann, M., Pentek, T. & Otto, B. (2016). *Design principles for Industrie 4.0 scenarios.* Paper presented at the 2016, 49th Hawaii international conference on system sciences (HICSS).

Herzberg, F. (2008). *One more time: How do you motivate employees?* Boston, MA: Harvard Business Review Press.

Herzog, C., Handkei, C. & Hitters, E. (2019). Analyzing talk and text II: Thematic analysis. *The Palgrave handbook of methods for media policy research*, Springer**:** 385-401.

Hetenyi, G., Lengyel, A. & Szilasi, M. (2019). Quantitative analysis of qualitative data: Using voyant tools to investigate the sales-marketing interface. *Journal of Industrial Engineering and Management (JIEM), 12*(3), 393-404.

Hiatt, J. M. (2006). *ADKAR: A model for change in business, government and our community: How to implement successful change in our personal lives and professional careers*. Loveland, CO, USA: Prosci Learning Center Publications.

Hodgdon, J. (2021). IT Insight: The seamless connection between the digital and real world. Retrieved 12 November 2021, from: https://www.seacoastonline.com/story/business/2021/03/25/insight-seamless-connection-between-digital-and-real-world/7006217002/.

Hofmann, E. & Rüsch, M. (2017). Industry 4.0 and the current status as well as future prospects on logistics. *Computers in Industry, 89*(1), 23-34.

Holden, M. T. & Lynch, P. (2004). Choosing the appropriate methodology: Understanding research philosophy. *The Marketing Review, 4*(4), 397-409.

Holgate, J. (2021). Trade unions in the community: Building broad spaces of solidarity. *Economic and Industrial Democracy*, *42*(2), 226-247.

Holloway, S. D. (2015). *Leading and Engaging Sustainable Change: Achieving Organizational Transformation through the Transformative Methodologies of the Change Acceleration Process and Lean Six Sigma.* Miwaukee, Wisconsin: Cardinal Stritch University.

Horn, A. (2008). Strategic competence: to soar above. *Library Management*, *29*(1/2), 5–17.

Houser, J. (2008). Selecting an appropriate research design. *Nursing research: Reading, Using and Creating Evidence*, *1*(1), 192.

Houngbo, G. F. (2020). What's needed to protect food security in Africa during COVID-19. Retrieved 2 June 2020, from World Economic Forum: *https://www.weforum.org/agenda/2020/05/what-s-needed-to-protect-food-security-during-covid-19/.*

Howe, K. & Eisenhart, M. (1990). Standards for Qualitative and Quantitative Research: A Prolegomenon. *Educational Researcher*, *19*(4), 2-9.

Huang, H. B. (2010). What is good action research. *Action Research*, *8*(1), 93-109.

Huang, Y. (2022). Investigation of the Application of Nudge Theory in Real World. *2022 8th International Conference on Humanities and Social Science Research* (ICHSSR 2022), Atlantis Press.

Human and Social Science Research Ethics Committee. (2020). Conducting Helpful, Hopeful and Respectful Research during COVID-19. *Research Ethics*. Durban, University of KwaZulu-Natal.

Hussein, A. (2009). The use of triangulation in social sciences research: Can qualitative and quantitative methods be combined. *Journal of Comparative Social Work*, *1*(8), 1-12.

Ik, M. & Azeez, A. A. (2020). Organisational green behavioural change: The role of Change Management. International Journal of Entrepreneurial Knowledge, 8(1), 34-48.

Im, I., Hong, S. & Kang, M. S. (2011). An international comparison of technology adoption: Testing the UTAUT model. *Information & management*, *48*(1), 1-8.

Islam, M. A. & Aldaihani, F. M. F. (2022). Justification for Adopting Qualitative Research Method, Research Approaches, Sampling Strategy, Sample Size, Interview Method, Saturation, and Data Analysis. *Journal of International Business and Management, 5*(1), 01-11.

Issa, A., Lucke, D. & Bauernhansl, T. (2017). Mobilizing SMEs towards Industrie 4.0-enabled smart products. *Procedia Cirp*, *63*(1), 670-674.

Jabbar, S., Khan, M., Silva, B. N. & Han, K. (2018). A REST-based industrial web of things' framework for smart warehousing. *The Journal of Supercomputing*, *74*(9), 4419-4433.

Jackson, C.M., Chow, S. & Leitch, R.A. (1997). Toward an understanding of the behavioural intention to use an information system. *Decision Sciences, 28*(2), 357-389.

Jacobs, G., Van Witteloostuijn, A. & Christe-Zeyse, J. (2013). A theoretical framework of organizational change. *Journal of Organizational Change Management, 26*(5), 772-792.

Jain, G., Singh, H., Chaturvedi, K. R. & Rakesh, S. (2020). Blockchain in logistics industry: in fizz customer trust or not. *Journal of Enterprise Information Management, 33*(3), 541-558.

Jalongo, M. R. & Saracho, O. N. (2016). *Writing for publication: Transitions and tools that support scholars' success.* New York, NY, Springer.

Johnson, C. & Parry, D. (2015). Contextualizing qualitative research for social justice. In C. Johnson & D. Parry (Eds.), Fostering social justice through qualitative inquiry: A methodological guide (pp. 11–22). Walnut Creek, CA: Left Coast Press.

Johnson, R. B. & Onwuegbuzie, A. (2004). Mixed methods research: A research paradigm whose time has come. *Educational Researcher, 33*(7), 14-26.

Joseph, D. L. & Newman, D. A. (2010). Emotional intelligence: an integrative meta-analysis and cascading model. *Journal of Applied Psychology, 95*(1), 54.

Junge, A. L., Verhoeven, P., Reipert, J. & Mansfeld, M. (2019). *Pathway of digital transformation in logistics: best practice concepts and future developments* (Vol. 8). Universitätsverlag der TU Berlin.

Kagermann, H. (2015). Change through digitization—Value creation in the age of Industry 4.0. In *Management of Permanent Change* (pp. 23-45). Wiesbaden: Springer Gabler.

Kalavani, A., Kazerani, M. & Shekofteh, M. (2018). Acceptance of evidence-based medicine (EBM) databases by Iranian medical residents using unified theory of acceptance and use of technology (UTAUT). *Health Policy and Technology*, *7*(3), 287-292.

Kalpokaite, N. & Radivojevic, I. (2019, October). Researching and engaging with the computer-assisted qualitative data analysis software ATLAS. ti. In *World Conference on Qualitative Research* (Vol. 1, pp. 120-121).

Kalpokas, N. & I. Radivojevic (2022). Bridging the gap between methodology and qualitative data analysis software: A practical guide for educators and qualitative researchers. *Sociological Research Online, 27*(2), 313-341.

Kamal, T., Zhang, Q. & Akbar, M. A. (2020). Toward successful agile requirements change management process in global software development: a client–vendor analysis. IET Software, 14(3), 265-274.

Kamble, S. S., Gunasekaran, A. & Sharma, R. (2018). Analysis of the driving and dependence power of barriers to adopt industry 4.0 in the Indian manufacturing industry. *Computers in Industry, 101*(1), 107-119.

Kanter, R. M. (1984). *Change masters.* New York, NY: Simon and Schuster.

Kanter, R. M. (1985). *The change masters. Corporate entrepreneurs at work.* London, Unwin Paperbacks.

Kanter, R. M. (2003). *Challenge of organizational change: How companies experience it and leaders guide it.* New York, NY: Simon and Schuster.

Kanter, R. M., Stein, B. & Jick, T. (1992). The Challenge of Organizational Change. New York: The Free Press.

Karadayi-Usta, S. (2019). An Interpretive Structural Analysis for Industry 4.0 Adoption Challenges. *IEEE Transactions on Engineering Management*, *67*(3), 973-978.

Kassai, E. T., Azmat, M. & Kummer, S. (2020). Scope of Using Autonomous Trucks and Lorries for Parcel Deliveries in Urban Settings. Logistics, 4(17), 11-34.

Kemmis, S. & McTaggart, R. (1988). *The action research planner (3rd ed.).* Victoria, Australia: Deakin University.

Kersten, W., Seiter, M., von See, B., Hackius, N. & Maurer, T. (2017). Trends and strategies in logistics and supply chain management–digital transformation opportunities. *BVL: Bremen, Germany*.

Kersten, Wolfgang (Ed.); Blecker, Thorsten (Ed.); Ringle & Christian, M. (Ed.). (2017). Digitalization in Supply Chain Management and Logistics: Smart and Digital Solutions for an Industry 4.0 Environment, Proceedings of the Hamburg International Conference of Logistics (HICL), No. 23, Berlin, epubli GmbH.

Khalid, W., Akalpler, E., Khan, S. & Shah, N. H. (2021). The Relationship Between Unemployment and Economic Growth in South Africa: VAR Analysis. *Forman Journal of Economic Studies, 17*(1), 1-32.

Khaldi, K. (2017). Quantitative, Qualitative or Mixed Research: Which Research Paradigm to Use? *Journal of Educational and Social Research*, *7*(2), 15.

Kim, K. K. & Prabhakar, B. (2004). Initial trust and the adoption of B2C e-commerce: The case of internet banking. *ACM SIGMIS Database: the DATABASE for Advances in Information Systems*, *35*(2), 50-64.

Kings, A. (2018). Food waste: a growing global concern with dire consequences. Biotech. Available at: https://born2invest.com/articles/food-waste-growing-global-concern/ [Accessed 28/09/2022].

Kokutse, F. (2021). *Africa's youth could pioneer digitally driven growth.* Retrieved 25 March 2021, from University World News: Africa's youth could pioneer digitally driven growth (universityworldnews.com).

Kolb, A. & Kolb, D. (2018). Eight important things to know about the experiential learning cycle. *Australian educational leader*, *40*(3), 8-14.

Korstjens, I. & Moser, A. (2018). Series: Practical guidance to qualitative research. Part 4: Trustworthiness and publishing. *European Journal of General Practice, 24*(1), 20-124.

Kotter, J. (1995). Leading change: Why transformation efforts fail. San Francisco, CA, Boston, MA: Harvard Business School Press, *73*(2), 59-67.

Kotter, J. (1996). *Leading change. The leadership challenge*. San Francisco, CA, Boston, MA: Harvard Business School Press.

Kotter, J. (2007). Leading change: Why transformation efforts fail. *Harvard Business Review, 86*(1), 97-103.

Kotter, J. (2008). *A sense of urgency.* Boston, MA: Harvard Business Press.

Kotter, J. (2011). Change Management vs. Change Leadership--What's the Difference? *Forbes online, 12*(21), 11. Retrieved 3 February 2020, from: https://www.forbes.com/sites/johnkotter/2011/07/12/change-management-vs-change-leadership-whats-the-difference/?sh=42cdd6214cc6.

Kotter, J. (2012). *Leading change.* Boston, MA: Harvard business press.

Kotter, J. (2014). *Accelerate: Building strategic agility for a faster-moving world.* Boston, MA: Harvard Business Review Press.

Kotter, J. (2015). *The 8-Step process for leading change.* Boston, MA: Harvard Business Press.

Kotter, J. & Cohen, D. (2002). *The heart of change: Real-life stories of how people change their organizations.* Boston: Harvard Business School Press.

Kotter, J. & Heskett, J. (1992). Corporate Culture and Performance, Free Press, New York.

Kotter, J. & Schlesinger, L. (2008). Choosing strategies for change. *Harvard Business Review, 86*(7/8), 1-11.

Kovács, G. & Kot, S. (2017). Facility layout redesign for efficiency improvement and cost reduction. *Journal of Applied Mathematics and Computational Mechanics, 16*(1), 63-74.

Krasnov, S., Sergeev, S., Mukhanova, N. & Grushkin, A. (2017). *Methodical forming business competencies for private label.* Paper presented at the 2017, 6th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions) (ICRITO).

Krauss, S. E. (2005). Research paradigms and meaning making: A primer. *The qualitative report, 10*(4), 758-770.

Kuk, H. S. & Holst, J. D. (2018). A dissection of experiential learning theory: Alternative approaches to reflection. *Adult Learning, 29*(4), 150-157.

Kukulska-Hulme, A. & Traxler, J. (2005). *Mobile learning: A handbook for educators and trainers.* Psychology Press, London: Routledge.

Kuo, Y. L. & Chen, I. J. (2019). Facilitating a change model in age-friendly hospital certification: Strategies and effects. *PloS One, 14*(4), 1-14.

Kuzel, A. 1992. Sampling in qualitative inquiry. *In Doing Qualitative Research*, ed. B. Crabtree and W. Miller (pp. 31–44). Newbury Park, CA: Sage.

Laforet, S. & Li, X. (2005). Consumers' attitudes towards online and mobile banking in China. International journal of bank marketing, 23(1), 362-380.

Laig, R. B. D. & Abocejo, F. T. (2021). Change Management Process in a Mining Company: Kotter's 8-Step Change Model. Journal of Management, Economics, and Industrial Organization, 5(3), 31-50.

Lambrechts, W., Klaver, J. S., Koudijzer, L. & Semeijn, J. (2020). Human Factors Influencing the Implementation of Cobots in High Volume Distribution Centres. Logistics, 4(17), 111-136

Lane, D., Ferri, M., Lemaire, J., McLaughlin, K. & Stelfox, H. T. (2013). A systematic review of evidence-informed practices for patient care rounds in the ICU. *Critical Care Medicine*, *41*(8), 2015-2029.

Lasi, H., Fettke, P., Kemper, H.-G., Feld, T. & Hoffmann, M. (2014). Industry 4.0. *Business & Information Systems Engineering, 6*(4), 239-242.

Lawrence, N. W. (2011). *Social Research Methods: Quantitative and Qualitative Approaches* (7th ed.). Boston, New York, San Fransisco: Pearson Education, Inc.

Leedy, P.D. & Ormrod, J.E., (2015). *Practical research: Planning and design,* (11th ed.), global edition. Chicago, IL: Pearson.

Lehmacher, W. (2021) Digitizing and Automating Processes in Logistics. In Wurst C., Graf L. (Ed.), *Disrupting Logistics: Future of Business and Finance* (pp. 9-27). Cham, Switzerland: Springer.

Leonard, T. C. (2008). Richard H. Thaler, Cass R. Sunstein, Nudge: Improving decisions about health, wealth, and happiness. *Constitutional Political Economy*, *19*(4), 356–360.

Leopold, T. A., Zahidi, S. & Ratcheva, V. (2016). The Future of Jobs Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution. Retrieved 26 February 2018, from World Economic Forum: http://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf.

Lescevica, M., Ginters, E. & Mazza, R. (2013). Unified theory of acceptance and use of technology (UTAUT) for market analysis of FP7 CHOReOS products. *Procedia Computer Science*, *26*(1), 51-68.

Lewin, K. (1947). Frontiers in group dynamics: II. Channels of group life; social planning and action research. *Human Relations, 1*(2), 143-153.

Lin, Y., Osman, M., & Ashcroft, R. (2017). Nudge: concept, effectiveness, and ethics. *Basic and Applied Social Psychology*, *39*(6), 293-306.

Lincoln, Y. S. & Denzin, N. K. (1994). The fifth moment. In N.K. Denzin & Y.S. Lincoln (Ed.), *Handbook of Qualitative Research* (pp.575-586). Thousand Oaks, California: Sage.

Lincoln, Y. S. & Guba, E. G. (1985). *Naturalistic Inquiry*. Beverly Hills, California: Sage.

Ling, R. & Pederson, P. E. (2002). Mobile end-user services adoption studies: A selective review.

Locke, W. (2021). The future for universities should be evidence-based. Retrieved 19 January 2021, from *University World News*: https://www.universityworldnews.com/post.php?story=20210115123736954.

Loewenstein, G., Bryce, C., Hagmann, D., & Rajpal, S. (2015). Warning: You are about to be nudged. *Behavioral Science & Policy*, *1*, 35–42.

Loyola, A. (2018). Transformational change to face the 4th Industrial Revolution. *Igniteorganizations.com*, 1-5. Retrieved 28 July 2019, from: https://igniteorganizations.com/transformational-change-to-face-the-4th-industrial-revolution/.

Lozza, L. (2017). Talent and Leadership Development In The Fourth Industrial Revolution Era. A *"Leading with a Smile" Grooa White Paper, 10*. Retrieved 19 May 2018, from: https://grooa.com/file/repository/Talent_and_Leadership_Developmeny_in_the_Fourth_Industrial_Revolution_COPYRIGHT.pdf.

Lu, Y. (2017). Industry 4.0: A survey on technologies, applications and open research issues. *Journal of Industrial Information Integration, 6*(1), 1-10.

Luarn, P. & Lin, H. H. (2005). Toward an understanding of the behavioral intention to use mobile banking. *Computers in human behavior, 21*(6), 873-891.

Lucas, H.C. & Spitler, V.K. (1999). Technology use and performance: a field study of broker Workstations. *Decision Sciences, 30*(2), 291-311.

Lyall, A., Mercier, P. & Gstettner, S. (2018). The Death of Supply Chain Management. Retrieved 23 June 2018, from https://hbr.org/2018/06/the-death-of-supply-chain-management?utm_medium=email&utm_source=SCMNow_06222018&utm_campaign=SCM%20Now.

MacArthur, B. (2020). COVID-19 Pandemic. Retrieved 01 June 2020, from University of KwaZulu-Natal: https://clms.ukzn.ac.za/thought-leadership-series/.

MacCarthy, M. (2014). Time to kill the tech job-killing myth. The Hill. Retrieved 23 June 2018 from: http://thehill.com/blogs/congress-blog/technology/219224-time-to-kill-the-tech-job-killing-myth.

Maclean, D. & Vannet, N. (2016). Improving trauma imaging in Wales through Kotter's theory of change. *Clinical Radiology, 71*(5), 427-431.

MacLennan, H., Piña, A. & Gibbons, S. (2018). Content analysis of DBA and PhD dissertations in business. *Journal of Education for Business, 93*(4), 149-154.

Maestrini, V., Luzzini, D., Shani, A. B. & Canterino, F. (2016). The action research cycle reloaded: Conducting action research across buyer-supplier relationships. *Journal of Purchasing and Supply Management, 22*(4), 289-298.

Mahadi, N., Tamin, R. S. M. & Baskaran, S. (2020). Linking Transparent Communication and Employees Openness to Change: Does Recognition Respect Matter? *International Journal of Academic Research in Psychology, 7*(1), 26-35.

Makoni, M. (2021). Social unrest disrupts South African health care. *The lancet, 398*(10297), 287.

Malik, A. A. & Bilberg, A. (2019). Complexity-based task allocation in human-robot collaborative assembly. *Industrial Robot: The International Journal of Robotics Research and Application, 46*(4), 471-480.

Malterud, K. (2001). Qualitative research: standards, challenges, and guidelines. *The Lancet, 358*(9280), 483-488.

Manavalan, E. & Jayakrishna, K. (2019). A review of Internet of Things (IoT) embedded sustainable supply chain for industry 4.0 requirements. *Computers & Industrial Engineering, 127*(1), 925–953.

Manyika, J. (2017). Technology, jobs and the future of work. *McKinsey Global Institute research,* (pp.1-5). Retrived 29 June 2021, from: www.mckinsey.com/globalthemes/employment-and-growth/technology-jobs-and-the-future-ofwork.

Manzoni, J. F. & Barsoux, J. L. (1999). The Set-up-to-fail Syndrome. *Organizational Culture, Harvard Business Review.* Retrieved 18 June 2018, from: https://hbr.org/1998/03/the-set-up-to-fail-syndrome.

Marikyana–d, D., Papagiannidisb–savvas, S. & Alamanosc–eleftherios, E. (2019). The Effect of Behavioural Beliefs on Smart Home Technology Adoption. *UK Academy for Information Systems Conference Proceedings*, 19.

Marikyan, D. & Papagiannidis, S. (2021) *Unified Theory of Acceptance and Use of Technology: A review*. In S. Papagiannidis (Ed), TheoryHub Book. [Accessed 26 October 2022], from: http://open.ncl.ac.uk.

Marshall, B., Cardon, P., Poddar, A. & Fontenot, R. (2013). Does sample size matter in qualitative research?: A review of qualitative interviews in IS research. *Journal of Computer Information Systems, 54*(1), 11-22.

Maslarić, M., Nikoličić, S. & Mirčetić, D. (2016). Logistics response to the industry 4.0: the physical internet. *Open Engineering, 6*(1), 511-517.

Mason. (2002). *Qualitative researching.* Thousand Oaks, California: Sage Publishing.

Mason, M. (2010). Sample size and saturation in PhD studies using qualitative interviews. *Forum: Qualitative Social Research, 11*(3), 1-19.

Mathauer, M. & Hofmann, E. (2019). Technology adoption by logistics service providers. *International Journal of Physical Distribution & Logistics Management*. *49*(4), 416-434.

Matheson, E., Minto, R., Zampieri, E. G., Faccio, M. & Rosati, G. (2019). Human–robot collaboration in manufacturing applications: a review. *Robotics, 8*(4), 100-125.

Mayer, J. (1997). What is emotional intelligence? In P. Salovey & D.J. Sluyter (Ed.), *Emotional Development and Emotional Intelligence: Implications for Educators* (pp. 3-31). New York, NY: Basic Books.

Mayer, J. D., Salovey, P. & Caruso, D. R. (2004). Emotional Intelligence: Theory, Findings, and Implications. *Psychological Inquiry, 15*(3), 197-215.

Mayoh, J. & Onwuegbuzie, A. J. (2015). Toward a conceptualization of mixed methods phenomenological research. *Journal of Mixed Methods Research, 9*(1), 91-107.

Mbuvi, L., Namusonge, G. & Arani, W. (2017). Factors Affecting Automation of Inventory Management in Micro, Small and Medium Enterprises: A Case Study of Kitui County.

McAfee, A., Goldbloom, A., Brynjolfsson, E. & Howard, J. (2014). Artificial intelligence meets the C-suite. *McKinsey Quarterly, 3*(1), 66-75.

McCallin, A. & Frankson, C. (2010). The role of the charge nurse manager: a descriptive exploratory study. *Journal of Nursing Management*, *18*(3), 319-325.

McCauley, C. D., Ruderman, M. N., Ohlott, P. J. & Morrow, J. E. (1994). Assessing the developmental components of managerial jobs. *Journal of Applied Psychology, 79*(4), 544.

McElroy, L. M. & Ladner, D. P. (2014). Defining the study cohort: Inclusion and exclusion criteria. In *Success in Academic Surgery: Clinical Trials* (pp. 131-139). Springer, London.

Mehra, B. (2006). An action research (AR) manifesto for cyberculture power to “marginalized” cultures of difference. In D. Silver & A. Massanari (Eds.), *Critical Cyber-culture Studies*, (pp. 205–215). New York, NY: New York University Press.

Mehra, B., Bishop, B. W. & Partee, R. P. (2017a). How Do Public Libraries Assist Small Businesses in Rural Communities? An Exploratory Qualitative Study in Tennessee. *Libri, 67*(4), 245-260.

Mehra, B., Bishop, B. W. & Partee, R. P. (2017b). Small business perspectives on the role of rural libraries in economic development. *The Library Quarterly, 87*(1), 17-35.

Mehra, B., Bishop, B. W. & Partee, R. P. (2018). A Case Methodology of Action Research to Promote Rural Economic Development: Implications for LIS Education. *Journal of Education for Library and Information Science, 59*(1-2), 48-65.

Mento, A., Jones, R. & Dirndorfer, W. (2002). A change management process: Grounded in both theory and practice. *Journal of Change Management, 3*(1), 45-59.

Mergenthaler, S. (2021). Global Technology Governance Summit. Retrieved 25 March 2021, from World Economic Forum: About > Global Technology Governance Summit | World Economic Forum (weforum.org).

Michel, A., Todnem, R. & Burnes, B. (2013). The limitations of dispositional resistance in relation to organizational change. *Management Decision, 51*(4), 761-780.

Miles, M. B. & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook* (3rd ed.). Thousand Oaks, CA: Sage.

Miles, M. B., Huberman, M. & Saldana, J. (2020). *Qualitative Data Analysis: A Methods Sourcebook.* Thousand Oaks, CA: SAGE.

Miller, J. L. (2017). Managing transitions: using William Bridges’ transition model and a change style assessment instrument to inform strategies and measure progress in organizational change management. In The 12th International Conference on Performance Measurement in Libraries Proceedings. *Scholarship and Professional Work, 74*(1), 357-364.

Mills, C. E. (2021). What's the story? Using narrative for workplace inquiry. In J. Crossman & S. Bordia (Ed.), *Handbook of Qualitative Research Methodologies in Workplace Contexts*, (pp. 157-175). Cheltenham, United Kingdom: Edward Elgar Publishing.

Molenaar, K., Brown, H., Caile, S. & Smith, R. (2002). Corporate culture. Professional safety, 47(7), 18-27.

Moran, J. W. & Brightman, B. K. (2000). Leading organizational change. *Journal of Workplace Learning, 12*(2), 66-74.

Morgan, J. (2014). *The future of work: Attract new talent, build better leaders, and create a competitive organization.* Hoboken (NJ): John Wiley & Sons.

Mørk, A., Krupp, A., Hankwitz, J. & Malec, A. (2018). Using Kotter's change framework to implement and sustain multiple complementary ICU initiatives. *Journal of Nursing Care Quality, 33*(1), 38-45.

Morris, T. H. (2019). Experiential learning–a systematic review and revision of Kolb's model. *Interactive Learning Environments, 28*(8), 1064-1077.

Morse, J. M. (1986). Quantitative and qualitative research: Issues in sampling. *P.L. Chinn (Ed.), Nursing research methodology: Issues and Implementation*, (pp. 181-193). Rockville: Apsen.

Morse, J. M. (1991). Strategies for sampling. *Qualitative nursing research: A contemporary dialogue* (pp. 127-145). Newbury Park, CA: Sage.

Morse, J. M. (2000). Determining sample size. *Qualitative Health Research, 10*(1), 3-5. In: Sage Publications Sage CA: Thousand Oaks, CA.

Moseley, C., Summerford, H., Paschke, M., Parks, C. & Utley, J. (2020). Road to collaboration: Experiential learning theory as a framework for environmental education program development. *Applied Environmental Education & Communication*, *19*(3), 238-258.

Motwani, J., Mirchandani, D., Madan, M. & Gunasekaran, A. (2002). Successful implementation of ERP projects: evidence from two case studies. *International Journal of Production Economics, 75*(1-2), 83-96.

Mulholland, B. (2017). Critical Change Models to Evolve and Survive. Retrieved 9 January 2020, from: http://www.process.st/changemanagement-models/.

Müller, J. M., Kiel, D. & Voigt, K.-I. (2018). What drives the implementation of Industry 4.0? The role of opportunities and challenges in the context of sustainability. *Sustainability, 10*(1), 247.

Myklebust, J. P. & Smidt, H. (2021). What is the role of universities in global upskilling? Retrieved 07 February 2021, from Higher Education Web Publishing Ltd: https://www.universityworldnews.com/post.php?story=20210129110449887.

Nafukho, F. M. (2021). Emotional intelligence skills key to navigating COVID-19. Retrieved 19 January 2021, from University World News: https://www.universityworldnews.com/post.php?story=20210110205926261.

Nagy, J., Oláh, J., Erdei, E., Máté, D. & Popp, J. (2018). The role and impact of Industry 4.0 and the internet of things on the business strategy of the value chain—the case of Hungary. *Sustainability, 10*(10), 3491.

Naismith, L., Sharples, M., Vavoula, G. & Lonsdale, P. (2004). Literature review in mobile technologies and learning. *FutureLab Report 11*. Retrieved 4 December 2019, from: http://www.futurelab.org.uk/resources/documents/lit_reviews/Mobile_Review.pdf.

Nasser, R. I. (2018). *Pitfalls in Textbooks Discussion of Types of Research Purposes*. Birzeit University.

Negri, M., Cagno, E., Colicchia, C. & Sarkis, J. (2021). Integrating sustainability and resilience in the supply chain: A systematic literature review and a research agenda. Business strategy and the environment, 30(7), 2858-2886.

Neuman, W. L. (2011). *Social Research Methods: Qualitative and Quantitative Approaches* (7th ed.). Boston, MA 02116: Peaarson Education, Inc.

Ng, L. C. (2011). Best management practices. *The Journal of Management Development, 30*(1), 93-105.

Nitsche, B. (2021). Exploring the Potentials of Automation in Logistics and Supply Chain Management: Paving the Way for Autonomous Supply Chains. Logistics, 5(51), 1-9.

Nitta, K. A., Wrobel, S. L., Howard, J. Y. & Jimmerson-Eddings, E. (2009). Leading change of a school district reorganization. *Public Performance & Management Review, 32*(3), 463-488.

Noble, H. & Smith, J. (2015). Issues of validity and reliability in qualitative research. *Evidence-based nursing, 18*(2), 34-35.

Nguyen, H., Ahn, J., Belgrave, A., Lee, J., Cawelti, L., Kim, H. E., Prado, Y., Santagata, R. & Villavicencio, A. (2021). Establishing trustworthiness through algorithmic approaches to qualitative research. International Conference on Quantitative Ethnography, Springer.

Nowell, L. S., Norris, J. M., White, D. E. & Moules, N. J. (2017). Thematic analysis: Striving to meet the trustworthiness criteria. *International journal of qualitative methods, 16*(1), 1-13.

Ophir, Y., Walter, D. & Marchant, E.R. (2020). A collaborative way of knowing: bridging computational communication research and grounded theory ethnography. *J. Commun. 70*(3), 447–472.

O'Sullivan, E., Andreoni, A., Lopez-Gomez, C. & Gregory, M. (2013). What is new in the new industrial policy? A manufacturing systems perspective. *Oxford Review of Economic Policy, 29*(2), 432-462.

Omarjee, L. (2017). Digital revolution good for small businesses, not so much for job security. Retrieved 19 May 2018, from fin24: https://www.news24.com/fin24/economy/digital-revolution-good-for-small-businesses-not-so-much-for-job-security-davies-20171217.

Omarjee, L. (2018). Cutting data costs a government priority. Retrieved 19 May 2018, from Mail & Guardian: https://mg.co.za/article/2018-02-20-cutting-data-costs-a-government-priority-patel/.

Oosthuizen, J. (2016). *An assessment of 4IR-Iintelligence of South African management practioners through the lens of the Fourth Industrial Revolution.* In proceedings of 28th Annual Conference of the Southern African Institute of Management Scientists (pp. 5-7), University of Pretoria, South Africa.

Oosthuizen, J. (2017). *The Determinants of Fourth Industrial Revolution Leadership Dexterity: A Proposed Framework for 4IR-Intelligence and Subsequent 4IR Leadership Development*. Paper presented at the 4th International Conference on Responsible Leadership (Vol. 30, No. 3, pp. 243-259), GIBS–Johannesburg, Conference paper.

Pandey, S. C. & Patnaik, S. (2014). Establishing Reliability and Validity in Qualitative Inquiry: A Critical Examination. *Jharkhand Journal of Development and Management Studies 12*(1), 5743-5753.

Parente, S. L. & Prescott, E. C. (1994). Barriers to technology adoption and development. *Journal of Political Economy, 102*(2), 298-321.

Patton, M. Q. (1980). *Qualitative evaluation methods.* Beverly Hills, CA: Sage publications.

Patton, M. Q. (1987). *How to use qualitative methods in evaluation* (2nd ed.). Newbury Park, CA: Sage.

Patton, M. Q. (1990). *Qualitative evaluation and research methods* (2nd ed.). London: Sage Publications.

Pederson, P. & Ling, R., (2002). Mobile end-user adoption studies: a selected review. Scandinavian Journal of Information Systems, 14(1), 1-17.

Pedersen, P. E. & Ling, R. (2003, January). Modifying adoption research for mobile Internet service adoption: Cross-disciplinary interactions. In 36th Annual Hawaii International Conference on System Sciences, 2003. Proceedings of the (pp. 10-pp). IEEE.

Perdue, R. T. (2017). Superintelligence and natural resources: morality and technology in a brave new world. *Society & Natural Resources, 30*(8), 1026-1031.

Peters, M. A. (2017). Technological unemployment: Educating for the fourth industrial revolution. *Journal of Self-Governance and Management Economics, 5*(1), 25-33.

Petrides, K. V. & Furnham, A. (2001). Trait emotional intelligence: Psychometric investigation with reference to established trait taxonomies. *European Journal of Personality, 15*(6), 425-448.

Pfeifer, T., Schmitt, R. & Voigt, T. (2005). Managing change: quality-oriented design of strategic change processes. *The TQM Magazine, 17*(4), 297.

Phelan, M. W. (2005). Cultural revitalization movements in organization change management. *Journal of Change Management, 5*(1), 47-56.

Pioneer. (2017a). About Us. Retrieved 19 June 2018, from: http://www.pioneerfoods.co.za//content/uploads/Other-Business-Units-contact-updated-FINAL-july-17.pdf.

Pioneer. (2017b). Pioneer Foods is going Google Cloud. Retrieved 24 September 2018, from: https://mail.google.com/mail/u/0/#advanced-search/from=felix.lombard%40pioneerfoods.co.za&has=google&sizeoperator=s_sl&sizeunit=s_smb&query=from%3A(felix.lombard%40pioneerfoods.co.za)+google/WhctKHTCFhNVgnSdLQKjBwDqMPcFttsJXvpzHQMXCVMJvCJVJNkFqmBbZtNVFcwNcrcDDlB.

Pioneer. (2018). SAP FIORI. Retrieved 24 September 2018, from: https://plus.google.com/u/0/s/google/top.

Polit, D. F. & Hungler, B. (1999). *Nursing Research: Principles and Methods* (6th ed.). Philadelphia, PA: Lipincott.

Pollack, J. & Pollack, R. (2015). Using Kotter's eight stage process to manage an organisational change program: Presentation and practice. *Systemic Practice and Action Research, 28*(1), 51-66.

Ponis, S. T. & Efthymiou, O. K. (2020). Cloud and IoT applications in material handling automation and intralogistics. *Logistics, 4*(3), 1-17.

Posada, J., Toro, C., Barandiaran, I., Oyarzun, D., Stricker, D., de Amicis, R. & Vallarino, I. (2015). Visual computing as a key enabling technology for industrie 4.0 and industrial internet. *IEEE Computer Graphics and Applications, 35*(2), 26-40.

Prabowo, A. & Syaifullah, D. H. (2021). Eliminating Unsafe Behaviour Through the Implementation of Nudge Theory in Indonesian Industry. *Second Asia Pacific International Conference on Industrial Engineering and Operations Management,* Surakarta, Indonesia, IEOM Society International**:** 3841-3851.

Pratt, M. G., Kaplan, S. & Whittington, R. (2020). Editorial essay: The tumult over transparency: Decoupling transparency from replication in establishing trustworthy qualitative research. *Administrative Science Quarterly*, *65*(1), 1–19.

Prause, D. & Mujtaba, B. G. (2015). Conflict management practices for diverse workplaces. *Journal of Business Studies Quarterly*, *6*(3), 13-22.

Püschel, J., Mazzon, J. A. & Hernandez, J. M. C. (2010). Mobile banking: proposition of an integrated adoption intention framework. *International Journal of bank marketing 28*(1), 389-409.

Qualizza, G. & de Luca, P. (2021). Innovation in the service supply chain: Qualitative research in a port context. *Track: Sectorial Marketing – Services, 1*(34123), 1-9.

Quinn, J.B. (2006). Organizational development, change and transformation. In M. Armstrong (Ed.), *A Handbook of Human Resource Management* (10th ed.), (pp. 337-348). London: Cambridge University Press.

Quint, F., Sebastian, K. & Gorecky, D. (2015). A mixed-reality learning environment. *Procedia Computer Science, 75*(2015), 43-48.

Ragin, C. C. & Becker, H. S. (1989). How the microcomputer is changing our analytic habits. In G Blank, JL McCartney and E Brent (Ed.), *New technology in sociology: Practical applications in research and work* (pp. 47-55). New Brunswick NJ: Transaction Publishers.

Rajan, R. & Ganesan, R. (2017). A critical analysis of John P. Kotter's change management framework. Asian Journal of Research in Business Economics and Management, 7(7), 181-203.

Ramkumar, M., Schoenherr, T., Wagner, S. M. & Jenamani, M. (2019). Q-TAM: A quality technology acceptance model for predicting organizational buyers' continuance intentions for e-procurement services. *International Journal of Production Economics*, *216*(1), 333-348.

Rao, S. K. & Prasad, R. (2018). Impact of 5G technologies on industry 4.0. Wireless Personal Communications, 100(1), 145-159.

Rapoport, R. N. (1970). Three dilemmas in action research: with special reference to the Tavistock experience. *Human Relations, 23*(6), 499-513.

Ren, Y., Yu, M., Wu, C., Wang, Q., Gao, M., Huang, Q. & Liu, Y. (2017). A comprehensive review on food waste anaerobic digestion: research updates and tendencies. *Bioresour Technology, 247*, pp.1069–1076

Reyneke, M. (2019). See the Signs: There is evidence that Africa is digitising rapidly. *World Economic Forum*, *iol.co.za/business-report*, 1. Retrieved 4 September 2019, from: https://www.iol.co.za/business-report/wef/see-the-signs-there-is-evidence-that-africa-is-digitising-rapidly-31804607

Riaz, M. N. & Riaz, M. A. (2015). Emotional Intelligence and Leadership Styles in College Teachers Mazhar Iqbal Bhatti* International Islamic University Islamabad, Pakistan Naila Batool University of Haripur, Pakistan. *Bahria Journal of Professional Psychology*, *14*(2), 70-80.

Ribeiro, J. L. & Gomes, D. (2016). Other organizational perspectives on the contribution of human resources management to organizational performance. In *Organizational Management* (pp. 63-106). Palgrave Macmillan, London: Springer.

Richards, G. (2017). *Warehouse Management: A complete guide to improving efficiency and minimizing costs in the modern warehouse* (2nd ed.). London: Kogan Page Publishers.

Riedl, J. (2018). *Digital transformation in the logistics industry*. Available at: https://www.bcg.com/industries/transportation-travel-tourism/center-digital-transportation/logistics.aspx [Accessed 26/05/2020].

Riquelme, H. E. & Rios, R. E. (2010). The moderating effect of gender in the adoption of mobile banking. *International Journal of bank marketing*, *28*(5), 328-341.

Roblek, V., Meško, M. & Krapež, A. (2016). A complex view of industry 4.0. *SAGE Open*, *6*(2), 1-11.

Rode, J. C., Mooney, C. H., Arthaud-Day, M. L., Near, J. P., Baldwin, T. T., Rubin, R. S. & Bommer, W. H. (2007). Emotional intelligence and individual performance: Evidence of direct and moderated effects. *Journal of Organizational Behavior, 28*(4), 399-421.

Rodger, J. A. & Pendharkar, P. C. (2001). A BPR case study at Honeywell. *Business Process Management Journal, 7*(2), 85-99.

Rogers, C.R. (1969). *Freedom to Learn.* Merrill: Columbus, OH, USA.

Ronaghi, M. H. & Forouharfar, A. (2020). A contextualized study of the usage of the Internet of things (IoTs) in smart farming in a typical Middle Eastern country within the context of Unified Theory of Acceptance and Use of Technology model (UTAUT). *Technology in Society, 63*(1), 1-25.

Rønningstad, C. (2018). Us and them–First-line management and change resistance. Nordic journal of working life studies, 8(2), 5-22.

Rosati, G., Faccio, M., Carli, A. & Rossi, A. (2013). Fully flexible assembly systems (F-FAS): a new concept in flexible automation. *Assembly Automation*, *33*(1), 8–2.

Rosati, G., Faccio, M., Finetto, C. & Carli, A. (2013). Modelling and optimization of fully flexible assembly systems (F-FAS). *Assembly Automation, 33*(2), 165-174.

Rose, J. & Johnson, C. (2020). Contextualizing reliability and validity in qualitative research: toward more rigorous and trustworthy qualitative social science in leisure research. *Journal of Leisure Research 51*(4), pp.432-451.

Rosenbaum, D., More, E. & Steane, P. (2018). Planned organisational change management: Forward to the past? An exploratory literature review. *Journal of Organizational Change Management, 31*(2), 286-303.

Rossman, G. B. & Rallis, S. F. (2011). *Learning in the field: An introduction to qualitative research* (2nd ed.). Thousand Oaks, CA: Sage.

Rouse, W. B. (2011). Necessary competencies for transforming an enterprise. *Journal of Enterprise Transformation, 1*(1), 71-92.

Rüßmann, M., Lorenz, M., Gerbert, P., Waldner, M., Justus, J., Engel, P. & Harnisch, M. (2015). Industry 4.0: The future of productivity and growth in manufacturing industries. *Boston Consulting Group, 9*(1), 54-89.

Salovey, P. & Mayer, J. D. (1990). Emotional intelligence. *Imagination, Cognition and Personality, 9*(3), 185-211.

Sand-Jecklin, K. & Sherman, J. (2013). Incorporating bedside report into nursing handoff: evaluation of change in practice. *Journal of Nursing Care Quality, 28*(2), 186-194.

Sandelowski, M. (1995). Sample size in qualitative research. *Research in Nursing & Health, 18*(2), 179-183.

Sarfaraz, J. (2017). Unified theory of acceptance and use of technology (Utaut) model-mobile banking. *Journal of Internet Banking and Commerce, 22*(3), 1-20.

Sarni, W. M. & Kaji, J. (2016). From Dirt to Data, the second green revolution and the Internet of Things. *Deloitte Rev. 18*(1), 4–19.

Saunders, M., Lewis, P. & Thornhill, A. (2003). *Research methods for business students* (3rd ed.). Upper Saddle River, N.J.: Prentice Hall.

Saunders, M., Lewis, P. & Thornhill, A. (2016). *Research methods for business students* (6th ed.). New York, NY: Pearson Education. Available at:

https://www.researchgate.net/publication/330760964_Research_Methods_for_Business_Students_Chapter_4_Understanding_research_philosophy_and_approaches_to_theory_development.

Saunders, M. & Tosey, P. (2012). The Layers of Research Design. *Rapport* (pp. 58-59). Available at: https://www.academia.edu/4107831/The_Layers_of_Research_Design.

Schaltegger, S. & Wagner, M. (2011). Sustainable entrepreneurship and sustainability innovation: categories and interactions. *Business Strategy and The Environment, 20*(4), 222-237.

Schech-Storz, M. D. (2013). *Organizational change success in project management: A comparative analysis of two models of change.* (Unpublished Phd thesis). Capella University.

Schein, E. (1990). Organisational culture, American Psychologist, 45 (2).

Schein, E. (2004). Part 3: The leadership role in culture building, embedding, and evolving. *The Learning Culture and the Learning Leader. Organizational Culture and Leadership* (3rd ed), (pp. 393-418). San Francisco, CA.

Schmidt, N. A. & Brown, J. (2015). Evidence-Based Practice for Nurses: Appraisal and Application of Research. (3rd ed). Burlington, MA: Jones and Bartlett.

Schmidt, N. A. & Brown, J. M. (2017). Evidence-Based Practice for Nurses: Appraisal and Application of Research: Appraisal and Application of Research. Jones & Bartlett Learning.

Schmieder, C. (2020). Qualitative data analysis software as a tool for teaching analytic practice: Towards a theoretical framework for integrating QDAS into methods pedagogy. *Qualitative Research 20*(5), pp.684-702.

Schwab, K. (2015). *The Fourth Industrial Revolution - (Foreign Affairs) (Online)*. Retrieved 26 February 2018, from World Economic Forum - Foreign Affairs: https://www.foreignaffairs.com/articles/2015-12-12/fourth-industrial-revolution.

Schwab, K. (2016). The Fourth Industrial Revolution: what it means, how to respond. Retrieved 19 May 2018, from World Economic Forum - Foreign Affairs: https://luminariaz.files.wordpress.com/2017/11/the-fourth-industrial-revolution-2016-21.pdf.

Schwab, K. (2017). *The Fourth Industrial Revolution.* New York, NY: Crown Business.

Senge, P. (1990). The fifth discipline. New York: Currency. *Doubleday. Senge, P. M. (1992). Mental Models. Planning Review, 20*(2), 4-13.

Senior, B. & Swailes, S. (2010). *Organizational change* (4th ed.). Harlow, Essex, England: Pearson Education.

Setyanto, E., Ikhwan, A., Amin, S., Muhammad Shabir, U. & Suharto, S. (2019). Challenges of the change management for managing people and organizational culture. *International Journal of Recent Technology and Engineering, 8*(2), 3822-3826.

Shiferaw, K. B. & Mehari, E. A. (2019). Modelling predictors of acceptance and use of electronic medical record system in a resource limited setting: Using modified UTAUT model. *Informatics in Medicine Unlocked, 17*(1), 1-9.

Shmatko, A., Barykin, S., Sergeev, S. & Thirakulwanich, A. (2021). Modeling a Logistics Hub Using the Digital Footprint Method—The Implication for Open Innovation Engineering. *Journal of Open Innovation: Technology, Market, and Complexity, 7*(59), 1-16.

Shukla, S., Goel, G. & Vasudevan, A. (2018). Building a Digital Supply Chain the Right Way. Retrieved 23 June 2018, from Digital Supply Chain, Internet of Things | APICS Magazine: http://www.apics.org/apics-for-individuals/apics-magazine-home/magazine-detail-page/2018/01/04/building-a-digital-supply-chain?utm_medium=email&utm_source=SCMNow_06222018&utm_campaign=SCM%20Now.

Silverman, D. (1993). *Beginning Research:Interpreting Qualitative Data: Methods for Analyzing Talk, Text, and Interaction.* London: Sage Publications.

Simon, M. K. & Goes, J. (2013). Assumptions, limitations, delimitations, and scope of the study. Retrieved 24 March 2021, from: http://www.dissertationrecipes.com/wp-content/uploads/2011/04/Assumptions-Limitations-Delimitations-and-Scope-of-the-Study.pdf.

Sippli, K., Schmalzried, P., Rieger, M. A. & Voelter-Mahlknecht, S. (2021). Challenges arising for older workers from participating in a workplace intervention addressing work ability: a qualitative study from Germany. *International Archives of Occupational and Environmental Health*, *94*(1), 919-933.

Ślusarczyk, B. (2018). Industry 4.0: are we ready? *Polish Journal of Management Studies, 17*(1), 232-248.

Small, A., Gist, D., Souza, D., Dalton, J., Magny-Normilus, C. & David, D. (2016). Using Kotter's change model for implementing bedside handoff: a quality improvement project. *Journal of Nursing Care Quality, 31*(4), 304-309.

Smith, I. (2005). Continuing professional development and workplace learning 11: managing the 'people' side of organizational change. *Library Management, 26*(3), 152-155.

Smith, W. (2017). Research Onion – Made easy to understand and follow. Retrieved 13 March 2018, from: http://cpanel-199-19.nctu.edu.tw/~etang/Marketing_Research/E3_Handout/1Research%20Onion%20-%20Made%20easy%20to%20understand%20and%20follow.pdf.

Sniderman, B., Mahto, M. & Cotteleer, M. J. (2016). *Industry 4.0 and manufacturing ecosystems: Exploring the world of connected enterprises.* New York, NY: Deloitte University Press.

Song, A. Q., Chen, Y., Zhong, Y., Lan, K., Fong, S. & Tang, B. R. (2021). A Supply-chain System Framework Based on Internet of Things Using Blockchain Technology. *ACM Transactions on Internet Technology (TOIT), 21*(1), 1-24.

Sreeram, G. V. & Madhav, V. V. (2022). Does English Language affect Digital money usage–An empirical Study. *Indian Journal of Economics and Business, 21*(2), 469-474.

Sripalawat, J., Thongmak, M. & Ngramyarn, A. (2011). M-banking in metropolitan Bangkok and a comparison with other countries. *Journal of computer information systems*, *51*(3), 67-76.

Stahl, N. A. & King, J. R. (2020). Expanding approaches for research: Understanding and using trustworthiness in qualitative research. *Journal of Developmental Education, 44*(1), pp.26-28.

Stats SA. (2021). South Africa's unemployment rate. Retrieved on 6 July 2021, from: http://www.statssa.gov.za/publications/P0211/Media%20release%20QLFS%20Q1%202021.pdfhttp://www.statssa.gov.za/publications/P0211/Media%20release%20QLFS%20Q1%202021.pdf.

Stern, N. J. T. E. J. (1989). The Economics of Development: A Survey. *The Economic Journal, 99*(397), 597-685.

Stock, T. & Seliger, G. (2011). Opportunities of sustainable manufacturing in Industry 4.0. *Procedia CIRP 40*(1), 536–541.

Stouten, J., Rousseau, D. M. & De Cremer, D. (2018). Successful organizational change: Integrating the management practice and scholarly literatures. Academy of Management Annals, 12(2), 752-788.

Strauss, A. & Corbin, J. (1990a). *Basics of qualitative research* (2nd ed.). Thousands Oaks, CA: Sage Publications, Inc.

Strauss, A. & Corbin, J. (1990b). Grounded theory procedures and techniques. In *Basics of Qualitative Research* (pp. 7-52). Newbury Park, CA: Sage.

Stringer, E. T. (1999). *Action research* (2nd ed.). Thousand Oaks, CA: Sage.

Sulaiman, A., Jaafar, N. I. & Mohezar, S. (2007). An overview of mobile banking adoption among the urban community. *International Journal of Mobile Communications*, *5*(2), 157-168.

Sulieman, A. A. (2018). Transformational leadership style and its relationship with change management, Business: Theory and Practice. *Vilnius Gediminas Technical University, Vilnius, 19*(1), 17-24.

Šumak, B. & Šorgo, A. (2016). The acceptance and use of interactive whiteboards among teachers: Differences in UTAUT determinants between pre-and post-adopters. *Computers in Human Behavior*, *64*(1), 602-620.

Suri, K., Cuccuru, A., Cadavid, J., Gerard, S., Gaaloul, W. & Tata, S. (2017). *Model-based Development of Modular Complex Systems for Accomplishing System Integration for Industry 4.0.* In Proceedings of the 5th International Conference on Model-Driven Engineering and Software Development (MODELSWARD 2017), pp. 487-495.

Sunstein, C. R. (2016). People prefer System 2 nudges (kind of). *Duke Law Journal*, *66*, 121–168.

Tardivo, A., Carrillo Zanuy, A. & Sánchez Martín, C. (2021). COVID-19 Impact on Transport: A Paper from the Railways' Systems Research Perspective. *National Academy of Sciences: Transportation Research Record*, *2675*(5), 367-378.

Tashakkori, A., Teddlie, C. & Teddlie, C. B. (1998). *Mixed methodology: Combining qualitative and quantitative approaches.* Thousand Oaks, CA: Sage.

Taylor, S. P. (2017). Decision making and 'Messy' methodological research approaches. *International Journal of Current Research, 9*(12), 63613-63618.

Tedros. (2020). Coronavirus (COVID-19) Quick Reference Guide. Retrieved 1 June 2020, from CustomGiud.Inc: https://www.aspenpharma.com/wp-content/uploads/2020/03/Coronavirus-quick-reference-guide.pdf.

Teixeira, B., Gregory, P. A. & Austin, Z. (2017). How are pharmacists in Ontario adapting to practice change? Results of a qualitative analysis using Kotter's change management model. *Canadian Pharmacists Journal/Revue des Pharmaciens du Canada, 150*(3), 198-205.

Thaler, R. H., & Sunstein, C. R. (2008). *Nudge: Improving decisions about health, wealth, and happiness*. New Haven, CT: Yale University Press.

Theofanidis, D. & Fountouki, A. (2018). Limitations and delimitations in the research process. *Perioperative Nursing, 7*(3), 155-163.

Thi, T. U. P. (2021). Enhancing the Effectiveness of Change Management in Private Universities: Case Study in Vietnam. *Journal of International Business Management Decision, **4***(12), 1-10.

Thoben, K.-D., Wiesner, S. & Wuest, T. (2017). "Industrie 4.0" and smart manufacturing-a review of research issues and application examples. *International Journal of Automation Technology, 11*(1), 4-16.

Thornhill, A., Saunders, M. & Lewis, P. (2009). *Research methods for business students* (6th ed.). London: Pearson Education.

Thu, T. D. T. & Thu, H. T. T. (2022). Change management in Higher Education by Kotter's Model: A Case Study in Vietnam Private University. Journal of International Business Management Decision, *5*(1), 1-12.

Tilson, D., Lyytinen, K. & Sørensen, C. (2010). Research commentary—Digital infrastructures: The missing IS research agenda. *Information Systems Research, 21*(4), 748-759.

Titler, M. (2007). Translating research into practice: Models for changing clinician behavior. *The American Journal of Nursing, 107*(6), 26-33.

Tjahjono, B., Esplugues, C., Ares, E. & Pelaez, G. (2017). What does industry 4.0 mean to supply chain? *Procedia manufacturing, 13*(1), 1175-1182.

Trotter II, R. T. (2012). Qualitative research sample design and sample size: Resolving and unresolved issues and inferential imperatives. *Preventive Medicine, 55*(5), 398-400.

Tsuyuki, R. T. & Schindel, T. J. (2008). Changing pharmacy practice: the leadership challenge. *Canadian Pharmacists Journal/Revue des Pharmaciens du Canada, 141*(3), 174-180.

Turbide, D. (2017). The Unique U-Shaped Effect of Automation on Today's Labor. Retrieved 23 June 2018, from: http://www.apics.org/apics-for-individuals/apics-magazine-home/magazine-detail-page/2017/03/22/the-unique-u-shaped-effect-of-automation-on-today-s-labor?utm_medium=email&utm_source=SCMNow_06222018&utm_campaign=SCM%20Now.

Unuofin, J. O., Aladekoyi, O. J. & Odeniyi, O. A. (2021). Food Wastes: Perceptions, Impacts and Management. In *Emerging Treatment Technologies for Waste Management* (pp. 175-196). Springer, Singapore.

Upadhyay, R. K. & Mishra, A. K. (2021). Emotional intelligence and employee acceptance to change with mediating role of locus of control. *International Journal of Business Innovation Research Ethics, 26*(1), 126-140.

Urquidi-Martín, A. C., Tamarit-Aznar, C. & Sánchez-García, J. (2019). Determinants of the effectiveness of using renewable resource management-based simulations in the development of critical thinking: An application of the experiential learning theory. *Sustainability, 11*(19), 1-15.

Vagle, M. D. (2018). *Crafting phenomenological research* (2nd ed.). New York, NY: Routledge.

Valaei, N., Nikhashemi, S., Bressolles, G. & Jin, H. (2019), A(n) (a)symmetric perspective towards task-technology-performance fit in mobile app industry. Journal of Enterprise Information Management, 32(5), 887-912.

Valentine, K. D., Kopcha, T. J. & Vagle, M. D. (2018). Phenomenological methodologies in the field of educational communications and technology. *TechTrends: Linking Research & Practice to Improve Learning, 62*(5), 462-472.

Valles, J-L. (2013). Factories of the future multiannual roadmap for the contractual PPP under horizon 2020. *European Factories of the Future Research Assiciation, 120706*(1), 1-136. Retrieved 14 April 2020, from: www.effra.eu/attachments/article/335/FoFRoadmap2020ConsultationDocument.

Valmohammadi, C. (2016). Examining the perception of Iranian organizations on Internet of Things solutions and applications. *Industrial and Commercial Training, 48*(2), 104-108.

van Hoek, R., Johnson, M., Godsell, J. & Birtwistle, A. R. (2010). Changing chains: Three case studies of the change management needed to reconfigure European supply chains. *The International Journal of Logistics Management, 21*(2), pp. 230-250.

Venkatesh, V., Morris, M. G., Davis, G. B. & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS quarterly, 27*(3), 425-478.

Veselovsky, M. Y., Pogodina, T. V., Ilyukhina, R. V., Sigunova, T. A. & Kuzovleva, N. F. (2018). Financial and economic mechanisms of promoting innovative activity in the context of the digital economy formation. *Entrepreneurship and Sustainability Issues, Entrepreneurship and Sustainability Center, 5*(3), 672-681.

Wahyuni, D. (2012). The research design maze: Understanding paradigms, cases, methods and methodologies. *Journal of Applied Management Accounting Research, 10*(1), 69-80.

Wallace, D. (2019). Parts of the Whole: Theories of Pedagogy and Kolb's Learning Cycle. *Numeracy: Advancing Education in Quantitative Literacy*, *12*(1), 250-256.

Waterman Jr, R. H., Peters, T. J., & Phillips, J. R. (1980). Structure is not organization. *Business horizons*, *23*(3), 14-26.

Waughray, D. (2018). Harnessing the Fourth Industrial Revolution for Life on Land. Retrieved 26 February 2018, from World Economic Forum's System Initiative on Shaping the Future of Environment and Natural Resource Security in partnership with PwC and the Stanford Woods Institute for the Environment: https://www.weforum.org/reports/harnessing-the-fourth-industrial-revolution-for-life-on-land.

Wieland, A. & Durach, C. F. (2021). Two perspectives on supply chain resilience. *Journal of Business Logistics*, *42*(3), 315-322.

Wisner, J. D. (2017). *Operations management: A supply chain process approach*. Thousand Oaks, Sage Publications.

Witkowski, K. (2017). Internet of Things, Big Data, Industry 4.0 – Innovative Solutions in Logistics and Supply Chains Management. *Procedia Engineering*, *182*(1), 763–769.

World Economic Forum. (2020). Intelligence. Retrieved 23 May 2020, from World Economic Forum: https://intelligence.weforum.org/topics/a1Gb0000001RIhBEAW?tab=publications.

Wentworth, D. K., Behson, S. J. & Kelley, C. L. (2018). Implementing a new student evaluation of teaching system using the Kotter change model. *Studies in Higher Education*, *45*(3), 511–523.

West, K. (2018). Three Truths for gearing up to the forth industrial revolution. Retrieved 1 March 2018, from Financial 24.com: https://www.fin24.com/Opinion/three-truths-for-gearing-up-to-the-fourth-industrial-revolution-20180301.

Willems, G., Stakenborg, J. & Veugelers, W. (2000). *Trends in Dutch Teacher Education*. University of Amsterdam: Velon & Garant-Publishers. Access: researchgate: https://www.researchgate.net/publication/241847416_New_Trends_in_Dutch_Teacher_Education(2000).

Woods, M. D., Kirk, M. D., Agarwal, M. S., Annandale, E., Arthur, T., Harvey, J. & Smith, L. (2005). *Vulnerable groups and access to health care: a critical interpretive review*. Report for the National Coordinating Centre NHS Service Delivery and Organisation R and D (NCCSDO) London: NCCSDO.

Wright, S., O'Brien, B. C., Nimmon, L., Law, M. & Mylopoulos, M. (2016). Research design considerations. *Journal of Graduate Medical Education*, *8*(1), 97-98.

Writer, S. (2021). South Africa's unemployment rate hits new all-time high. Retrieved 6 July 2021, from Business Tech: https://businesstech.co.za/news/government/495075/south-africas-unemployment-rate-hits-new-all-time-high/.

The World Technology Network. (2015). The World Summit on Technological Unemployment. Retrieved 26 February 2018, from TIME Magazine Conference Center in New York City: http://www.wtn.net.

Xian, K. (2017). Internet of things online monitoring system based on cloud computing. *Int. J. Online Eng.*, *13*(9), 123-131.

Yeganegi, K. (2019). The role of incubators in developing small and medium-sized industries. *Social Science Learning Education Journal*, *4*(7), 01-04.

Yeh, H. C., Yu, M. C., Liu, C. H. & Huang, C. I. (2022). Robo-advisor based on unified theory of acceptance and use of technology. *Asia Pacific Journal of Marketing and Logistics*, (ahead-of-print).

Yuen, K. F., Cai, L., Qi, G. & Wang, X. (2021). Factors influencing autonomous vehicle adoption: An application of the technology acceptance model and innovation diffusion theory. *Technology Analysis & Strategic Management*, *33*(5), 505-519.

Yin, R. K. (1994). Discovering the future of the case study method in evaluation research. *Eval Pract.*, *15*, 283-290.

Younus, U. M. (2017). Fourth Industrial Revolution. *Dawn: Albright Stonebridge Group, Washington D.C.* Retrieved 26 February 2018, from Dawn, Today's Paper: https://www.dawn.com/news/1331909.

Zeleza, P. T. & Okanda, P. M. (2021). Promoting digital transformation with a 12-point agenda. Retrieved 14 February 2021, from Higher Education Web Publishing Ltd: https://www.universityworldnews.com/post.php?story=20210208135348558.

Zhou, T., Lu, Y. & Wang, B. (2010). Integrating TTF and UTAUT to explain mobile banking user adoption. *Computers in human behavior*, *26*(4), 760-767.

Zuma, N. D. (2020). *Disaster Management Act of South Africa, Act 57, 2002: Determination of Alert Levels and Hotspots*. Retrieved 2 June 2020, from: https://www.gov.za/documents/disaster-management-act-regulations-alert-level-3-during-coronavirus-covid-19-lockdown-28.

APPENDIX A: INFORMED CONSENT LETTER

Informed Consent Letter 3C

UNIVERSITY OF KWAZULU-NATAL
GRADUATE SCHOOL OF BUSINESS AND LEADERSHIP

Doctoral Research Project
Researcher: Neville Chinniah (0844691418)
Supervisor: Prof. Cecile Gerwel-Proches (0312608318)
Co-Supervisor: Dr. Simon Taylor (0312608670)
Research Office: Ms. P Ximba (0312603587)

Dear Respondent,

I, Neville Chinniah, am a Doctoral student, at the Graduate School of Business and Leadership, of the University of KwaZulu-Natal. You are invited to participate in a research project entitled: *A change management framework to develop capabilities for the logistics workforce to embrace technological change in a FMCG company in KwaZulu-Natal, South Africa*. The aim of this study is to propose a change management framework to develop the competencies of the logistics workforce to embrace technological change.

Through your participation I hope to understand if the workforce is aware of the change management framework, how the technological change impacts the workforce, and to examine the challenges that the current workforce face in embracing technological change, to identify the competencies required by the workforce to embrace the technological change, to determine how Kotter's framework for change management can be implemented to develop the competencies of the workforce to embrace technological change, and to evaluate the implementation of Kotter's framework for change management. The results of the interview are intended to contribute to ascertaining a change management framework in effectively developing the competencies of the workforce to embrace technological change.

Your participation in this project is voluntary. You may refuse to participate or withdraw from the project at any time with no negative consequence. There will be no monetary gain from participating in this interview. Confidentiality and anonymity of records identifying you as a participant will be maintained by the Graduate School of Business and Leadership, UKZN.

If you have any questions or concerns about participating in the interview or about participating in this study, you may contact me or my supervisor at the numbers listed above.

The interview/focus group interview should take about 45 minutes to an hour. I hope you will take the time to participate.

Sincerely

Investigator's signature: _________________ Date: ______________

This page is to be retained by the participant

APPENDIX B: CONSENT DOCUMENT

UNIVERSITY OF KWAZULU-NATAL
GRADUATE SCHOOL OF BUSINESS AND LEADERSHIP

Doctoral Research Project
Researcher: Neville Chinniah (0844691418)
Supervisor: Prof. Cecile Gerwel Proches (0312608318)
Co-Supervisor: Dr. Simon Taylor (0312608670)
Research Office: Ms. P Ximba (0312603587)

CONSENT

I…………………………………………………………………………………...(full names of participant) hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participation in the research project.

I understand that I am at liberty to withdraw from the project at any time, should I so desire.

I hereby consent/do not consent to the interview being audio recorded.

SIGNATURE OF PARTICIPANT…………………………DATE …………………………

This page is to be retained by the researcher

APPENDIX C: SEMI-STRUCTURED INTERVIEW SCHEDULE

UNIVERSITY OF KWAZULU-NATAL
GRADUATE SCHOOL OF BUSINESS AND LEADERSHIP

Doctoral Research Project

Researcher: Neville Chinniah (0844691418)
Supervisor: Dr Cecile Gerwel Proches (0312608318)
Co-Supervisor: Dr. Simon Taylor (0312608670)
Research Office: Ms. P Ximba (0312603587)

Title of study:

From a manual to a system-guided process: Implementing change in a Fast-Moving Consumer Goods company in KwaZulu-Natal, South Africa

SEMI-STRUCTURED INTERVIEW SCHEDULE

1. Are you an employee of?
    - Logistic Services
    - Service provider (State which one)
2. For which department do you work?
    - Warehouse
    - Primary Distribution
    - Secondary Distribution
    - Reworks/De-briefing
    - Admin
3. What is your position?
    - Manager
    - Supervisor
    - Despatch/Receiving Co-ordinator
    - General Clerk
    - Materials Handling Operator

- Order picker
- General worker

4. Do you know about the Fourth Industrial Revolution?
    - Yes
    - No
5. If answer is yes, please elaborate.
6. What technology are you currently using in the workplace?
7. What technology are you familiar with?
8. Are there any new technological systems and processes that your organisation are going to implement? Please elaborate.
9. Do you think that the workforce is adequately skilled to embrace digital technology, and internet of things? Please elaborate.
10. How do you see the impact of technology advancing in respect of speed, scope and systems?
11. How do you think that the technological change will impact the workforce?
12. What are the challenges that you think the workforce will face in embracing technological change?
13. What competencies are required by the workforce to embrace the technological change?

APPENDIX D: FOCUS GROUP INTERVIEW SCHEDULE

UNIVERSITY OF KWAZULU-NATAL
GRADUATE SCHOOL OF BUSINESS AND LEADERSHIP

Doctoral Research Project
Researcher: Neville Chinniah (0844691418)
Supervisor: Dr Cecile Gerwel Proches (0312608318)
Co-Supervisor: Dr. Simon Taylor (0312608670)
Research Office: Ms. P Ximba (0312603587)

Title of study:

From a manual to a system-guided process: Implementing change in a Fast-Moving Consumer Goods company in KwaZulu-Natal, South Africa

FOCUS GROUP INTERVIEW SCHEDULE

1. Are you an employee of?
   - Logistic Services
   - Service Provider (State which one)
2. For which department do you work?
   - Warehouse
   - Primary Distribution
   - Secondary Distribution
   - Reworks/De-briefing
   - Admin
3. What is your position?
   - Manager
   - Supervisor
   - Despatch/Receiving Co-ordinator
   - General Clerk
   - Materials Handling Operator

- Order picker
- General worker

4. Do you know about the Fourth Industrial Revolution?
    - Yes
    - No
5. If answer is yes, please elaborate.
6. How do you think your organisation will be impacted by the Fourth Industrial Revolution?
7. What technology are you currently using in the workplace?
8. Are there any new technology, systems, and processes that your organisation going to implement that you are aware of? Please elaborate.
9. Do you think that you as a member of the current workforce are adequately skilled to embrace digital technology, and internet of things? Please elaborate.
10. How do you see the impact of technology advancing in respect of your work?
11. How will the technological change impact you as a member of the workforce?
12. What are the challenges that you think that you as a member of the workforce will experience in embracing technological change?
13. What competencies are required by you as a member of the workforce to embrace the technological change?

APPENDIX E: TOTAL EXPIRED INVENTORY SCRAPPING IN DURBAN FOR 2019 AND 2020 FINANCIAL YEAR

Total scrapping of expired products for the operations in Durban (logistics study site) for financial year 2019 and financial year 2020

CORD - GI's TO EXPIRED STOCK AS % OF TURNOVER							
			Year 2019			Year 2020	
Region	**Orig_Plant2**	**Orig_Plant**	**GI Value**	**Sales Value**	**GI value % of Sales**	**GI Value**	**Sales Value**
Hub	Ess. Foods Grain Atlant	MW13	R5,642,699	R957,738,078	0.589%	R 1,732,309	R 981,126,150
	Essential Foods Grain	DG07	R10,554,136	R646,686,512	1.632%	R 1,939,720	R 540,799,814
	Sasko **Durban DC**	DK09	**R1,471,610**	R1,477,519,657	0.100%	**R 560,555**	R 1,779,447,972
Hub Total			**R17,668,445**	**R3,081,944,247**	**0.573%**	**R 4,232,584**	**R 3,301,373,936**

APPENDIX F: TOTAL EXPIRED INVENTORY SCRAPPING IN GAUTENG AND WESTERN CAPE FOR 2019 AND 2020 FINANCIAL YEAR

Total scrapping of expired products for the operations in Gauteng and Western Cape for financial year 2019 and financial year 2020

GROCERIES - STOCK SCRAPPINGS					
		Year 2019	Year 2020		
Region	Orig_Plant2	GI Value	GI Value	Var %	Variance
PFLS	Hub Groceries	R948,308	R9,953,208		R9,004,900
	RBI Wadeville (Gauteng)	R3,715,959	R1,253,943	-66%	-R2,462,016
	Ceres Western Cape	R9,932,946	R1,186,571	-88%	-R8,746,375

APPENDIX G: REVISED SOP OF MANAGING SHORT-DATED INVENTORY

ES01 New process development and implementation.

Introduction

A Process was designed and implemented to manage short-dated products in the warehouse.

Ordinary 'good stock' is stored in storage location FW01 (known as stock type F2 on EWM).

A new storage section was created to segregate the short-dated products from the good stock called ES01 (known on EWM as stock type F3).

Overview of old (manual) process

Prior to the implementation of this process and EWM the process was:

The warehouse co-ordinator would walk through the entire warehouse and manually identify which stock is short dated. They would then compile this on a list and send it to the sales team.

The risk was that whilst the sales teams were trying to find a customer to purchase the short-dated stock, a different order could be placed for the same products this creates a duplicate and results in a lost sale to one of the customers.

New Process

In Durban RDC, stocks are now managed as follows:

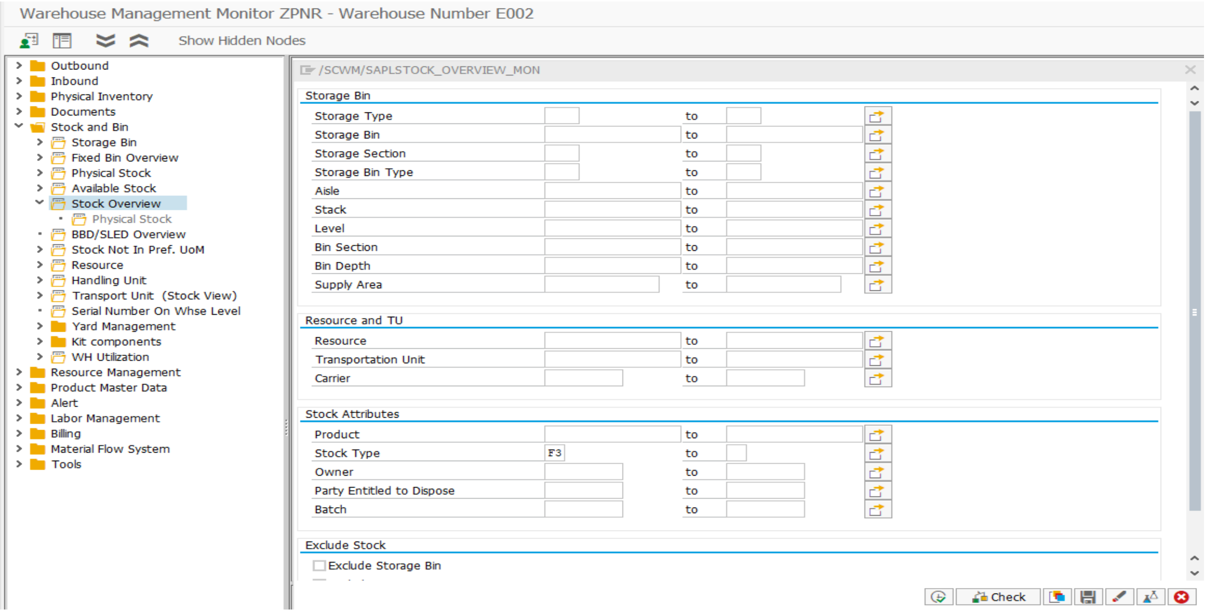
PLANT	STORAGE LOCATION	Description
DK09	FW01	Good Stock
	ES01	Short Dated Stock
RD14	FW01	Good Stock
	ES01	Short Dated Stock
WD14	FW01	Good Stock
	ES01	Short Dated Stock

The benefits of having the stock separated are:

- Easier to Identify the Good stock / Short-Dated Split
- Easier to manage and handle the short-dated products

- It prevents sales orders being generated for good stock and only at the point of picking discover that the stock is short dated and cannot be delivered, this prevents lost sales being incurred.
- With the integration of EWM, and automated process was developed to further improve the process of handling short-dated products.

Warehouse co-ordinators will pull an EWM report searching for any short-dated products by simply looking at a stock overview for stock type F3:



EWM Background Jobs

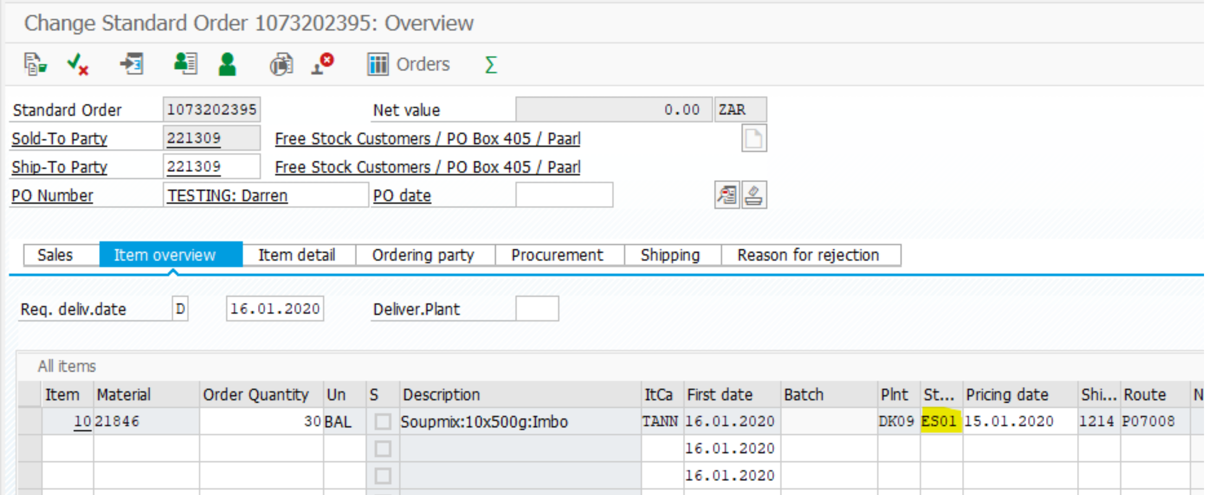
In the background, EWM is set up to go through all the products once a day and automatically change any products with a shelf-life of less than 60 days from F2 to F3. It does this via an automatic posting change, which triggers a MIGO 311 movement between the storage locations on ERP.

The results will look like this:

Stock Overview

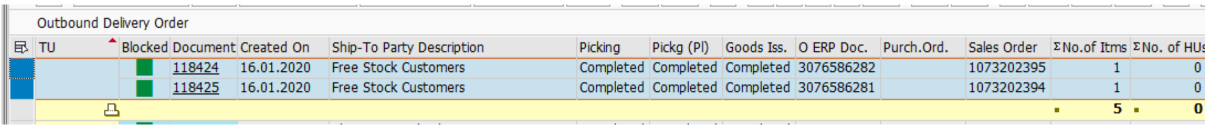
Owner	Cat	Document	Typ	Storage Bin	RB	PB	IA	Resource	Product	Product Short Description	ST	ShLife Exp.Date	In
DK09			0A55	009.018.A					53674	Lentils:Brown:10x500g:Ubrand	F3	02.07.2020	
DK09			0A55	013.007.A					53673	Peas:Split:Green:10x500g:Ubrand	F3	03.07.2020	
RD14			0A11	002.030.D					30830	Sultana:Golden:Ind:1x15kg:Safari	F3	18.08.2020	
RD14			0A11	002.050.E					55041	Rusks:W/Wheat:1x24x500g:PNP	F3	17.08.2020	
RD14			0A11	002.053.D					55041	Rusks:W/Wheat:1x24x500g:PNP	F3	17.08.2020	
RD14			0A11	002.054.E					55041	Rusks:W/Wheat:1x24x500g:PNP	F3	17.08.2020	
RD14			0A11	003.005.D					55041	Rusks:W/Wheat:1x24x500g:PNP	F3	17.08.2020	
RD14			0A11	003.010.C					54413	Bar:Oats & Nuts:1x20x40g:Bokomo	F3	31.07.2020	
RD14			0A11	003.048.C					55041	Rusks:W/Wheat:1x24x500g:PNP	F3	17.08.2020	
RD14			0A11	004.015.C					49948	Juice:Cranberry Cooler:6x1.25L:LF:SP	F3	20.08.2020	
DK09			0A11	004.028.C					53673	Peas:Split:Green:10x500g:Ubrand	F3	04.07.2020	
DK09			0A11	005.016.C					53673	Peas:Split:Green:10x500g:Ubrand	F3	03.07.2020	

This list is then exported onto a spreadsheet and sent to the sales teams to create sales orders at discounted prices. To ensure that such an order is delivered with the correct short-dated stock and not good stock, the sales team will place the order in ES01:



This also helps to prevent customers requiring good stock from receiving short-dated products.

Once an order is captured on SAP ERP, it will have transport planning done and then distributed to EWM:



From this point, the order is processed just like any other sales order. A stock clerk will call up this order and release a picking wave which identifies the F3 – Short dated stock and creates warehouse tasks for the Pickers, Forklifts and Reach trucks to pick the stock and stage it in the staging lane chosen by the stock clerk.

Taking it a step further, on EWM we have created 2 addition storage bins which have a physical demarcated area in the warehouse. This Bins are used to all short-dated pallets from Bulk storage bins to be removed and stored separately from the good stock, they also allow for partial quantities to be picked.

The bins are:

ES01.FULL: This bin allows storage of full pallets with a stock type of F3, it does not allow break bulk picking. Only full pallets remove for bulk storage is moved into this bin.

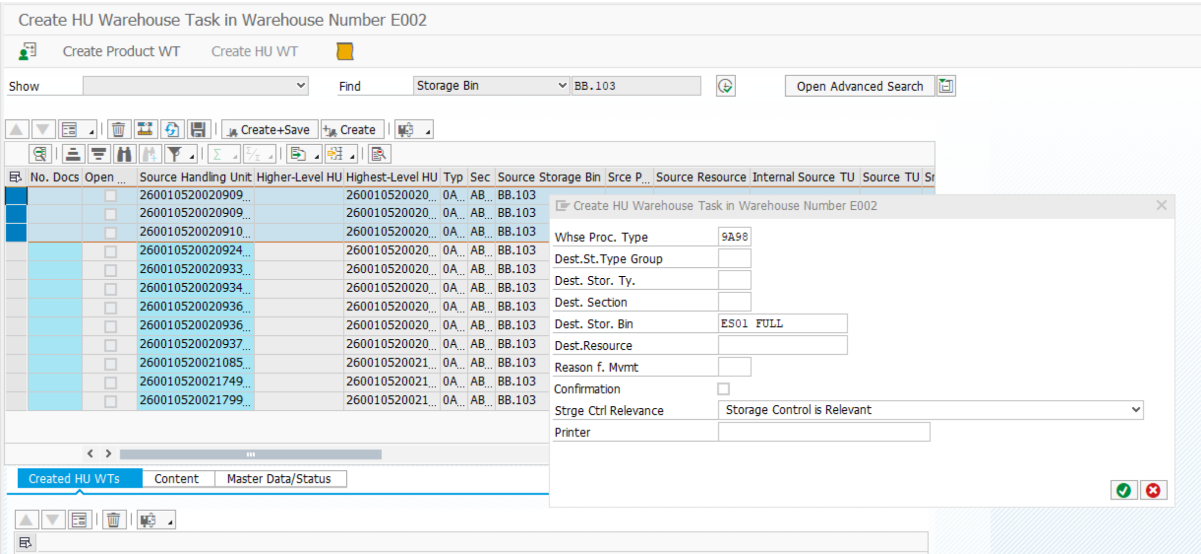
ES01.BREAK: This bin allows a picker to pick partial quantities of a full pallets to allow for the flexibility of a customer's order quantity.

Storage Bin

Storage Bin	Typ	Section	BT	Acc. Type
ES01 BREAK	7A41	AG05	G005	A000
ES01 FULL	7A40	AG05	G005	

Racking: If a pallet of stock stored in the APR racking becomes short dated, it is changed to F3 stock type in place and will remain in that bin until it is required for picking for an ES01 sales order.

Pallets from the bulk bins require the warehouse co-ordinators to create the warehouse tasks to move the stock from F2 bulk storage to F3 ES01 FULL. This is done with transaction SCWM/ADHU on EWM.



The Co-ordinator will highlight the short-dated Handling Units and create warehouse tasks to the ES01 FULL bins. Those tasks will direct the forklift to the Bulk bin but only allow him to scan the short dated HUs. When the order wave is released, the warehouse tasks would look like this.

Warehouse Task

Document	WhsePrcTpe	WT	Whse Order	Dest. Handling Unit	Queue	Product	Product Description	SrceTgtQty	DestActQty	Unit	SrceTgtQty	Dest.Qty	Activity	Status	Source Bin	Dest.Bin
	2A10	1499841	737622	260010520010971749	IO.FLT	21846	Soupmix:10x500g:Imbo	750	150	KG	150	750	PICK	C		633.OUT
	2A10	1499842	737623	160010520005447498	OUT.APF.B	21846	Soupmix:10x500g:Imbo	150	30	KG	30	150	PICK	C		633.OUT
118042	2A10	1499830	737623	160010520005447498	OUT.APF.B	21846	Soupmix:10x500g:Imbo	150	30	KG	30	150	PICK	C	ES01 BREAK	
118043	2A10	1499831	737622	260010520010971749	IO.FLT	21846	Soupmix:10x500g:Imbo	750	150	KG	150	750	PICK	C	ES01 FULL	

The pickers would receive a task on his scanner directing him to ES01 BREAK requesting him to pick part of a full pallet.

The forklift driver would receive a task on his scanner requesting him to go to ES01 Full and pick a full pallet.

In the above test the stock was then staged at 633.OUT. From this point, the stock clerk would print an ordinary load sheet and check the stock as he would any other.

APPENDIX H: TESTING & TRAINING SESSION

A testing and training sessions were held and concluded on 16.01.2020 at Durban RDC,

The people who attended are as follows:

Position	Role in the process
Co-Ordinator	Manage any bulk stock changes required. Export list and send to sales weekly
Co-Ordinator	Manage any bulk stock changes required. Export list and send to sales weekly
Co-Ordinator	Manage any bulk stock changes required. Export list and send to sales weekly
Distribution Manager	Oversee sales order and distribution process
Stock Clerk	Release orders for picking, check and dispatch stock
Stock Clerk	Release orders for picking, check and dispatch stock
PI Counter	Check and maintain accurate inventory of stock in all locations and stock types
Picking Supervisor	Supervise and train Pickers on the newly added storage bin for picking short-dated products.

Position	Sign
Co-Ordinator	[redacted]
Co-Ordinator	
Co-Ordinator	
Distribution Manager	
Stock Clerk	
Stock Clerk	
PI Counter	
Picking Supervisor	

Test sales orders were created:

1073202395

1073202394

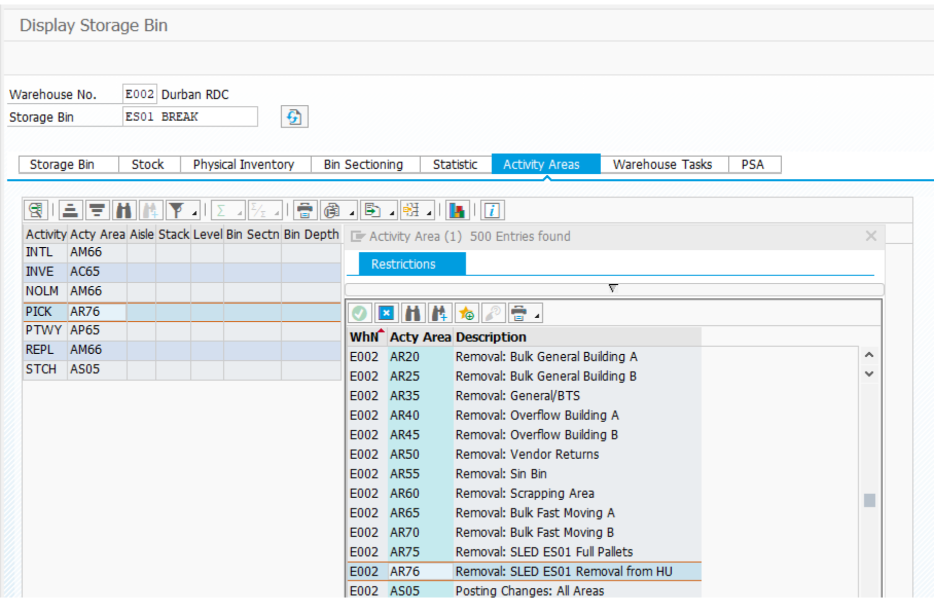
10172435		118042	15.01.2020	Free Stock Customers	Completed	Completed	Completed	3076586282	1073202395
		118043	15.01.2020	Free Stock Customers	Completed	Completed	Completed	3076586281	1073202394
10172435									

Notes from the training session:

1. Stock was placed into storage location ES01 via a posting change to stock type F3 on EWM.
2. Order's department was requested to place 2 orders, for a Full Pallet and a Partial Quantity of product 21846 – Imbo 10x500g Soup mix.
3. Shipments were linked to the orders: 10172435
4. 2 Full Pallets of Stock was moved into ES01 FULL and ES01 BREAK bins.
5. The shipments were assigned a staging lane, a wave was created and released.
6. The warehouse tasks were created correctly. The warehouse tasks were created for a Picker to pick 30 Bals from ES01 BREAK and a warehouse task was created for a Forklift to pick up a full pallet of 150 Bals from ES01 FULL.
7. The full pallet was picked up by a forklift and staged without any issues.
8. The fine picking appeared correctly on the picker's scanner, however requested him to scan the source HU and not the Source Bin, this will need to be changed so that ES01 BREAK will delete the original HU when stock is placed in it and the picker verifies he is at the correct source Bin as it happens in a 0A55 bin type.
9. We proceeded to pick up items for the exercise and 30 Bals were picked up successfully and staged without issues.

The picking up was completed, and the order was cancelled afterwards.

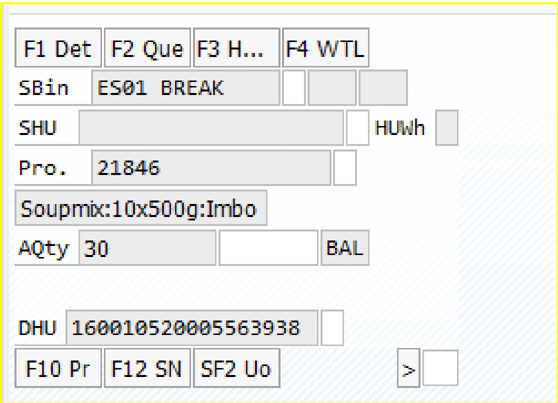
Actions were taken to amend point 8 of the notes. A correction to storage bin ES01 BREAK's activity area was made:



The use of an incorrect activity area resulted in the picker having to verify the Pallet he was picking up rather than the storage bin, this would not have worked out as the original HU barcode is destroyed when the Pallet is broken down.

The change allows the picker to scan the storage bin ES01 BREAK and a baler barcode for the verification. After making the change to the activity area, another test was done for picking up partial quantities out of ES01 BREAK.

The result was as follows:

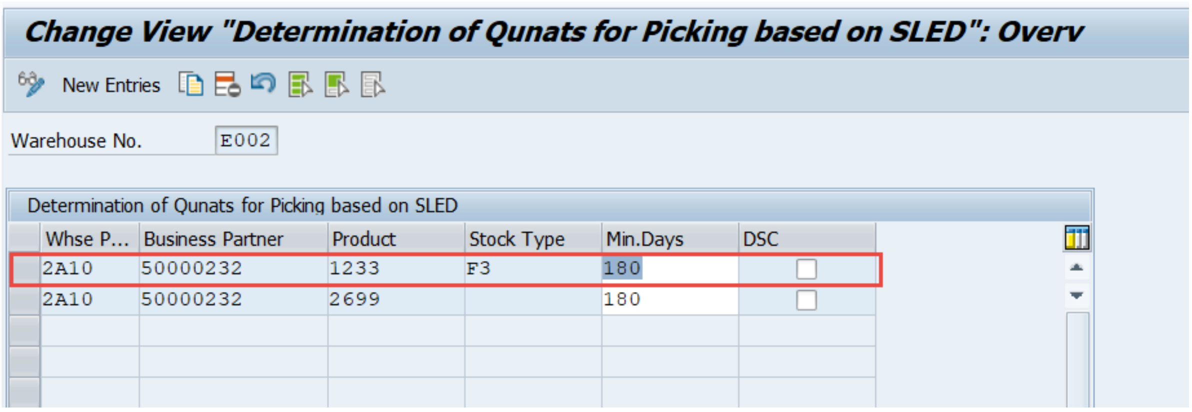


Above is a view from an Arm Mount Scanner (AMT) which is what the picker will see,

1. He will need to scan the verification barcode of Source bin (SBin) - ES01 BREAK
2. He will need to scan the Baler Barcode Product (Pro.) - 21846
3. He will need to pick the 30 Bals
4. Scan the Destination HU (DHU)
5. Lastly the scanner will direct him to the Staging Lane to stage the stock.

APPENDIX I: STANDARD OPERATING PROCEDURE OF SHORT - DATED INVENTORY

SCOPE AND OVERVIEW	The purpose of this SOP is to explain the process relating to the outbound process where stocks were picked up from SLoc ES01.

No. Ref.	ACTION STEPS	Role
1	**TOOLS AND ACCESSORIES**	
1.1	Access to SAP EWM	
2.	**PRECAUTIONS**	
2.1	Maintain table ZLOG_SLED_DET with different allowable expiry dates per stock type 	Supervisor
3.	**PROCEDURE**	
3.1	In the current process the outbound clerks will most likely only realise they need to pick up F3 stocks when the tasks fail to create. When investigating the wave items clearing the user will see that the system requesting stock from Storage Types 7A40 and 7A41. The oldest stock (Stock Type F3) of the required product must then systematically be moved to the ES01 bins.	Supervisor

Warehouse Order

Whse Order	WO Cr. Rle	Creat.Cat.	Hdr WhsePT	Queue	Wa...	Status	WO ActArea	Created By	Created On	Created At	Processor	Resour...	Start Date	Start Time	Latest Date	LatestT
144249	IM01	B	9A99	IO.BENDI			AM15	ATRUTER	10.06.2019	13:36:39		RCH.0...		00:00:00	10.06.2019	13:30:0
144250	IM01	B	9A99	IO.BENDI			AM15	ATRUTER	10.06.2019	13:36:39		RCH.0...		00:00:00	10.06.2019	13:30:0
144251	IM01	B	9A99	IO.BENDI			AM15	ATRUTER	10.06.2019	13:36:39		RCH.0...		00:00:00	10.06.2019	13:30:0
144252	IM01	B	9A99	IO.BENDI			AM15	ATRUTER	10.06.2019	13:36:39		RCH.0...		00:00:00	10.06.2019	13:30:0
144253	IM01	B	9A99	IO.BENDI			AM15	ATRUTER	10.06.2019	13:36:39		RCH.0...		00:00:00	10.06.2019	13:30:0
144254	IM01	B	9A99	IO.BENDI			AM15	ATRUTER	10.06.2019	13:36:39		RCH.0...		00:00:00	10.06.2019	13:30:0
144255	IM01	B	9A99	IO.BENDI			AM15	ATRUTER	10.06.2019	13:36:39		RCH.0...		00:00:00	10.06.2019	13:30:0
144256	IM01	B	9A99	IO.BENDI			AM15	ATRUTER	10.06.2019	13:36:39		RCH.0...		00:00:00	10.06.2019	13:30:0
144257	IM01	B	9A99	IO.BENDI			AM15	ATRUTER	10.06.2019	13:36:39		RCH.0...		00:00:00	10.06.2019	13:30:0

Warehouse Task

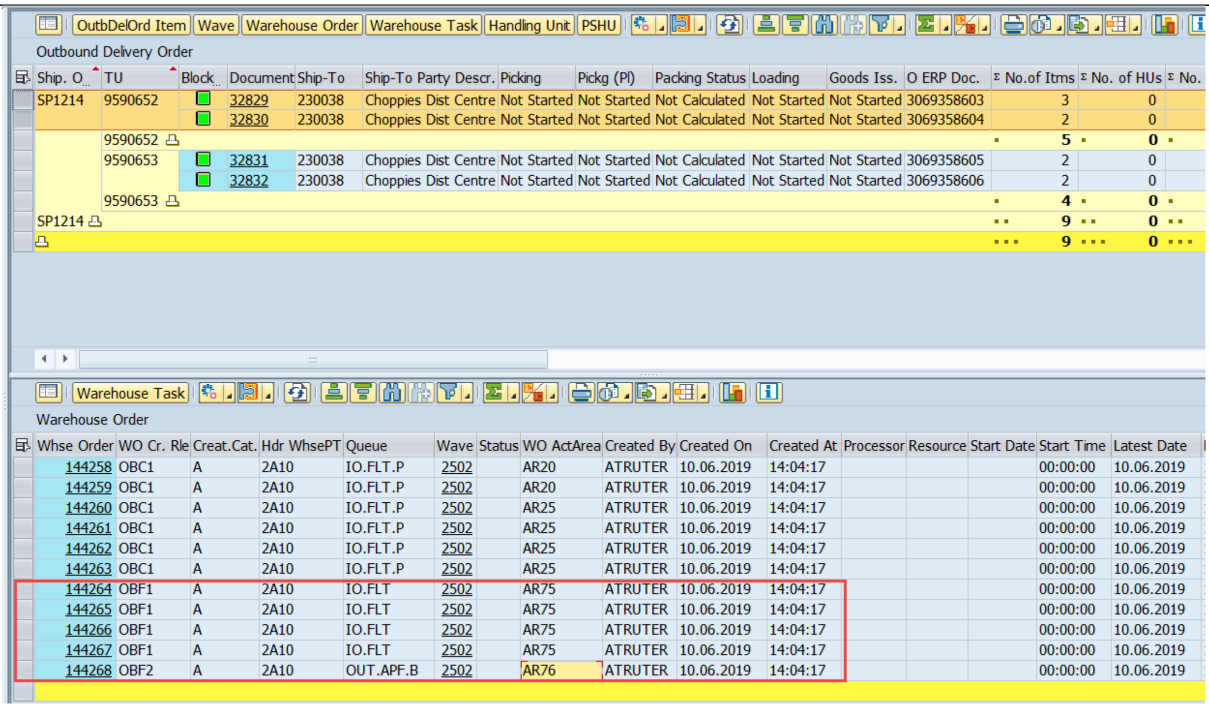
WT	Whse Order	Queue	Product	Product Short Description	Batch	HU WT	WhsePrcTpe	C	Activity	Process	Step	Status	Exception	Typ	Sec	Source Bin	Type	S
287843	144257	IO.BENDI	43032	Maize Meal:Super:4x2.5kg:PL:WS Quick		X	9A99	3	INTL		MOVE			0A11	AA25	001.035.B	7A40	A
287844	144253	IO.BENDI	52045	Instant Maize:Banana:4x2kg:W/Star		X	9A99	3	INTL		MOVE			0A11	AA05	002.002.C	7A40	A
287845	144254	IO.BENDI	52045	Instant Maize:Banana:4x2kg:W/Star		X	9A99	3	INTL		MOVE			0A11	AA05	002.008.C	7A40	A
287846	144255	IO.BENDI	52045	Instant Maize:Banana:4x2kg:W/Star		X	9A99	3	INTL		MOVE			0A11	AA05	002.009.C	7A41	A
287847	144251	IO.BENDI	2699	Maize Meal:Super:1x10kg:PO:White Star		X	9A99	3	INTL		MOVE			0A11	AA25	002.024.B	7A41	A
287848	144252	IO.BENDI	2699	Maize Meal:Super:1x10kg:PO:White Star		X	9A99	3	INTL		MOVE			0A11	AA25	002.031.B	7A40	A
287849	144250	IO.BENDI	43032	Maize Meal:Super:4x2.5kg:PL:WS Quick		X	9A99	3	INTL		MOVE			0A11	AA05	003.002.C	7A40	A
287850	144249	IO.BENDI	43032	Maize Meal:Super:4x2.5kg:PL:WS Quick		X	9A99	3	INTL		MOVE			0A11	AA15	013.014.B	7A41	A
287851	144256	IO.BENDI	2699	Maize Meal:Super:1x10kg:PO:White Star		X	9A99	3	INTL		MOVE			0A11	AA25	001.025.B	7A40	A

house Number E002

Physical Stock

Typ	Storage Bin	Log.Pos	Handling Unit	Product	Product Short Description	Quantity	BUn	PckQty AUn	AUn	ST	Description of Stock Type	Batch	RU	Origin	C
7A40	ES01 FULL		160010520001122320	2699	Maize Meal:Super:1x10kg:PO:White Star	340	KG	34	BAG	F3	Unrestricted-Use Whse ExpStock				D
7A41	ES01 BREAK		260010520001703892	43032	Maize Meal:Super:4x2.5kg:PL:WS Quick	900	KG	90	BAL	F3	Unrestricted-Use Whse ExpStock				D
7A40	ES01 FULL		160010520001486446	2699	Maize Meal:Super:1x10kg:PO:White Star	730	KG	73	BAG	F3	Unrestricted-Use Whse ExpStock				D
7A41	ES01 BREAK		260010520002223399	52045	Instant Maize:Banana:4x2kg:W/Star	720	KG	90	BAL	F3	Unrestricted-Use Whse ExpStock				D
7A40	ES01 FULL		260010520002170389	52045	Instant Maize:Banana:4x2kg:W/Star	720	KG	90	BAL	F3	Unrestricted-Use Whse ExpStock				D
7A40	ES01 FULL		260010520002170402	52045	Instant Maize:Banana:4x2kg:W/Star	720	KG	90	BAL	F3	Unrestricted-Use Whse ExpStock				D
7A41	ES01 BREAK		160010520001863124	2699	Maize Meal:Super:1x10kg:PO:White Star	400	KG	40	BAG	F3	Unrestricted-Use Whse ExpStock				D
7A40	ES01 FULL		160010520001945103	43032	Maize Meal:Super:4x2.5kg:PL:WS Quick	310	KG	31	BAL	F3	Unrestricted-Use Whse ExpStock				D
7A40	ES01 FULL		260010520001732953	43032	Maize Meal:Super:4x2.5kg:PL:WS Quick	900	KG	90	BAL	F3	Unrestricted-Use Whse ExpStock				D

3.2	ES01 FULL for full pallet picks and ES01 BREAK for break pallet pick-ups. Re-release the waves for Warehouse Orders to Create from the ES01 bins.	Supervisor



OutbDelOrd Item | Wave | Warehouse Order | Warehouse Task | Handling Unit | PSHU

Outbound Delivery Order

Ship. O..	TU	Block..	Document	Ship-To	Ship-To Party Descr.	Picking	Pickg (Pl)	Packing Status	Loading	Goods Iss.	O ERP Doc.	Σ No.of Itms	Σ No. of HUs	Σ No.
SP1214	9590652		32829	230038	Choppies Dist Centre	Not Started	Not Started	Not Calculated	Not Started	Not Started	3069358603	3	0	
			32830	230038	Choppies Dist Centre	Not Started	Not Started	Not Calculated	Not Started	Not Started	3069358604	2	0	
	9590652											5	0	
	9590653		32831	230038	Choppies Dist Centre	Not Started	Not Started	Not Calculated	Not Started	Not Started	3069358605	2	0	
			32832	230038	Choppies Dist Centre	Not Started	Not Started	Not Calculated	Not Started	Not Started	3069358606	2	0	
	9590653											4	0	
SP1214												9	0	
												9	0	

Warehouse Task

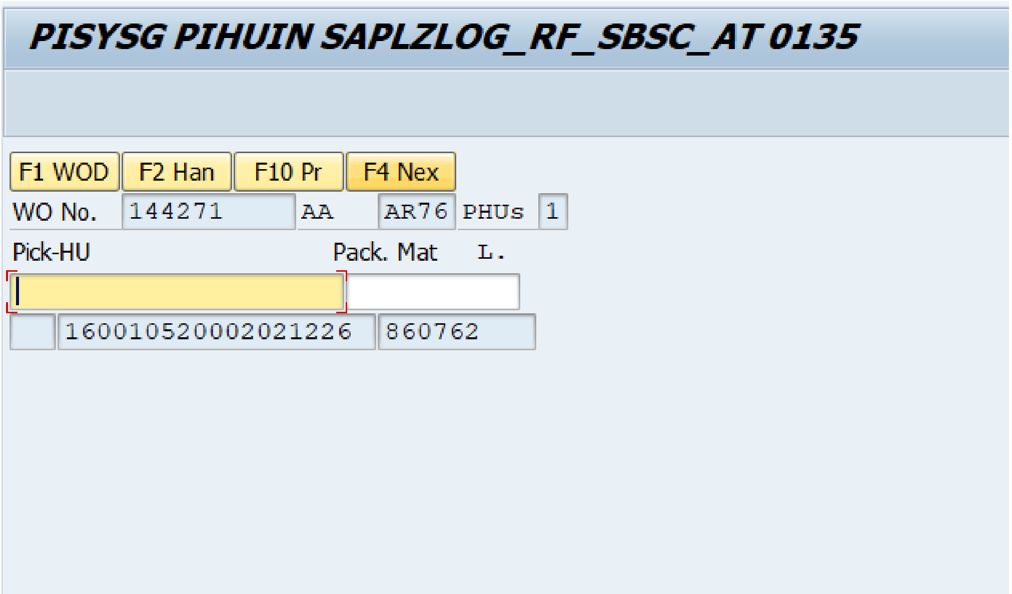
Warehouse Order

Whse Order	WO Cr. Rle	Creat.Cat.	Hdr WhsePT	Queue	Wave	Status	WO ActArea	Created By	Created On	Created At	Processor	Resource	Start Date	Start Time	Latest Date
144258	OBC1	A	2A10	IO.FLT.P	2502		AR20	ATRUTER	10.06.2019	14:04:17				00:00:00	10.06.2019
144259	OBC1	A	2A10	IO.FLT.P	2502		AR20	ATRUTER	10.06.2019	14:04:17				00:00:00	10.06.2019
144260	OBC1	A	2A10	IO.FLT.P	2502		AR25	ATRUTER	10.06.2019	14:04:17				00:00:00	10.06.2019
144261	OBC1	A	2A10	IO.FLT.P	2502		AR25	ATRUTER	10.06.2019	14:04:17				00:00:00	10.06.2019
144262	OBC1	A	2A10	IO.FLT.P	2502		AR25	ATRUTER	10.06.2019	14:04:17				00:00:00	10.06.2019
144263	OBC1	A	2A10	IO.FLT.P	2502		AR25	ATRUTER	10.06.2019	14:04:17				00:00:00	10.06.2019
144264	OBF1	A	2A10	IO.FLT	2502		AR75	ATRUTER	10.06.2019	14:04:17				00:00:00	10.06.2019
144265	OBF1	A	2A10	IO.FLT	2502		AR75	ATRUTER	10.06.2019	14:04:17				00:00:00	10.06.2019
144266	OBF1	A	2A10	IO.FLT	2502		AR75	ATRUTER	10.06.2019	14:04:17				00:00:00	10.06.2019
144267	OBF1	A	2A10	IO.FLT	2502		AR75	ATRUTER	10.06.2019	14:04:17				00:00:00	10.06.2019
144268	OBF2	A	2A10	OUT.APF.B	2502		AR76	ATRUTER	10.06.2019	14:04:17				00:00:00	10.06.2019

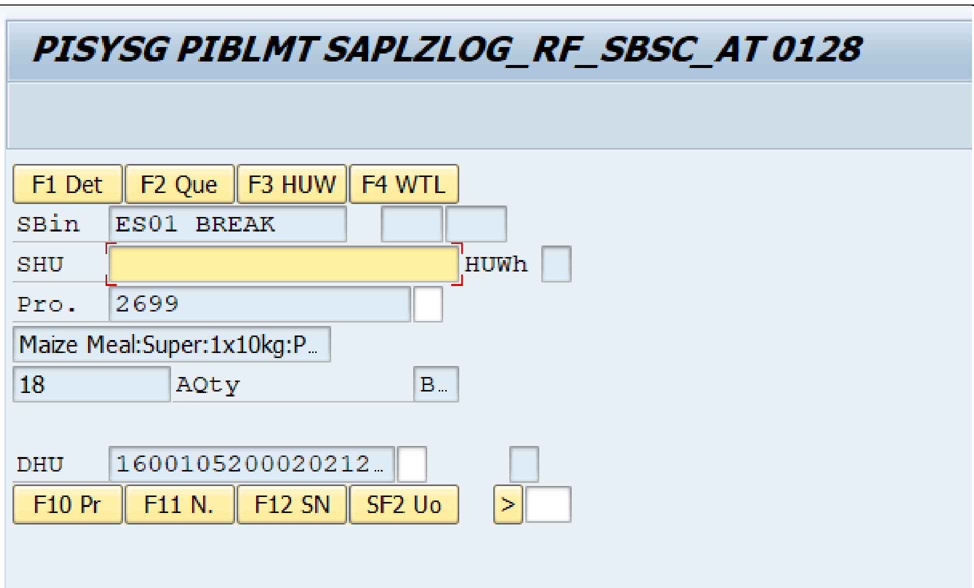
3.3

RF picking up Break Bulk. Log onto normal picking up resource. Print HU and press F4 to continue.

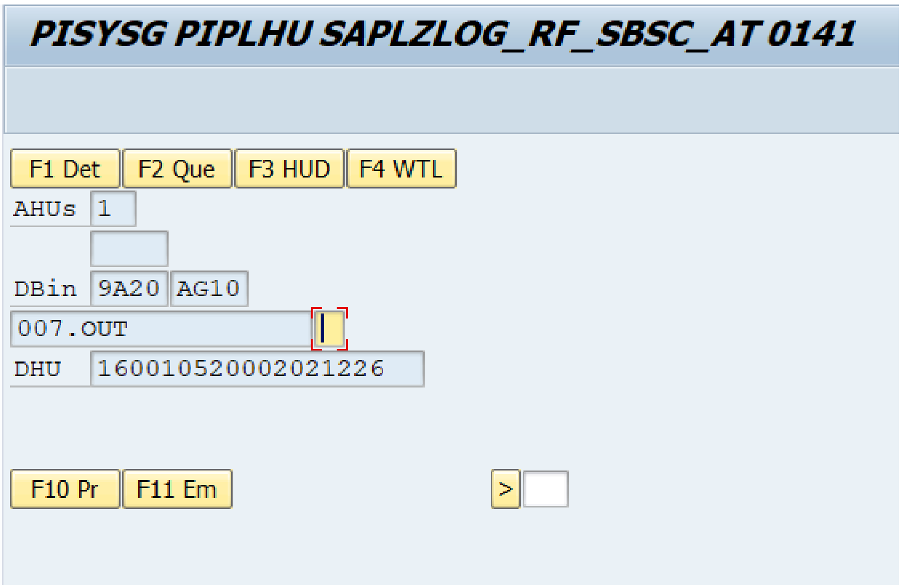
Supervisor

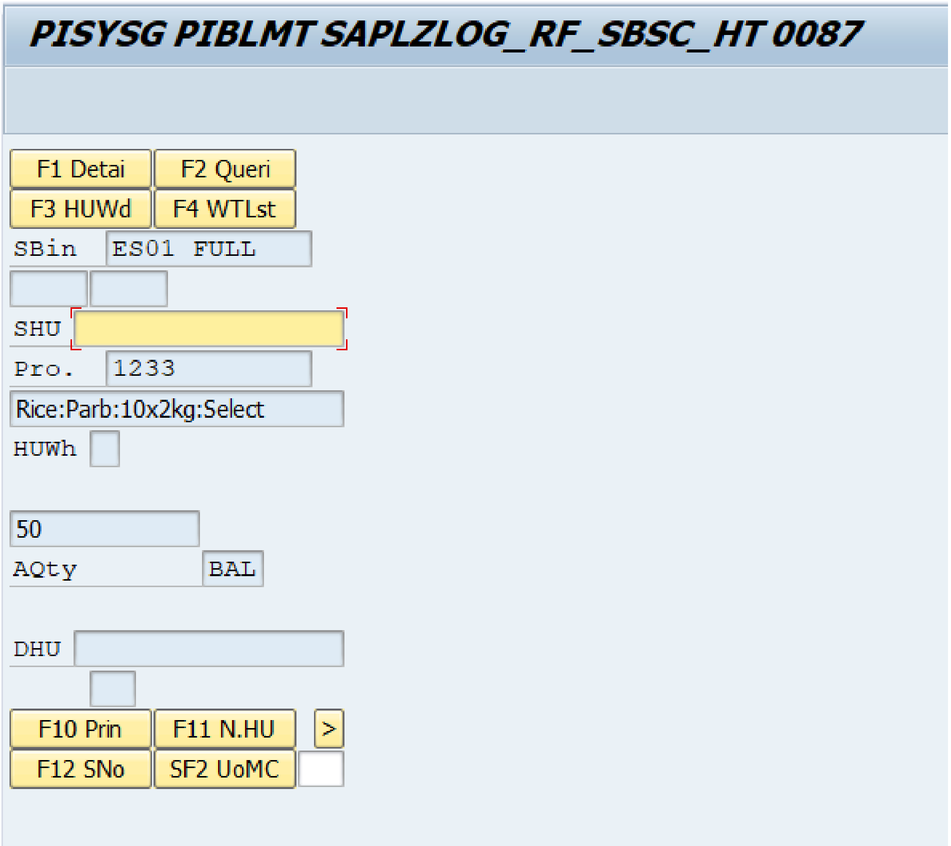


Scan the source HU.



Scan the outbound staging lanes.



3.4	RF picking Full Pallet. Scan Source HU from ES01 FULL bin. 	Supervisor

4.	**Possible Faults and Causes**	
4.1	**Refer to SOPs for further details with regards to specific processes:** - OUTB-SOP-002 - SOP Outbound Pick-up Planning by wave - OUTB-SOP-003 - SOP Release Pick up - OUTB-SOP-004 - SOP Monitor Pick up - OUTB-SOP-007 - SOP Perform Wave Items Clearing - OUTB-SOP-009- SOP Outbound House Keeping - OUTB-SOP-012- SOP Outbound House Keeping Cancel Pick up	Available on shared drive

APPENDIX J: SEMI-STRUCTURED INTERVIEW SCHEDULE

UNIVERSITY OF KWAZULU-NATAL
GRADUATE SCHOOL OF BUSINESS AND LEADERSHIP

Doctoral Research Project

Researcher: Neville Chinniah (0844691418)

Supervisor: Dr Cecile Gerwel Proches (0312608318)

Co-Supervisor: Dr. Simon Taylor (0312608670)

Research Office: Ms. P Ximba (0312603587)

Title of study:

From a manual to a system-guided process: Implementing change in a Fast-Moving Consumer Goods company in KwaZulu-Natal, South Africa

SEMI-STRUCTURED INTERVIEW SCHEDULE: SYSTEM-GUIDED PROCESS

(1) Please explain the manual process that was used.

(2) What was the process of the intervention?

(3) What was the results achieved?

(4) Was the workforce aware of the changes?

(5) How did the technological change impact the workforce?

(6) What was the challenges that the workforce faced in embracing change?

(7) What were the competencies required by the workforce to embrace this change?

(8) How was change management implemented to develop the competencies of the workforce to embrace this technological change?

(9) What was the feedback of changing from a manual to a system guided approach?

APPENDIX K: INTERNAL MONTHLY KPI REPORT

2019.11.30 KPI CORD

EXPIRED PRODUCT MONTH-TO-DATE VOLUME

			Values	Year	Date			
			IssueQty		Sum of Sales Vol		Sum of % of Turnover	
			⊞2019	⊞2020	⊞2019	⊞2020	⊞2019	⊞2020
Region	Orig.Plant2	Orig.Plant						
⊟Hub	⊟Ess Foods Grain Atla	MW13	51,145	359,275	17,284,065	18,349,544	0.30%	1.96%
	⊞Essential Foods Grai		1,140,373	315,557	16,688,400	9,439,301	6.83%	3.34%
	⊟Sasko Durban DC	DK09	196,860	80,333	30,057,737	30,931,132	0.65%	0.26%
Hub Total			**1,388,378**	**755,164**	**64,030,201**	**58,719,976**	**2.17%**	**1.29%**
⊟KZN.FS	⊟Durban Overflow WH	DK11			1,469		0.00%	#DIV/0!
	⊟Ess Foods Grain Beth	DF10	67,443	90,653	2,362,204	1,971,144	2.86%	4.60%
	⊟Kokstad Depot	DK52	28,130	16,495	2,084,875	1,256,584	1.35%	1.31%
	⊟Vryheid Depot	DK55	43,475	26,134	879,543	1,332,220	4.94%	1.96%
KZN.FS Total			**139,048**	**133,282**	**5,328,090**	**4,559,947**	**2.61%**	**2.92%**
[illegible]	[illegible]	[illegible]			[illegible]	[illegible]	[illegible]	[illegible]

EXPIRED PRODUCT VALUE

Year	Date	Values Sum of Value Issue	Sum of Sales Val	Sum of % of Revenue
⊟**2019**	2019_001	R 3,921,636	R 737,694,905	0.532%
	2019_002	R 2,530,980	R 799,777,623	0.316%
	2019_003	R 1,465,505	R 674,255,535	0.217%
	2019_004	R 2,583,170	R 618,876,731	0.417%
	2019_005	R 2,160,174	R 638,210,097	0.338%
	2019_006	R 2,810,177	R 676,320,808	0.416%
	2019_007	R 2,172,993	R 755,257,320	0.288%
	2019_008	R 1,404,166	R 686,221,590	0.205%
	2019_009	R 2,773,732	R 617,167,462	0.449%
	2019_010	R 5,063,983	R 875,810,344	0.578%
	2019_011	R 691,770	R 721,807,281	0.096%
	2019_012	R 1,018,245	R 790,253,684	0.129%
2019 Total		**R 28,596,530**	**R 8,591,653,380**	**0.333%**

⊟**2020**	2020_001	R 3,269,811	R 835,647,293	0.391%
	2020_002	R 2,647,444	R 977,298,326	0.271%
	2020_003	R 840,839	R 818,917,830	0.103%
2020 Total		**R 6,758,094**	**R 2,631,863,449**	**0.257%**

APPENDIX L: INTERNAL EXECUTIVE KPI REPORT

P F L S

L O G I S T I C S

K P I

R E P O R T I N G

December 2019

*Financial Year is from 1 October to 30 September hence December 2019 will be within the 2020 financial year.

Executive Summary

PFLS - December 2019

Cost overview

December YTD Group distributed packed volumes are up 1.8% (With STO volumes down 5.2%) versus prior year with associated Cost to Serve costs down 2.3% (R/kg down 4.0%), driven mainly by lower Warehouse costs (down 14.1%).

The SEIFSA L2 index reported a 6.3% weighted YoY increase for Nov 2019 with a predicted 3.6% for Dec 2019. The CPI index reported a 3.7% increase for Nov 2019

- Customer warehouse allowances are up 8.5% (R/kg up 4.1%) driven by food inflation (Sales realisation up 8.0%)
- Total transport costs (STO's, Primary- & Secondary distribution consolidated) down 3.7% (R/kg down 3.3%) mainly driven by Primary- & Secondary transport down 3.0% (R/kg down 4.8%)
- Plato transport costs up 8.9%, due to an increase in Planned loads (R26.6m)
    - Loads increased by of 15.5% (Mainly due to increased planned vs unplanned loads)
    - Variable rate decrease of 7.1% (Fuel)
    - Fixed rate increase of 1.9% (SEIFSA)
    - Value extraction cost of 4.2% (-R2.9m) mainly due to volume mix changes on routes with an YoY increased rate
    - Distance per load decrease of 4.8% or 22km per load
    - Weight per load increase of 6.4% (Mainly caused by secondary loads with declining volumes per load – 470kg per load)
- Warehouse costs are down 14.1% (R/kg down 12.4%) mainly due to IFRS 16 postings impacting costs i.e. Property rentals & Depreciation without profit center plant assignments (R13,975k mainly Grains) – Warehouse costs down 2.7% (R/kg down 0.75%) excluding impact of IFRS 16

Service Levels

CYTD CSL's are 91.3% (PYTD CSL's was 91.6%)

Lost sales due to cancelled customer orders for Dec 2019 amounted to 2,779,394 cases compared to 1,307,698 cases for Dec 2018 (These lost sales represent the bulk of the gap between our CSL's and that of our customers)

Lost sales due to OOS's amounted to 2,054,670 cases (Of which 12% was contributed by 3PL's, 46% by Manufacturing and 42% by PFLS) for Dec 2019 vs 1,386,373 cases for Dec 2018 (Of which 21% was contributed by 3PL's, 42% by Manufacturing and 38% by PFLS)

Planning & Replenishment

The overall stock position for PFLS (excl. manufacturing) has decreased by 12% to R450m (20 days stock cover) with stocks exceeding 30 days stock cover up 8% (R180m) and stock levels below 14 days down 7% (R369m)

SCRAPPING OF STOCK (TRADE RETURNS & EXPIRED STOCK)

Month	(Multiple Items)				
	2019		2020		
Row Labels	**Sum of Movement Qty**	**Sum of Stock Movements**	**Sum of Movement Qty**	**Sum of Stock Movements**	**Var**
Grains	**-134,468**	**-R 415,012**	**-229,222**	**-R 765,002**	84%
Groceries	**-237,631**	**-R 5,454,301**	**-102,680**	**-R 3,888,943**	-29%
PFLS Grains	**-7,823**	**-R 18,836**	**-1,380**	**-R 2,342**	-88%
Essential Foods Grain Gauteng			-1,380	-R 2,342	#DIV/0!
Kokstad Depot	-4,921	-R 6,397			-100%
Sasko Durban DC	-2,740	-R 12,196			-100%
Sasko East London DC	-162	-R 243			-100%
PFLS Groceries	**-390,941**	**-R 3,913,945**	**-396,680**	**-R 4,997,556**	28%
PFG Groc CFJ Ceres	-337,040	-R 2,699,456	-288,394	-R 2,285,252	-15%
PFG Groc Atlantis DC			-28,072	-R 956,712	#DIV/0!
PFG Groc Gauteng DC	-4,442	-R 720,351	-11,898	-R 603,985	-16%
PFG Groc KZN DC			-22,036	-R 299,647	#DIV/0!
PFG Wellingtons Atlantis DC			-6,150	-R 258,113	#DIV/0!
PFG Groc: Wadeville CSD's	-48,894	-R 408,388	-21,796	-R 235,827	-42%
PFG Groc Cereals DC Vryheid			-9,903	-R 144,545	#DIV/0!
PFG Wellingtons Gauteng DC			-3,402	-R 105,350	#DIV/0!
PFG Wellingtons KZN DC			-2,217	-R 56,180	#DIV/0!
PFG Groc Cereals DC Kokstad			-1,493	-R 32,290	#DIV/0!
PFG Groc Cereals DC Springb			-146	-R 8,508	#DIV/0!
PFG Groc SLFJ DC (LAUS)			-720	-R 7,445	#DIV/0!
PFG Groc Cereals DC White R			-24	-R 5,654	#DIV/0!
PFG Groceries PE Depot			-408	-R 4,077	#DIV/0!
Groc Bev DC:Vector Gauteng	-12	-R 46	-58	-R 459	888%
PFG Groc Cereals Atlantis	-301	-R 43,174	0	R 0	-100%
PFG Groc Cereals DC Polokwa			0	R 0	#DIV/0!
FMC Logistics Groceries	-251	-R 42,530	36	R 6,488	-115%
3PL-Groceries	**-276,652**	**-R 6,614,423**	**-162,326**	**-R 3,987,829**	-40%
Grand Total	**-1,047,514**	**-R 16,416,517**	**-892,288**	**-R 13,641,671**	-17%

Mainly used by Groceries for trade returns and expired stocks

CORD - EXPIRED STOCK

			IssueQty		Sum of Sales Vol		Sum of % of Turnover		
			2019	2020	2019	2020	2019	2020	VAR
Region	**Orig.Plant2**	**Orig.Plant**							
Hub	**Ess Foods Grain Atla**	MW13	68,015	395,475	24,361,077	24,311,312	0.28%	1.63%	483%
	Essential Foods Grai		1,352,723	397,889	26,478,818	13,313,280	5.11%	2.99%	-41%
	Sasko Durban DC	DK09	199,208	96,853	42,892,304	46,842,949	0.46%	0.21%	-55%
Hub Total			**1,619,945**	**890,216**	**93,732,198**	**84,467,540**	**1.73%**	**1.05%**	-39%
KZN.FS	**Durban Overflow WH**	DK11			1,469		0.00%	#DIV/0!	0%
	Ess Foods Grain Beth	DF10	73,508	92,119	3,529,949	3,145,971	2.08%	2.93%	41%
	Kokstad Depot	DK52	28,130	17,520	3,145,487	1,804,871	0.89%	0.97%	9%
	Vryheid Depot	DK55	45,630	29,250	1,376,705	1,892,551	3.31%	1.55%	-53%
KZN.FS Total			**147,268**	**138,889**	**8,053,609**	**6,843,393**	**1.83%**	**2.03%**	11%
EC	**George Depot**	DW58			2,446,729	3,308,055	0.00%	0.00%	0%
	Kimberley Depot	DC59	36,665	2,605	7,388,559	6,975,210	0.50%	0.04%	-92%
	Port Elizabeth Mill	DE66			9,588,369	10,164,922	0.00%	0.00%	0%
	Sasko East London DC	DE64		13	6,357,063	6,444,188	0.00%	0.00%	0%
	Port Elizabeth DC	DE66	6,846	400			#DIV/0!	#DIV/0!	0%
EC Total			**43,511**	**3,018**	**25,780,719**	**26,892,374**	**0.17%**	**0.01%**	-93%
WC.NC	**Springbok Depot**	DC53	4,598	1,378	319,715	272,394	1.44%	0.51%	-65%
	Upington Depot	DC55	8,835	12,927	1,595,010	1,613,280	0.55%	0.80%	45%
WC.NC Total			**13,433**	**14,305**	**1,914,725**	**1,885,674**	**0.70%**	**0.76%**	8%
INLAND	**Sasko Polokwane DC**	DP51		24,810	5,996,176	7,997,158	0.00%	0.31%	0%
	Witrivier Depot	DM51	4,841	6,998	1,634,886	2,486,866	0.30%	0.28%	-5%
	Sasko Gauteng FMC Warehouse	DG10			6,713,451	2,409,125	0.00%	0.00%	0%
INLAND Total			**4,841**	**31,808**	**14,344,512**	**12,893,149**	**0.03%**	**0.25%**	631%
Grand Total			**1,828,997**	**1,078,235**	**143,825,763**	**132,982,129**	**1.27%**	**0.81%**	-36%

Expired stocks down 36% with focus on Atlantis/Bethlehem/Kokstad/Upington/Polokwane which is up on PY

APPENDIX M: CHECKLIST

Checklist from a manual to system-guided management of short-dated stock

People

- Identify all relevant stakeholders
    - Operational staff (pickers, forklift drivers & reach truck drivers)
    - Supervisory staff (stock controllers & picking supervisor)
    - Management (Co-ordinators & managers)
    - Admin staff (sales order clerks & billing clerks)
    - Sales (Sales manager & sales representatives)
- Training
    - EWM ES01 storage location
    - EWM ES01 break-bulk picking location
    - EWM ES01 bulk picking location
    - Pickers on Arm mounted terminals (AMT scanners)
    - Forklift drivers on scanners
    - Capturing sales order on ES01 storage location
    - Creating of pick waves
    - Releasing of pick waves
    - Picking of break-bulk order
    - Picking of Bulk order
    - Staging of order picked
    - Final check of order picked
    - Billing of order picked

Equipment

- Scanners
- Arm mount terminals

System readiness

- EWM ES01 storage location
- System programmed to move stock with less than 60 days shelf-life expiry from FW01 to ES01
- Create sales orders on ES01 storage location
- Extraction of report of ES01 storage location inventory with (SLED)

Communication

- Standard operating procedure
- Reporting to sales of short-dated stock
- Sales obtain orders for short-dated stock
- Sales order clerk receives orders and captures on SAP – ERP system
- Distribution team receives sales orders
- Stock controller creates the picking wave
- Stock controller releases the picking wave
- Task received by break-bulk & bulk picker on AMT & scanners
- Once picked issued to billing clerk for sales order to be billed
- Delivered to customer

Reporting

- Standard operating procedure
- Final SOP after process is refined
- Details are extracted monthly and reflected on the internal KPI reports

APPENDIX N: COVID-19: THE NEW NORMAL FOR THE WORKPLACE

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From left: Mr Neville Chinniah, Dr Simon Taylor and Professor Cecile Gerwel Proches.

COVID-19: The New Normal for the Workplace

- By Mr. Neville Chinniah, Dr Simon Taylor, and Professor Cecile Gerwel-Proches

The COVID-19 pandemic has become an international disaster for world governments, and global economies and institutions (Agarwal, Punn, Sonbhadra, Nagabhushan, Pandian, and Saxena, 2020; Tedros, 2020). COVID-19 has impacted the world adversely and has forced many countries to action national shutdowns (Abbey, Adu-Danso, and Aryeetey, 2020).

The disruption due to the coronavirus has been unprecedented and inevitable throughout the world. This has proven to be very challenging for the leadership of organisations across the globe and they have had to adapt and transform to ensure their survival. Social distancing measures have had to be enforced in places of employment and trade (Hamilton, 2020).

The aim of the lockdown in South Africa was to 'flatten the curve' – to reduce the spread of the pandemic, however, the lockdown has also resulted in numerous other adverse impacts socially, and economically for the country and the world at large (MacArthur, 2020).

Volatility, Uncertainty, Complexity, and Ambiguity (VUCA) have been prevalent in Industry 4.0 (i4.0), which refers to the digital technological transformation that South Africans are still in the process of conceptualising and embracing. COVID-19 has brought about disruption that has demanded instant adaptation and a paradigm shift. This has impacted the way people feel, to varying degrees of discomfort, which has resulted in resistance to these changes and fear of what lies ahead even though people are not quite sure what the future holds.

In ensuring the safety of their employees and to minimise the spread of COVID-19, companies have had to close, and where it was practical for people to work from home, this arrangement was applied (Hamilton, 2020). On returning to work, workstations had to be rearranged. This was done in adherence with the recommended safe working distance of two metres apart. In addition, the use of personal protective equipment such as gloves has been enforced, where applicable as well as the use of hand sanitisers (Hamilton, 2020).

There is a worldwide challenge with supply due to the excessive demand for what has become essential protection for people against the virus, such as masks and gloves, and also hand sanitisers, ventilators and testing kits. Exporting of these essentials has been adversely affected as internal demand has constrained the supply of export demand.

Africa, which is largely reliant on imports, has a huge backlog of supply due to COVID-19 (Abbey et al., 2020). Frequent touch points and contact areas must be more frequently sanitised and good hygiene practices have had to be increased immensely. Virtual workstations at home have become more acceptable and more practical, and organisations have had to adapt very quickly to ensure business continuity and productivity in this disruptive era. The information flow is critical to keep people abreast of changes and action plans (Hamilton, 2020).

Adapting to the 'new normal' is indeed overwhelming as people adjust to taking on other responsibilities that have been brought about by the global disruption experienced due to COVID-19. One such disruption has been the enforcement of virtual work environments, a situation where those who could work from home had to do so and had no choice but to adapt. People have had to rely on their ability to transform and to adapt to these unprecedented changes and disturbances. The COVID-19 pandemic has also caused disruptions which have impacted negatively on people's emotions and their emotional balance (Abdel-Fattah, 2020). The economic impact that the world will have to endure or sustain post this pandemic is unknown. The pandemic has interrupted global markets and has brought with it a test of emotional resilience and stability. The ability to survive the aftermath of the pandemic will not be based on strength or intelligence but will instead be determined by one's ability to adapt to changes (Abdel-Fattah, 2020).

In addition, COVID-19 has impacted the supply chain network. Work streams, work environments and the workforce have had to be remodeled to comply with: minimal physical contact, commonly referred to as social distancing; restriction of movement within departments; assisting with contact tracing if there is a suspected or positive COVID-19 case; reduced labour on delivery vehicles to comply with the minimum distance between people, and work from home for support services. Essential services have had to continue with operations during the period of the lockdown, hence the supply chain fraternity have had to transform very quickly without adequate deliberation on strategic directional adaptation to the 'new normal' way of day-to-day business activities and the implications thereof. Companies were required to have their COVID-19 operational readiness plans engineered and communicated across the business to the workforce, and the logistics sector also had to comply with the COVID-19 regulations and procedures at the customers' premises where they supply and deliver to.

These disruptions have resulted in a 'new normal' way of businesses executing their functions, which they have adapted to despite the challenges faced. Digital technology has proven to be an integral part of the transformation journey since the inception of lockdown. People working remotely and the subsequent convenience of reduced travel time have resulted in significant uptake of virtual meetings through the different digital platforms available. Although physically apart, people are more frequently in contact, and there is increased productivity from the levels of work that are conducted from home, as reduced travel time is accumulated into a productive contribution. People are thus indeed leveraging the capabilities of digital technology.

Given the financial impact of COVID-19 compliance measures related to operational readiness and supply of personal protective equipment, companies need to consider working remotely from home as a strategic plan. This form of work results in benefits pertaining to the reduced costs for office space, onsite parking space, canteen facilities, and meeting offices, which will contribute to economic benefits and maximise storage space for products. Further financial benefits will emanate from arrangements such as virtual meetings for conferences, for regular meetings of different stakeholders from different geographies, and for organised labour, because of reduced travel and accommodation expenditure. According to the President of the United Nations International Fund for Agricultural Development, the current unprecedented times that have resulted due to COVID-19 have exposed the manufacturing network of food, processes, and supply chain to its vulnerabilities (Houngbo, 2020).

New skill sets need to be developed to ensure both effective leadership as well as the ability to follow this leadership. Collaborative engagement is crucial so that teams can successfully navigate the challenges that will inevitably arise due to the disruptions brought about by the measures implemented to curb the spread of COVID-19.

References

Abbey, E., Adu-Danso, E., & Aryeetey, E. (2020). Research Universities' Multiple Responses to COVID-19. University World News, Africa Edition. Retrieved 26 April 2020, from: https://www.universityworldnews.com/post.php?story=20200420091917110.

Abdel-Fattah, H. M. M (2020). Emotional Intelligence and Emotional Stability in Crises. *Journal of Psychiatry and Psychiatric Disorders, 4*(2), 56-62.

Agarwal, S., Punn, N. S., Sonbhadra, S. K., Nagabhushan, P., Pandian, K., & Saxena, P. (2020). Unleashing the power of disruptive and emerging technologies amid COVID 2019: A detailed review. arXiv preprint arXiv:2005.11507.

Hamilton, J. (2020). How to Manage Workplace Disruption During the COVID-19 Pandemic. Retrieved 1 June 2020, from: https://www.immoafrica.net/news/manage-workplace-disruption-during-covid-19-pandemic/.

Houngbo, G. F. (2020). What's needed to protect food security in Africa during COVID-19. Retrieved 2 June 2020, from World Economic Forum: https://www.weforum.org/agenda/2020/05/what-s-needed-to-protect-food-security-during-covid-19/.

MacArthur, B. (2020). COVID-19 Pandemic. Retrieved 1 June 2020, from University of KwaZulu-Natal: https://clms.ukzn.ac.za/thought-leadership-series/.

Tedros, A. G. (2020). Coronavirus (COVID-19): Quick Reference Guide. Retrieved 1 June 2020, from CustomGiud.Inc: https://www.customguide.com/cheat-sheet/coronavirus-quick-reference.pdf.

UKZN MBA graduate Mr. Neville Chinniah is National Logistics Manager for Pioneer Foods; Dr Simon Taylor is Project Manager at UKZN's Regional and Local Economic Development Initiative; and Professor Cecile Gerwel Proches is an associate professor at UKZN's Graduate School of Business and Leadership.

APPENDIX O: GATEKEEPER LETTER

Prof Cecile Gerwel Proches and Dr Simon Taylor
Graduate School of Business and Leadership
University Of KwaZulu-Natal
Westville Campus
Durban
3630

30 August 2019

Dear Prof Cecile Gerwel Proches and Dr Simon Taylor

RE: PERMISSION TO CONDUCT RESEARCH

This letter serves to confirm that I, Tertius Barnard, Logistics Executive in Pioneer Foods Logistics Services, hereby acknowledge and approve the research of Neville Chinniah within the Company for the completion of his DBA degree.

[redacted]

Tertius Barnard
PFLS Executive

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APPENDIX P: THESIS ENGLISH LANGUAGE EDITED

ETHEL ROSS

English language editing and proofreading

14 December 2022

To whomever it may concern:

This letter serves to confirm that I worked as the proofreader and language editor on Neville Chinniah's Ph.D. thesis:

FROM A MANUAL TO A SYSTEM-GUIDED PROCESS: IMPLEMENTING CHANGE IN A FAST-MOVING CONSUMER GOODS COMPANY IN KWAZULU-NATAL, SOUTH AFRICA

In no way did I change the content.

Yours faithfully

[redacted]

Ethel Ross (BA Hons; H Dip Ed)

Email: clanross1@icon.co.za Tel: 083 954 5412

APPENDIX Q: ETHICAL CLEARANCE APPROVAL

UNIVERSITY OF KWAZULU-NATAL
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07 November 2022

Neville Chinniah (207521427)
Grad School Of Bus & Leadership
Westville Campus

Dear N Chinniah,

Protocol reference number: HSSREC/00000501/2019
Project title: A change management framework to develop capabilities for the logistics workforce to embrace technological change in a FMCG company in KwaZulu-Natal, South Africa
Amended title: From a manual to a system-guided process: Implementing change in a fast moving consumer goods company in KwaZulu-Natal, South Africa.
Degree: DBA

Approval Notification – Amendment Application

This letter serves to notify you that your application and request for an amendment received on 07 November 2022 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.

Best wishes for the successful completion of your research protocol.

Yours faithfully

[redacted]

………………………………………………………

Professor Dipane Hlalele (Chair)

/dd

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