



UNIVERSITY OF THE WESTERN CAPE

Digital transformation : The case of Cape Town based SMEs in the manufacturing sector

Dissertation by

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Abstract

The era of digitisation is accelerating the pace of digital transformation in manufacturing SMEs. Research has demonstrated that various challenges originate from within and outside the SME business level such as, among many, company culture and strategy, business processes, financial resources, and government support continue to hinder the way manufacturing SMEs adopt digital transformation. The underpinning research problem is the understanding of how these challenges impact the digital transformation adoption in the established context with limited research to practically address them by jointly engaging scholarship and recent field data.

Through the application of a multiple case study method, it is established that manufacturing SMEs in Cape town are digitally transforming. The study is qualitative in nature and used the interpretive methodology which allowed the researcher to apply the DREAMY model, capture the subjective SME experiences as outlined in the conceptual framework and aligns with the importance of the research through the determined research questions. The question that guided the research was (i) how far are manufacturing SMEs with digital transformation? The key findings were that Cape Town manufacturing SMEs are at Maturity Level 1 Initial stage of digital transformation. The recommendations are that at an employee level, a significant action is to empower the employees with basic digital skills and understanding and that they are forced to remain inquisitive of new technology and skills to remain relevant. Moreover, SMEs need to understand that the adoption of technology implies a change in the entire growth strategy and cannot be excluded as an enabler of success when planning the future despite the challenges around costs and other aspects.

Keywords: Digital transformation, SMEs, Cape Town, Digital economy

Declaration

I, Alutha Thandolwethu Tyali, declare that this research report is my own work that is submitted as part of the requirements of the Master of Commerce at the Department of Management and Entrepreneurship at the University of the Western Cape, Cape Town, South Africa. I declare that ***Digital transformation: The case of Cape Town based SMEs in the manufacturing sector*** is my own work, that it has not been submitted before for any degree or assessment in any other university, and that all the sources I have used or quoted have been indicted and acknowledged by means of complete references.



Signed

Date 18 September 2023



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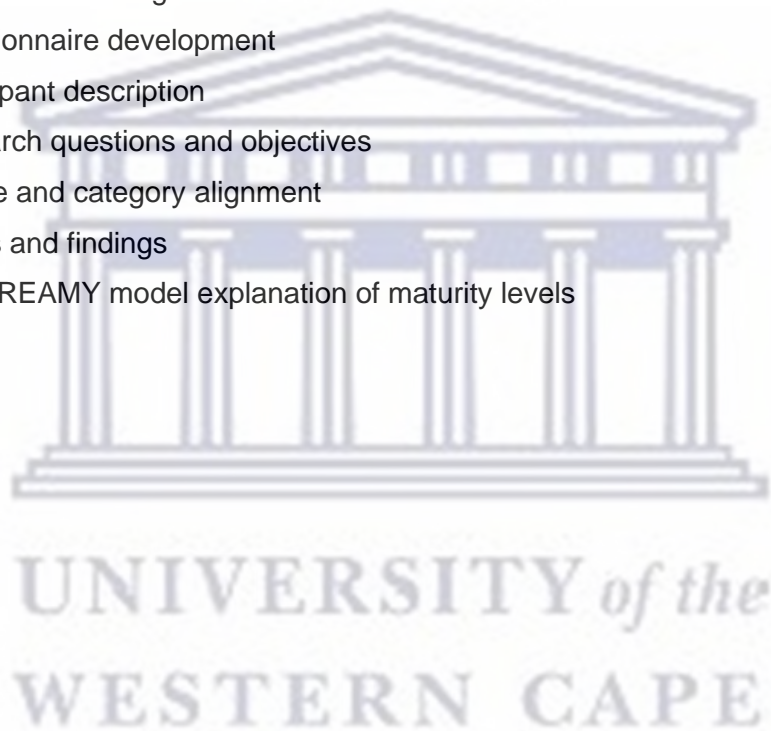
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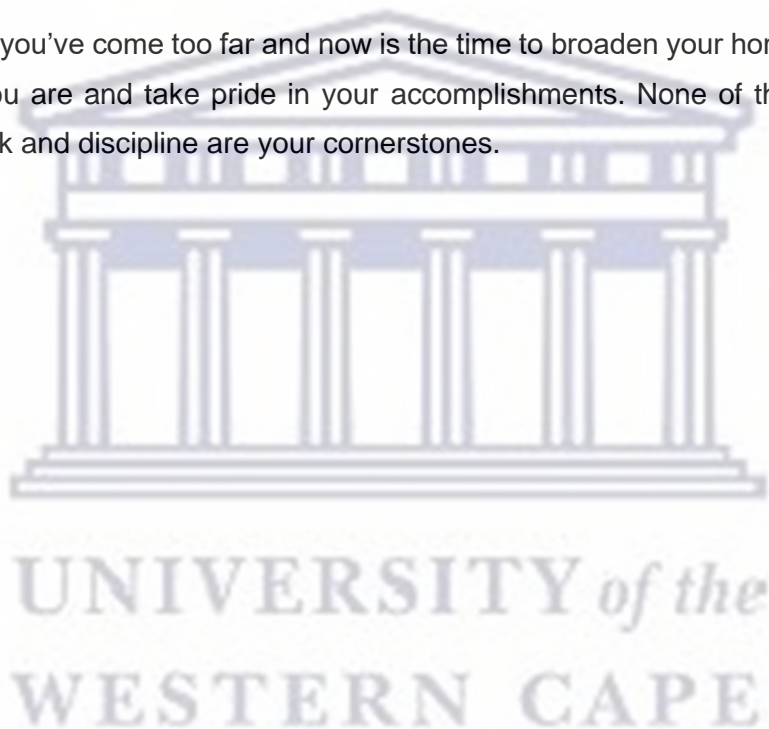
I am forever grateful to the Lord my God, the living and the departed, you lifted me up where I belong.

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To my friends and family, I hope this inspires you to achieve your dreams - they are valid.

Lastly to myself, you've come too far and now is the time to broaden your horizons. Always be proud of who you are and take pride in your accomplishments. None of this was by luck - prayer, hard work and discipline are your cornerstones.



CHAPTER 1: Introduction of the research study

1.1 Introduction

The South African manufacturing industry increased by 0,2% in the fourth quarter of 2023 (Statistics South Africa (Stats SA), 2023). The report released by Stats SA (2023) published that, four out of the ten manufacturing sub-sectors reported higher production, contributing to a 1,4% increase in the manufacturing output. In the quarter that ended in May 2023, saw a 3,8% increase in seasonally adjusted manufacturing sales compared to the prior quarter. (Stats SA, 2023). Botswana, Lesotho, Namibia, and Eswatini declared that South Africa represented 58%, 77%, 45%, and 73% of their world imports in 2019, respectively (ICT Trade Map, 2020). It is implausible to believe that these countries could obtain such a large proportion and range of imports from a single country. Within the bigger manufacturing industry, Small and Medium Enterprises (SME's) exist and contribute to national GDP through job creation, production, and growth. The small and medium business environment is difficult to operate in, particularly in these COVID-19 times (Viswanathan and Telukdarie, 2021). Many developing countries, like South Africa, rely heavily on microenterprises for socioeconomic growth (Makoza and Chigona, 2012). The number of SMEs in South Africa (SA) fell by 11% (or 289 000) year on year (y-o-y) in the first quarter of 2021, from 2.61 million to 2.33 million registered businesses. The fall in the number of formal and informal firms was of the same magnitude, demonstrating that the sector is still under constraint despite the larger improving economy. The proportion of SME employment in total employment, at 64% (9.8 of 15.2 million), has stayed reasonably consistent compared to 63% a year before (10.4 of 16.6 million). Large business employment fell by 12.5% (or 802 000) during the year to the first quarter of 2021, which was significantly worse than SME employment (which had recovered substantially) (The Small Enterprise Development Agency (SEDA), 2022).

Verhoef, Broekhuizen, Bart, Bhattacharya, Dong, Fabian and Haenlein (2021) digital solutions have become a major part of our lives, presenting enormous opportunities for South Africa to charter a new digital-driven development path. Digital transformation and resultant business model innovation have fundamentally altered consumers' expectations and behaviours, pressured traditional firms, and disrupted numerous markets. At the company level, many traditional firms have been surpassed by innovative fast-growing digital entrants and suffered as a result of this Verhoef, et al. (2021). As many of the traditional employment pathways start to close off due to automation and the reshoring of global value chains, the digital economy offers South Africa's most promising pathway to collective prosperity. Organisation for Economic Co-operation and Development (OECD) (2021) digitalisation of SMEs is crucial in building inclusive and resilient economies and societies. Ensuring the uptake of digital

technologies by all SMEs and entrepreneurs are central to fully unlocking the potential of the digital revolution at large (OECD, 2020). It is apparent that SMEs operate within the advancing digital economy and because of their contribution, it is paramount that the engagement on this subject considers them as key players in the space.

The performance indicators and implications of technology in SMEs have attracted and generated considerable interest among academics and entrepreneurs (Boateng, Hinson, Heeks, and Mbarika, 2010; Mohamad and Ismail, 2009; Fink and Disterer, 2006; Beck and Demirguc-Kunt, 2006; Grandon and Pearson, 2004). Digital transformation has received the most attention within specific business disciplines. For instance, marketing researchers have mainly focused on digital advertising and social media effects including attribution model developments (Lamberton and Stephen, 2016; Kannan and Li, 2017) and multi-channel and omni-channel developments (Verhoef, Kannan and Inman, 2015). The strategic management literature has mostly focused on the conceptualisation, operationalisation and renewal of (digital models) (Foss and Saebi, 2016; Osterwalder and Pigneur, 2010). In the information systems literature, researchers have traditionally paid strong attention to technical developments regarding adoption and use of digital technologies and resultant business value (Nambisan, Lyytinen, Majchrzak, and Song, 2017; Sambamurthy, Bharadwaj and Grover, 2003). To the best of the researcher's knowledge, there has been no recent management studies on digital transformation, specifically about Cape Town manufacturing SMEs. Various scholars such as (Nordås, 1996; Furawo and Scheepers, 2018; Gaffley and Pelser, 2021; Jere and Ngidi, 2020; Parschau and Hauge, 2020; Richter, Vodanovich, Steinhüser and Hannola, 2017; Megha, 2020) have shared discoveries on the outcomes of their respective studies but lack local contextualisation. The evaluation of the literature demonstrates the claim of this thesis that a direct relationship between the predictors of digital transformation affects the digitisation journey of manufacturing SMEs. The evaluation of the predictors as guided by the literature and primary data conducted by the researcher, identifies gaps in the understanding of the subject by SMEs and provides practical recommendations towards achieving digitisation in the manufacturing sector.

1.2 Background of the problem statement

Despite the numerous long-term hurdles that SMEs confront, the COVID-19 outbreak increased the push for digitisation (Codreanu, 2021). Being digital is no longer a luxury; it is an absolute need. COVID-19 pandemic epitomised the need for SME to digitise and acted as a catalyst for digitalisation of the sector. Digital technology has been critical in allowing many SMEs to continue economic activity and provide important services during the crisis). The digitalisation of SMEs is critical for the development of accessible and sustainable economies and societies. Ensuring that all SMEs and entrepreneurs adopt digital technology is critical to

fully realising the capacity of the digital transformation as a whole. Small and medium-sized enterprises (SMEs) form the backbone of most OECD economies.

The digital economy according to Gaziz, Oteshova, Prodanova, Savina, and Bokov (2020) is the most important step in the success of small and medium enterprises. Today's digitalisation process affects every country in the world. Furthermore, each country establishes its own digital growth priorities. The modest size and scope of their marketplaces is a major hurdle for digital enterprises in underdeveloped countries (United Nations, 2019). For example, most businesses focus on exploiting digital technologies to serve a local specialised market (United Nations, 2019). Friederici and Graham (2018) found that 117 out of 135 businesses (87%) targeted their domestic businesses in their study on Africa. SMEs in South Africa, on the other hand, are lagging behind in terms of digitalisation. According to the OECD (2019), digital or ICT adoption is weaker in smaller businesses. These businesses also have a difficult time making the additional investments in skills and organisational changes required to adopt and gain from technology. The competitive landscape is shifting in many industries as a result of business digitalisation, according to Sia, Soh, and Weill (2016). This adds to the pressure on SME digitisation. New market entrants pose a digital disruption threat to businesses, and digitally savvy clients are demanding more from them. A study conducted by Gaffley and Pelser (2021) to gain insight into the transformative skills of business leaders in the South African manufacturing sector to drive their business' digital transformation process realised that the level of digital transformation in the manufacturing sector in South Africa was 47.7%. The 52.3% difference reveals that some organisations are on some stage of their digital transformation or are not at all (Gaffley and Pelser, 2021). Therefore, this prompts the researcher to position the study within the contextualised area as new information is lacking, hence it remains unknown where Cape Town is with the digitisation journey of manufacturing SMEs.

The study region is Cape Town, which is located in the Western Cape province of South Africa, one of nine provinces in the country and the fourth largest, each with its own distinct industrial composition. Finance and business services, commerce, and manufacturing are the most important industries in the Western Cape (Stats SA, 2019). According to the government's National Development Plan 2030, the role of SMEs is crucial in South Africa, with opportunities for employment and economic drivers, and the digital economy is a clear priority for the government, with ICT explicitly defined (SME South Africa, 2019). The Western Cape Government has pledged to encouraging the growth and expansion of the provincial economy through the assistance of broadband use and, infrastructural facilities, and preparedness through the stimulation of digital adoption to improve the business competitiveness and peoples' livelihoods (Western Cape Government, 2020). The Western Cape's manufacturing industry has not spared the national manufacturing recession caused by cheaper labour and

materials available in other developing markets. As a result, digital capabilities' efficiency is increasingly vital to discover. For example, the Western Cape's tragic and severe downturn in the textile industry (Morris, Barnes and Esselaar, 2005) is attributable to a lack of comprehension or knowledge of important technological advancements underpinning world class textile manufacture. Manufacturing now accounts for 13.9% of official employment in the Western Cape (Western Cape Government, 2017); the manufacturing industry is a major labour-absorber among the low-skilled and low-educated workforce and will likely stay so through digitisation. Considering the presented facts, the study adopts its inquiry from the above arguments, to investigate the indications of digital transformation by Cape Town based SMEs in the manufacturing sector to participate in the digital economy.

1.3 Research problem statement

Businesses have a variety of problems when implementing digital transformation, and they must restructure their businesses to meet these issues in order to increase performance (Tarut, Duobien, Klovien, Vitkauskait, and Varanit, 2018). Among the problems, Western Cape Government (2017) the manufacturing sector in the province was not exempt from the national manufacturing recession, making digital capabilities-based efficiency even more important to pursue. Digitalisation challenges in the context of SMEs, as well as variables impacting digitalisation processes and key activities to be handled in SMEs, are still understudied (Tarut, et al, 2018). Small and medium businesses lag behind in digitalisation, according to the OECD (2019). These businesses also have a difficult time making the additional investments in skills and organisational changes required to adopt and benefit from technology. The 52.3% difference reveals that some organisations are on some stage of their digital transformation or are not at all (Gaffley and Pelser, 2021). The economical contributions, challenges and the need for SME digital transformation have been explained, most importantly the effects of lagging digital transformation on both SMEs and the economy. As much as digital transformation is a lifelong journey for many SMEs, there is limited perspective in research to understand how these predictors could be practically addressed using recent field data and scholarship to develop recommendations suitable for this specific context in the Cape Town manufacturing sector. From a research point of view, a theoretical problem does exist, and it is crucial that it is correctly comprehended to address the practical problem of digitisation by discovering new business paradigms that direct SMEs towards the desired digital transformation.

1.4 Research objectives

This research has four objectives to achieve namely

- (i) To determine the direction of digital transformation in Cape Town manufacturing SMEs.
- (ii) To investigate the areas which manufacturing SMEs intend to digitise.
- (iii) To determine how COVID-19 pandemic has affected the digitisation of manufacturing SMEs.
- (iv) To determine how SMEs can be supported towards the digitisation agenda

1.5 Research questions

- (i) What progress has been made by manufacturing SMEs towards digitalisation
- (ii) Which business areas do manufacturing SMEs target for the digitisation agenda?
- (iii) How has the COVID-19 affected manufacturing SME digitisation progress?
- (iv) How can SMEs be supported to participate in the digital economy?

1.6 Contribution of the research

The significance of this study is to contribute to the general body of knowledge, particularly in its established area of research and further enrich the existing knowledge and insights into the process of digital transformation by Cape Town based manufacturing SMEs. The contribution to knowledge was achieved by inferring empirical findings from related studies within and outside of the South African context to extend and support previously existing theories and methodologies. By exploring the indications of SME digital transformation in the Cape Town manufacturing industry, the research adopted the predictors from the literature to formulate the context or circumstances which the journey towards digitisation will be based upon or referred. Moreover, the maturity levels have been adopted and reinvented from an existing DREAMY model to assist in determining the stage which the SME is with digitisation. To assess a company's digital preparedness or transformation, the model includes five maturity stages ((1) digital-oriented, (2) integrated and interoperability, (3) defined, (4) managed, and (5) initial.

1.8 Theoretical Framework

The study deduces its theoretical framework from the predictors of digital transformation that are explored in the literature as factors that directly impact the advancement of digitisation in SMEs. To comprehend the research problem, the theoretical framework is informed by the literature and is viewed from an inside-out perspective inherent from within the enterprise, the

market or industry environment and the external macro environment. The adoption of the SME definitions by various organisations is synthesised and the applicable definition by the National Small Enterprise Act, 1996 (Act No. 102 of 1996) is also contextualised. Further advancement of the theoretical framework is enriched by the application of the theories relevant to SMEs and digital adoption which include Industry 4.0 Maturity Model, Maturity Model for Digitalisation, IMPULS Industry 4.0 Readiness Model and The DREAMY model. From the evaluation and synthesis of the different models, The DREAMY model is adopted and particularly the maturity levels to define the stage which the Cape Town manufacturing SMEs are at with digital transformation. The motive to adopt this component of the model is to specifically define, evaluate and respond to the research questions.

1.9. Study Model/Conceptual Mode

To develop the conceptual framework, the predictors of digital transformation are used as input factors that impact the adoption process. As understood from the literature, digitisation is a process, hence the middle component of the model regards it as the middle process between the predictors and the SME maturity level. The adoption of the DREAMY model to comprehend the Maturity Level (ML) of Cape Town based manufacturing SMEs is applied. The discovery of the response to the research question regarding the progress that has been made by manufacturing SMEs towards digitalisation is evaluated and aggregately ascertained from the sample.

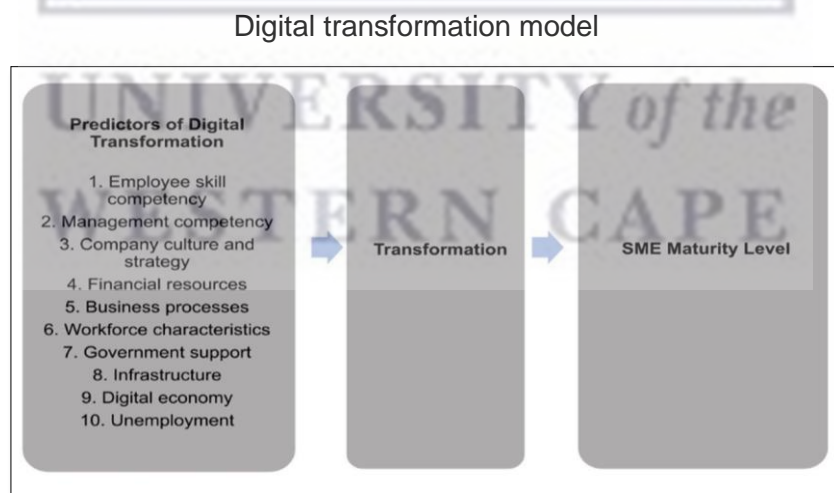


Figure 1: Proposed digital transformation model

1.10 Methodology

This study applies the qualitative methodology and the interpretative approach as a research design to comprehend the presented phenomena in its unique context. The adoption of this methodology is informed by the conclusions of Creswell (1998), Bryman (1984) and Denzin

and Lincoln (2011) highlighting its contributions to research such as the richness of qualitative data and its great quality which is often quite great despite the small sample sizes. Moreover, (Bryman, 1984; Denzin, et al., 2011) qualitative research tends to be built upon the epistemological assumption that psychological and social phenomena are inherently complex and interwoven, to the point that pulling them apart into measurable variables is impossible, or difficult at best. It is because of such complexities within the various environments that the SMEs operate in that this research has adopted this methodology to dissect and respond to the research questions above. As informed by the literature explored in the following chapter, the realities of the various enterprises cannot be fully quantified hence the adoption of this methodology to highlight and account for the dissimilar outcomes from the thematic analysis. An open-ended questionnaire is used to collect the data from the selected sample and the population consisted of the SME community in Cape Town and was narrowed down using purposive sampling to compile the sampling frame and sample which only consisted of registered manufacturing SMEs in Cape Town. The data was recorded and transcribed using the application Otter and Atlas.ti to map the relationships between the predictors of digital transformation that have been identified. To ensure rigor, the researcher has considered the following elements: credibility, transferability, dependability and confirmability by Lincoln and Guba (1985).

1.11 Structure of the study

Chapter 1

This chapter introduces the study by providing a background of the manufacturing sector, SMEs, and digital transformation. It also discusses the research problem of the study. Furthermore, the section formulates the research objectives and the questions of the study. Lastly, it gives the aim of the study and its contribution to the body of knowledge.

Chapter 2

This chapter's focus is to discuss previous literature that is related to SMEs, digital transformation, and its predictors. It explores the different definitions of SMEs both locally and internationally, together with digital transformation and the broader scope of the manufacturing sector. Moreover, the study synthesises the literature that have been conducted around the subject to highlight the gap which the outcome intends to fill. The predictors of digital transformation are discussed in depth with the focus being the international context, African then to South Africa and Cape Town where the study happens. This chapter also discusses different digital transformation theories or frameworks, mainly highlighting the conceptual framework designed for the study.

Chapter 3

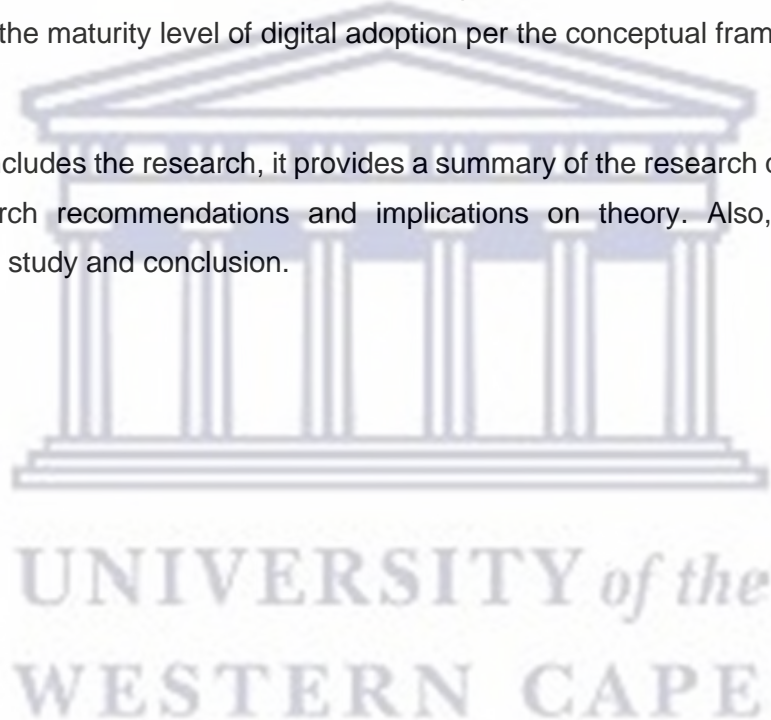
In this chapter, the researcher looks at the methodology that was applied to answer the research questions, the roadmap that is followed as a guideline on how to conduct the study. The study makes use of the interpretive paradigm to help answer the questions posed by the study. Additionally, the researcher elaborates on the methodology, research approach, subject, population, sample, data collection and analysis and ethical consideration of the study.

Chapter 4

This is an analysis chapter which provides elaborate details of the research results. This section looks at the coding and thematic analysis of the data from the transcribed interviews using the software Atlas.ti. From there onwards, it provides the discussion of the outcomes and determines the maturity level of digital adoption per the conceptual framework.

Chapter 5

This chapter concludes the research, it provides a summary of the research questions and the answers, research recommendations and implications on theory. Also, it provides the limitations of the study and conclusion.



CHAPTER 2: Literature review & conceptual model

2.1 Introduction

The evaluation of the literature demonstrates the claim of this thesis that a direct relationship between the predictors of digital transformation affects the digitisation journey of manufacturing SMEs. The evaluation of the predictors, as guided by the literature and primary data conducted by the researcher, identifies gaps in the understanding of the subject by SMEs and provides practical recommendations towards achieving digitisation in the manufacturing sector. This chapter presents small and medium-sized enterprises (SMEs), the assortment of acronyms that different international bodies use for these businesses, as well as an overview of the literature review on this topic, and the factors that predict SME digital transformation. Additionally, the role and responsibilities of the several government agencies in South Africa that are in charge of SME development are explored. The impact of digital transformation on the growth of SMEs, particularly those in manufacturing, is discussed. The chapter's consideration of theoretical frameworks for digital transformation and the conceptual framework created for the current study's aims completes the chapter.

2.2 Acknowledgement of SMEs in local and international context

Bureau for Economic Research (2016) small businesses, commonly referred to as Small, Medium, and Micro Enterprises (SMMEs), are crucial to the health of an economy. Also, they may serve as important catalysts for innovation, economic growth, and employment creation. According to Bruwer (2020) South African SMEs are essential to the economy because they contribute significantly towards the socio-economic objectives, and they can be key drivers of economic growth, innovation and job creation. The South African government gives credit to the importance of SMMEs, so much so that a new Ministry of Small Business Development was established in early 2014. The aim of the Ministry was to facilitate the promotion and development of small businesses in South Africa (Department of Small Business Development, n.d). Zafar and Mustafa (2017) note that SMEs play a significant role in the economic, modern and social advancement of a nation. It embraces an essential part in the worldwide economy through its contribution to the Gross Domestic Product (GDP) and improvement of the general population's living standards. The Small Enterprise Development Agency of South Africa (SEDA) indicated that as economies developed over the years and adapted to the new changes, it was also necessary for SMEs in the South African environment (SEDA, 2018). Organisation for Economic Co-operation and Development (OECD) (2017) such integration of SMEs into the local and global markets can help to strengthen their contributions to economic development and social well-being, by creating opportunities to scale up, accelerating innovation, facilitating spill-overs of technology and managerial knowhow, broadening and deepening the skill set, and enhancing productivity. Some niche international markets are dominated by SMEs, and innovative small enterprises are often key

partners of larger multinationals in developing new products or serving new markets (OECD, 2017).

The acronym SME is commonly used in the European Union (EU) and also in other international organisations such as the World Trade Organisation (WTO), The United Nations (UN) and the World Bank, among others. While in the USA the term Small Medium Business (SMB) is preferred, the term Micro Small Medium Enterprise (MSME) is used in parts of Africa and the world. In South Africa, the term SMME is adopted for Small, Medium and Micro Enterprises. All these acronyms are defined and synthesised below as per their respective definitions depending on the organisation which they are applied or acknowledged.

In South Africa, the government recognises the importance of this segment of business activity. The 1995 White Paper on SMME Development served as the foundation for The Department of Trade and Industry (The DTI) (2005) government policy on South Africa's SMME development. A plan of action was put forward by the Integrated Small Business Development Strategy, with an emphasis on:

- 1) Increasing financial and non-financial support
- 2) Creating a demand for the products and services provided by the SMMEs
- 3) Reducing regulatory constraints

In line with this action plan, the government established a number of institutions detailed in the Bureau for Economic Research of 2016 no. 1 which would be responsible for the implementation of this small business development strategy (GEM, 2014) and (The DTI, 2005).

2.3 Definitions of SMEs

Small Medium Enterprises (SMEs) are defined differently across the world and there is no generally accepted definition. To provide a broader explanation of the SME definition and to adopt one for the purposes of this study, the various definitions are defined by the following organisations: European Commission, World Trade Organisation (WTO), United Nations (UN) and South Africa are defined.

2.3.1 European Commission

The first Community definition of the SME sector was formulated in the European Commission Recommendation No. 96/280/EC of 3 April 1996, yet in practice previous national criteria were also used. As of 1 January 2005, a new European Commission Recommendation No. 2003/361/EC of 6 May 2003 regulating the definition of SMEs became effective (Wach, 2015). Small enterprises are defined as enterprises that employ fewer than 50 persons and whose

annual turnover or annual balance sheet total does not exceed EUR 10 million (European Commission, 2019).

Financial assets frequently qualify as part of the definition of SMEs. The new definition from the OECD (n.d) raises the financial ceilings: the annual revenue of medium-sized businesses (50–249 employees) should not exceed 50 million euros; that of small businesses (10–49 employees) ought not exceed 10 million euros; and that of micro businesses (less than 10 employees) need to not exceed 2 million euros.

2.3.2 World Trade Organisation (WTO)

Small and medium-sized businesses (SMEs) are often described as enterprises with between 10 and 250 employees. Firms with up to 10 employees are usually referred to as micro firms (World Trade Organization (WTO), 2017). The businesses with fewer than 10 employees are commonly referred to as "micro" enterprises, while those with 10 to 49 employees can be classified as "small" enterprises, those with 50 to 249 employees as "medium-sized" enterprises, and those with 250 or more employees as "large" enterprises. The categories above differ from those employed by the World Bank in their Enterprise Surveys, in that the latter excludes firms with fewer than 5 employees and businesses with 100 or more employees from its definition of SMEs (World Trade Organisation (WTO), 2016).

2.3.3 United Nations Development Plan (UNDP)

SMEs are essentially defined the same way by the WTO and the United Nations Development Plan (UN), the leading UN body for international development. According to the UN, a SME is an organisation with 5 to 200 workers that operates in the regulated sector of the economy and is registered as a business (United Nations Development Programme (UNDP), 1999). According to the United Nations Development Programme (UNDP) (1999) small and medium companies (SMEs) and micro-enterprises account for more than 95% of all businesses and produce between two thirds and Half of all non-farm employment globally. SMEs play pivotal roles in creating dynamic, market oriented economic growth, employing the growing workforce in developing countries, alleviating poverty and promoting democratization (United Nations Development Plan (UNDP), 1999).

2.3.4 South African definition of SMEs

The National Small Enterprise Act, No. 102 (1996) defines SMME as “small business” means a “separate and distinct business entity, including cooperative enterprises and non-governmental organisations, managed by one owner or more which, including its branches or subsidiaries, if any, is predominantly carried on in any sector or subsector of the economy mentioned in column 1 of the Schedule and which can be classified as a micro-, a very small, a small or a medium enterprise by satisfying the criteria mentioned in columns 3, 4 and 5 of

the Schedule opposite the smallest relevant size or class as mentioned in column 2 of the schedule.”

Below is the schedule in a table format used as a Schedule to define SMEs in South Africa as per the government gazette No.3353 published by Department of Small Business Development (2023).

Table 1: Expanded definition of SMEs across sectors

Column 1	Column 2	Column 3	Column 4
Sectors	Size or class of enterprise	Total full-time equivalent of paid employees	Total annual turnover
Agriculture	Medium	51-250	< 35.0 million
	Small	11-50	<17.0 million
	Micro	0-10	<7.0 million
Mining and Quarrying	Medium	51-250	<210.0 million
	Small	11-50	<50.0 million
	Micro	0-10	<15.0 million
Manufacturing	Medium	51-250	<170.0 million
	Small	11-50	<50.0 million
	Micro	0-10	<10.0 million
Electricity, Gas and Water	Medium	51-250	<180.0 million
	Small	11-50	<60.0 million
	Micro	0-10	<10.0 million
Construction	Medium	51-250	<170.0 million
	Small	11-50	<75.0 million
	Micro	0-10	<10.0 million
Retail, motor trade and repair services	Medium	51-250	<80.0 million
	Small	11-50	<25.0 million
	Micro	0-10	<7.5 million
Wholesale	Medium	51-250	<220.0 million
	Small	11-50	<80.0 million
	Micro	0-10	<20.0 million
Catering, Accommodation and other Trade	Medium	51-250	<40.0 million
	Small	11-50	<15.0 million
	Micro	0-10	<5.0 million
Transport, Storage and Communications	Medium	51-250	<140.0 million
	Small	11-50	<45.0 million
	Micro	0-10	<7.5 million
Finance and Business Services	Medium	51-250	<85.0 million
	Small	11-50	<35.0 million
	Micro	0-10	<7.5 million
Community, Social and Personal Services	Medium	51-250	<70.0 million
	Small	11-50	<22.0 million
	Micro	0-10	<5.0 million

Source: Department of Small Business Development (2023)

According to the National Credit Regulator (NCR) (2011) the National Small Business Act, No. 102 (1996) further distinguishes small businesses into survivalist, micro, very tiny, small, and

medium firms. In addition to retailing, wholesale trading, tourism, mining, farming, manufacturing, construction, and service, South African SMMEs also work in a variety of other industries (Chimucheka, 2013). The disparities in sizes mentioned by the National Business Act above are depicted in Table 2 below.

Table 2: Broad definitions of SMMEs in the National Small Business Act

Definitions of SMMEs given in the National Small Business Act			
Enterprise size	Number of employees	Annual turnover	Gross assets, excluding fixed property
Medium	Fewer than 100 to 200, depending on industry	Less than R4 million to R50 million, depending upon industry	Less than R2 million to R18 million, depending on industry
Small	Fewer than 50	Less than R2 million to R25 million, depending on industry	Less than R2 million to R4,5 million, depending on industry
Very small	Fewer than 10 to 20, depending on industry	Less than R200 000 to R500 000, depending on industry	Less than R150 000 to R500 000, depending on industry
Micro	Fewer than 5	Less than R150 000	Less than R100 000

Source: Falkena, et al. (2001)

According to The DTI (2008), the definition of SMMEs comprises a wide variety of businesses, including legally registered, unofficially registered, and non-VAT registered entities. According to Berry, Von Blotnitz, Cassim, Kesper, Rajaratnam, and Van Seventer (2002), small companies can be anything from formal micro-enterprises to reputable traditional family enterprises that employ over a hundred employees. The last group consists of independent, survivalist individuals from the weakest socioeconomic groups. The range's higher end can be compared to the small- and medium-sized companies (SME) market in nations with advanced economies. In South Africa, a large majority of SMMEs are concentrated on the very lowest end, where survivalist firms are found. These businesses might be small-scale manufacturing and service businesses, periodic evening employment working from home, or even street trading businesses. According to The DTI (2008), SMEs make up the majority of the informal sector; those categorised as survival businesses have extremely little room for expansion and are less likely to acquire new employees. It might be difficult to define a SME because the term has many different meanings throughout the world (Sitharam and Hoque, 2016).

Table 3: Synthesis of the SME definition

Definition by	Number of employees	Annual turnover
European Commission	50 – 249 employees	Not exceed EUR 50 million
World Trade Organisation (WTO)	10 - 250 employees	Not stipulated
United Nations Development Plan	5 – 200 employees	Not stipulated
National Small Business Act	Small >50 employees Medium less 100 / 200	Small >R2M to R25M Medium >R4M to R50M

Source: UNDP (1999)

2.3.5 Similarities and differences of the SME definitions

All the above organisations use the number of employees (less than 300) to define the size of the SME including South Africa. In terms of the profit margin, the WTO and UNDP do not categorically stipulate the figures. Nevertheless, a significant difference is the compilation of the acronym SME or SMME- small, micro and medium. The European Union, World Trade Organisation and United Nation Development Plan combine the acronym with no classification. On the other hand, the National Small Business Act, No. 102 (1996) considers the acronym differently as far as the size of the enterprise and industry is concerned. As per Schedule 1 of the act, the correct definition applied to an SMME varies in terms of its size and the industry it is based in. In the case of this study, the definition is deduced from the manufacturing industry specifications. Below is an illustration of the definition from the schedule.

Table 4: Comparison of SME definitions

Size or class of enterprise	Number of employees	Revenue
Micro	0 – 10	less or equal R10 million
Small	11 – 50	less or equal R50 million
Medium	51 – 250	less or equal R170 million

For the purposes of the present research, the definition of Small Medium Enterprises is adopted as defined by the National Small Business Act, No. 102 (1996) and National Small Business Amendment Act, No. 29 (2004). The selected definition applies in the context of South Africa and governs the rules of registration and recognition of SMEs in the Republic of South Africa which Cape Town is based.

2.4 Formality and types of SMEs in South Africa

SME South Africa (2022) the informal and formal industries make up the two main categories in which the SME sector in South Africa differentiates. All legally operating, tax-paying, and regulated enterprises are considered to be part of South Africa's formal sector. The most prominent private companies are included. The business belongs to the formal sector as long as it complies with all legal criteria and employs people in a lawful manner. As for the informal sector, SME South Africa (2022) defines it as the portion of the economy that is not subject to government regulation or taxation. Regardless of the formality, the contribution of the informal sector cannot be downplayed. According to estimates, 30% of South Africans work in the informal sector, which is half of the national rate in Sub-Saharan Africa (Bhorat, Asmal, Lilenstein, and Van der Zed, 2018). Based on estimates of the overall number of SMMEs

provided by SEDA and the total labour force at 14,7 million in Q3 in 2020 based on the Quarterly 3 Labour Force Survey, micro and informal enterprises constitute 45% of employment (StatsSA, 2020). However, this contribution was impacted by COVID-19. According to the United Nations Development South Africa (2020), because micro and informal enterprises were not initially taken into account in the rules, and all were forced to cease operations, the informal industry was disproportionately impacted by lockdown regulations. Additionally, the informal sector was already at risk before the crisis since it had less financial cushion or assets to rely on in difficult economic times.

2.4.1 Informal SMEs

South Africa is not exempt from the trend in Africa, where the contribution of the informal sector in the economy has grown over the past ten years (Mintah and Darkwah, 2018). The International Labour Organisation (ILO) (2016) estimates that the average contribution of the informal economy as a percentage of the GDP in Sub-Saharan Africa (SSA) is 41%, with 30% in South Africa to around 60% in Nigeria, Zimbabwe, and Tanzania with the informal sector representing about three quarters of non-agricultural employment and 72% of Sub-Saharan African employment. Mwanza and Benedict (2018) state that informal SMEs are the backbone of many countries across Africa contributing to an estimated 50% towards Gross Domestic Product (GDP) and 60% towards employment generation in their respective economies. More than 10 years ago, Western Cape Government (2007) South Africa's informal sector was estimated at 23% of total employment, which is small in comparison to the rest of Sub-Saharan Africa. Small businesses were found in the formal and informal sector but were more prevalent in the latter in the Western Cape. Furthermore, 10,1% of total provincial employment, the Western Cape had an even smaller informal sector than the national average. While acknowledging the contributions of informal SMEs, the sector still has no widely accepted definition. Although there is no universally accepted definition of what constitutes an informal SME, there is consensus that they are small scale, and operate outside registration, tax and social security frameworks, and health and safety rules for workers, with informal economic activity being defined by its 'precarious' nature (Western Cape Government, 2007).

2.4.2 Formal SMEs

In South Africa, statistical accounts suggest roughly 91% of formal business entities are SMMEs who contribute between 51% and 57% to the gross domestic product (GDP) and 60% of jobs (Reginald and Millicent, 2014). To define formal small enterprises, they are formally registered businesses and their size, remuneration and may be defined relatively to the industry which they operate as per schedule 1 of National Small Business Act, No. 102 (1996).

Table 5 below shows the growth of SMMEs in the 3rd quarter of 2021 as per the Small Enterprise Development Agency. From 2020 Q3, a decline in the number of registered SMMEs

is notable, presenting a negative change of 2.7%. A similar trend is noted in the decline of the number of SMMEs that exist in the informal sector, presenting a 2.2% decline which is still less than the formal sector. As explained by the acknowledgement of SMEs in local and international context, the SMME industry overall is a significant contributor to employment growth which a decline in the sector subsequently yields a 5.5% reduction in the number of jobs provided. The difference of -0.5% between the formal and informal SMMEs does not confirm if some of the informal enterprises were not accounted for or are flexible in nature to withstand challenges as compared to the formal SMMEs. Nevertheless, these figures emphasise the significance of the informal sector and the effect of COVID-19 which was at its prime in 2020/2021.

Table 5: SEDA SMME Quarterly Update 3rd Quarter 2021

KEY INDICATORS	2020Q3	2021Q2	2021Q3	q-o-q change	y-o-y change
Number of SMMEs	2 363 513	2 471 735	2 404 564	-2.7%	1.7%
Number of formal SMMEs	653 530	709 323	677 786	-4.4%	3.7%
Number of informal SMMEs	1 580 155	1 678 454	1 641 859	-2.2%	3.9%
Number jobs provided	10 058 355	10 326 238	9 758 313	-5.5%	-3.0%

Source: Small Enterprise Development Agency (SEDA) (2021)

2.5 Legislations that govern SMEs in South Africa

In South Africa, the government has established several legislations and policies that are intended to support and govern the establishment of SMEs of which manufacturing SMEs are also included. The Department of Small Business Development was formed in May 2014 to oversee an integrated strategy to foster the growth and expansion of small enterprises and cooperatives and to implement these SME policies. The 2004 amendments to the National Small Business Act, No. 102 of (1996) (National Treasury, 2017) provides the main framework of how the SMEs are governed and makes provisions for other amended legislations.

2.5.1 The National Small Business Act 102 of 1996

The National Small Enterprise Act, No. 102 (1996) was the first Act on small business development post-apartheid and was promulgated as a replacement to the (now-repealed) Small Business Act of 1981. Subsequently, The National Small Enterprise Act, No. 26 of 2003 amended the National Small Enterprises Act, No. 102 (1996) to repeal all provisions pertaining to the National Small Business Council and to empower the Minister to establish an Advisory Body to represent the interests of small business. Following that amendment, The National Small Enterprise Act, No. 29 of 2004 amended the National Small Enterprises Act, No. 29 (2004) to additionally provide for the establishment of the Small Enterprise Development Agency and to repeal all provisions relating to the Ntsika Enterprise Promotion Agency (Department of Small Business Development, (2004)). SMEs are further divided into five

distinct classifications under the Act (Act No. 102 of 1996): Survivalist enterprises, Micro enterprises, Very Small Enterprises, Small Enterprises, and Medium Enterprises. The Act allows for the explicit application and control of governmental assistance and incentives, when available, to respective firms by identifying and classifying the various enterprises (Ngcobo and Sukdeo, 2015).

Bruwer (2016) the formal recognition of SMMEs in 1996 allowed the National Government to brand these business entities as 'solutions' to achieve three important socio-economic goals including lowering unemployment, reducing poverty, and distributing wealth equally. This was done through the publication of the National Small Business Act No. 102 of (1996) which also led to the establishment of relevant Government Support structures, primarily through the Department of Trade and Industry (Molapo, Mears and Viljoen, 2008; Timm, 2011). The National Empowerment Fund provides funding for black-owned SMMEs, Khula Finance Limited provides funding, the Industrial Development Corporation provides financial backing, and the Small Enterprise Development Agency aids with financing, development, and franchising (National Empowerment Fund, 2014). Several studies support the above-explained role of the government support structures, in which funding assistance is prominent. Botha (2014) states that entrepreneurs face specific barriers, such as limited access to finance, lack of support, negative prevailing socio-cultural attitudes, gender discrimination and bias, personal difficulties, lack of training and education. In their study, Rankhumise and Masilo (2017) discovered that despite the government agencies' progress with their assistance, there are still many difficulties, particularly with regard to access to capital and the market. Meyer and Meyer (2017) discovered that SMEs have difficulties due to a lack of material assets for loans and financing.

SEDA (2012) in the manufacturing sector, the support needs of SMEs are shown to be most urgent with respect to financial assistance, support to develop industry-specific skills and knowledge, assistance to comply with industry standards, regulations and accreditation requirements, training and technical skills development, support to access raw materials, support to strengthen supplier relationships with large enterprises and industry-specific incubation. An interesting fact to discover is that as much as access to funding is an important barrier to be addressed by the government structures through the enactment of the National Small Business Act, No. 102 (1996), some studies argue otherwise about their effect on SMEs. Mthoa and Rankhumise (2021) suggest that effective support can only be rendered to SMEs only if the prospective support providers have a clear understanding of the challenges faced by SMEs. Colin Timmis, country manager at Xero South Africa, a reputable small medium business accounting firm also explains, "It's great to see small businesses embracing digital tools but investing in technology is only the first step. Many small businesses don't yet have the skills to match. We need a greater focus from government and technology firms on closing

this gap, and helping small businesses develop the right skills to build back faster and stronger from this crisis.” (Kanali, 2021). On the other hand, evidence from a report by SEDA (2019) indicated that the major failure of government support and training, according to women and youth SMME entrepreneurs, is that it takes a "one size fits all" approach. When trying to find assistance, most individuals are subjected to different types of repetitive training, which may or may not speak to the actual need of the specific business. What could be another issue according to Rogerson (2004) is, there is a general mistrust of external agencies among SMEs on the one hand and the incapacity of support institutions to persuasively raise awareness about their existence and effectiveness on the other hand. From the information, it is clear that the government structures or agencies place more focus on financial assistance for obvious reasons, however there are other child problems born out of this challenge. Rankhumise and Masilo (2016) highlight the skills gap, Kamunge, et al. (2014) mentions government regulatory and law issues and Rogerson (2004) adds mistrust of external agencies among SMEs. As much as these challenges may not solely be addressed by the government agencies, the dominant approach and focus by most of them on the financial aspect in addressing SME challenges does not seem to be producing the best support impact.

2.6 Government agencies that support SMEs

The introduction of the National Small Enterprise Act, No. 102 (1996) as amended in 2004 through its provisions, has given birth to the establishment of the Small Enterprise Development Agency which works with the Small Enterprise Financial Agency to provide SMEs with the necessary support both financially and non-financial support.

2.6.1 Small Enterprise Development Agency

SEDA (2018) small businesses and cooperatives can get non-financial help from the Small Enterprise Development Agency (SEDA), a division of the Department of Small Business Development (DSBD). Additionally, 99 technology Incubation Centres supported by SEDA are located all throughout the nation, providing start-ups and new transformative inventions with a well-equipped and secure environment to nurture and expand for a duration of three years. SEDA will also facilitate private sector partnerships for the establishment of digital hubs, with 41 new hubs to be added by the 2024 financial year, following a district model (SEDA, 2018).

2.6.2 Small Enterprise Financial Agency

Small Enterprise Financial Agency (SEFA) (n.d) the National Small Business Act of 1996, as revised in 2004, defines SMMEs and cooperatives that meet its eligibility requirements. The Small Enterprise Finance Agency (SEFA) offers financial goods and services to these entities through a hybrid of wholesale and direct lending channels within the following sectors: services, manufacturing, agriculture, construction, mining, and green industries. It functions as a Development Finance Institution (DFI) that supports the formation, advancement and

expansion of SMMEs and cooperatives and to contribute to poverty alleviation, job creation and economical improvement.

2.7 Other SME government support initiatives / programmes

2.7.1 Manufacturing Investment Programme (MIP)

For local and foreign-owned manufacturing enterprises that want to set up a new manufacturing plant, extend an existing production establishment, or modernise an existing facility in the clothes and textiles sector (Industrial Development Corporation (IDC), n.d.).

2.7.2 The Manufacturing Competitiveness Enhancement Programme (MCEP)

Industrial Policy Niche Projects Fund focuses on projects selected by the Department of Trade and Industry sector desks and IDC's strategic business units concentrating on new areas with an opportunity for job creation, diversification of manufacturing production, and contribution to shipments that would otherwise be ineligible for commercial or IDC funding may be eligible for an MCEP grant that may be structured as part of the borrower's equity contribution (The DTI, n.d.).

2.8 Impact of the government and non-governmental support initiatives

A study by SEDA (2012) on the awareness of SEDA's programmes, products and services suggests a relatively high awareness, at least among the SME respondents interviewed during the course of the research. Only two of the fifteen SMEs' representatives were ignorant of any of SEDA's product and service offerings. In response, 10 of the 15 SME representatives reported that they have used particular SEDA programmes, goods, or services. However, the study identifies various shortcomings and problematic aspects that reduce the relevance and efficacy of SEDA's existing product and service offerings. These deficiencies include a lack of follow up support and mentorship after initial support has been provided and a lack of sector specific expertise, knowledge and experience among some of SEDA's Business Advisors.

It has been a significant period since the SME support initiatives have been in existence, however, Pretorius and Vuuren (2003) argue that economic incentives do not favour SMMEs, and believe the core focuses of government programmes, as promulgated through DTI and its apex organisations include finance, growth, expansion and competitiveness assistance programmes, are more relevant to existing businesses than to start-ups. In a survey conducted by the Global Entrepreneurship Monitor (GEM) (2004), less than one-in-ten respondents rated the government's overall effort to promote the SMME sector effective. Almost 20 years later, Global Entrepreneurship Monitor (GEM) (2023) still maintains that many governments may need to take action to help new enterprises through laws and programs if these circumstances are to effectively develop.

Additionally, to this low effect, Peters and Naicker (2013) assert that despite the lack of awareness of the respective government support initiatives in the SMME sector, the general feeling that there is too much red tape associated with the application and usage of government support initiatives is the primary reason for lack of usage of these initiatives. The majority of the respondents felt that the services provided by the government support initiatives are neither good nor poor, indicating room for improvement in various service areas. The services overall did not as yet have the desired effect. Concisely, it is evident that not all SMEs are satisfactorily benefiting from the programmes, particularly to address their business-specific needs besides finances which the support mostly focuses on.

2.9 Locating South Africa's manufacturing sector in the international landscape

Although South African SMEs are presented with a number of barriers to adoption, many international SMEs face similar challenges, even SMEs in countries that are considered industry 4.0 leaders such as Germany. A study done by Andulkar, Le and Berger (2018) examined the challenges facing 20 SMEs in Germany in relation to the adoption of industry 4.0. Their challenges related to enterprise resource planning, automation and factory planning. The study also used 5 SMEs as case studies, examining readiness and feasibility of adopting industry 4.0 concepts. Most of the SMEs were still struggling with planning, organisation and automation, making the implementation of industry 4.0 with their current operations, infeasible. Research into the roles of SMMEs in driving GDP growth and creating employment have indicated that SMMEs are critical in sustaining the economic health of both developing and developed countries (Edinburgh Group, 2013). A 2018 study by the Organisation for Economic Co-operation and Development (OECD), indicate that for OECD countries, SMMEs are the dominant form of enterprise, with the majority of enterprises (between 70% and 95%) classified as micro-enterprises (employing 10 or less people) (OECD, 2017). When comparing this with countries within the European Union (EU), approximately 92% of enterprises in 2012 were classified as micro-enterprises (employing 10 or less people), with only 0,2% of enterprises classified as large. SMMEs make up 67% of all private sector employment in the European Union and around 58% of total company Gross Value Added (Edinburgh Group, 2013).

2.10 History of the South African manufacturing sector

2.10.1 Manufacturing industry in the 1900's

The manufacturing sector is analysed along three dimensions, wage costs, technology and orientation. The focus is particularly on productivity performance and competitiveness in order to assess the manufacturing sector's ability to generate income and accumulate technological capacity in a more liberal trade regime (Nordås, 1996). The Customs Tariff Act, No. 36 (1925) was the cornerstone of the South African government's efforts to build a sustainable manufacturing sector. Tariff rates under this act ranged from 20% to 25%, which was not particularly high for a developing country during that period but was substantial enough to

make it quite profitable to produce for the domestic market (Schneider, 2000). South Africa was still heavily reliant on imported technology, foreign enterprises' participation in the industrialisation process was critical. For example, before the Customs Tariff Act, No. 36 (1925), most profits from gold flowed overseas, and practically no capital was reinvested in local development (Bonner, Delius and Posel, 1935). Now the manufacturing sector has become an extremely profitable place to invest. There was a 7.7% increase in the number of manufacturing firms from the time tariffs were in 1925 until the Great Depression in 1929. The number of manufacturing firms even increased slightly (by 1 percent) during the depression years of 1929-1933 (Black, 1991). By the late 1970s, South Africa's manufacturing sector was stagnant, and its GDP growth fell below world GDP growth by 2.9% for the first time in decades (Schneider, 2000). One of the biggest failures was the inability of the government to develop a vibrant capital goods sector and technological autonomy (Dietz, 1992), which meant that once international businesses pulled out of South Africa, technological change slowed to a crawl (Schneider, 2000). It goes without saying that competitive, high-technology industries generate the highest income, while they are a drain on resources if not competitive. It is found that South Africa's competitiveness lies mainly in resource-intensive and low-technology industries (Nordås, 1996). The manufacturing industry currently relies on labour intensity and the evolving adoption of technology in the manufacturing process as Maisiri and van Dyk (2021) suggested.

South Africa's manufacturing sector is significantly underperforming in comparison to other nations at comparable stages of development. Moreover, the contribution of manufacturing to gross domestic product (GDP) has notably declined over time; according to Bhorat, Cassim and Hirsch (2014) the share of manufacturing in GDP dropped from 19% in 1994 to 17% in 2012. In parallel, while manufacturing output still grew at 2.7% per year during the aforementioned period, employment growth in the sector has been relatively weak - increasing at less than 1% between 1997 and 2012 according to data from Bhorat, et al. (2014) but decreasing according to other data sources. De-industrialisation, a concept that is used to refer to the small and declining contribution of manufacturing to the economy as a whole, has been in the making for some time. The declining importance of manufacturing in economic activities, described as a pattern of de-industrialisation, is far from being unique to South Africa; it is a widespread trend as documented by Rodrik (2016). Despite a robust and comprehensive industrial policy, South Africa is rapidly de-industrialising. This assertion proves a notable change in the standpoint of the country's manufacturing sector as compared to the 2.9% decline in the 1970's (Schneider, 2000). Edwards, Flowerday, Rankin, Roberts and Schöer (2014) show that manufacturing as a share of GDP has been declining from the late 1980s but they also find that the share of the manufacturing sector employment in non-agricultural employment declined much more markedly from the early 1980s onward with the

drop accelerating from 1995 onward. Considering the above discussion on the history and growth of South Africa's manufacturing industry, the role of technology is recognised along with other factors that have propelled the industry which for the purposes of this study can be related to digital transformation. However, because the studies date back to before 1994, it can be assumed that SMEs were an insignificant part of the industry and through the new government legislation, the Department of Small Business Development (2004) introduced the National Small Enterprises Act, No. 102 (1996). Additionally, because the manufacturing industry was already in existence when SMEs were constitutionally recognised, it is paramount that the history is discussed in order to elaborate and highlight the progress and economic environment in which they are set to thrive.

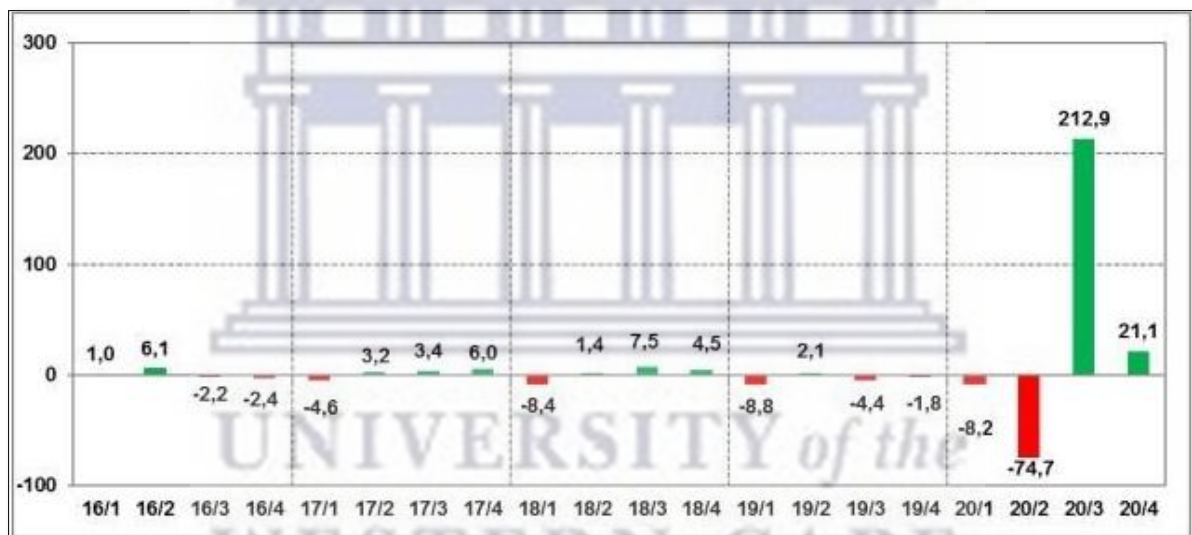
2.10.2 Manufacturing industry in the 2000's

South Africa's manufacturing industry today employs a large number of unskilled and semiskilled people (MerSETA, 2018). South Africa's manufacturing industry is the fourth largest. It consists of ten sectors (Republic of South Africa, 2018b), including the metals, automotive, and polymer manufacturing industries (MerSETA, 2018). The manufacturing industry contributes approximately 14% to the South African gross domestic product (StatsSA, 2018a): a significant input to the countries' economy. The manufacturing industry also offers a significant number of employment (MerSETA, 2018) and employs around one in every ten people in the country (StatsSA, 2018b). A general decline in the total number of employees has been noticed as follows: 1.44, 1.19 and 1.1 million in the years 2005, 2014 and 2019, respectively (Plastic & Chemical Trading, 2019). The manufacturing industry is identified as an employment generator (Kleynhans and Sekhobela, 2008). It has the potential of employing 1.7 million people (Republic of South Africa, 2018a) if the country's installed capacity is fully utilised as opposed to the current 81% capacity utilisation (Plastic & Chemical Trading, 2019). Partially using capacity has been linked to a lack of expertise, among other things (Plastic & Chemical Trading, 2019). Research by Maisiri and van Dyk (2021) on the perspective of the South African manufacturing industry found that a significant number of participants emphasised that technology could create more opportunities by not taking away jobs and companies will still need more people, but it will be more on a different skill level. Some businesses are automating regular operations not to shrink the employee number or take away people's jobs, but to empower employees to innovate and come up with new solutions to address issues.

According to the Industrial Policy Action Plan of 2017/18 - 2019/20 (2017), the manufacturing sector has high economic multipliers because of its value addition linkages to upstream production sectors of the economy. The South African share of world manufacturing output has decreased, with manufacturing production falling to 1.3% year on year in 2018 and failing

to meet and achieve market expectations of a one percent rise (Trading Economics, 2019). In the manufacturing sector, small business accounts for only a tenth of South Africa's revenue but a fifth of employment (Ndlovu and Makgetla 2017). Overall, SMEs contribute more than 40% towards the country's overall GDP and provide more than 50% of employment to labour (Kelley, Singer and Herrington 2016), while findings by the Small Business Institute (SBI), a non-profit organisation, have also shown that 98.5% of formal businesses in the South African economy is incorporates of formal SMEs (SBI, 2018). Nonetheless, the Small Business Institute (2018) findings show that, overall, the contribution of SMEs to employment delivery and economic growth of the country is of great concern, as the formal SME sector has been found to only account for 28% of the jobs in South Africa (SA), while this ought to be 60-70% based on international trends (SBI, 2018). This emphasises the critical need for increased local economic and manufacturing production.

Figure 1: Manufacturing growth rate



Source: Statistics South Africa (2020)

Statistics South Africa (2020) the manufacturing industry increased at a rate of 21,1% in the fourth quarter, contributing 2,4% points to GDP growth. In the fourth quarter, nine out of ten manufacturing segments recorded positive growth rates. Food and drinks, automotive accessories and components, and other transport equipment, basic steel and iron; non-ferrous metal goods, metal products and machineries; and wood-based goods, paper, the publishing sector, and printing contributed the most to the increase. A survey was conducted in South Africa where more than 27% of the sectors who were of traditional method rated their sectors as digitised and the value is expected to rise within the next five years (PwC, 2016). Also, 2.9% reported an increase in total revenue cost and 3.9% reported reduced cost. Therefore, it is of great importance for companies in the manufacturing sector to adapt and take advantage

of this digital technology era to grow and expand businesses and even compete globally (Ndou, Madonsela and Twala, n.d).

Comparing the 2 periods, it is evident that the key strategies to forge a thriving manufacturing industry is through the constitution as a backbone, namely the Tariff Act of 1925 and National Small Enterprises Act of 1996 respectively. In the 1900's and as far as the reviewed studies suggest, the South African manufacturing sector experienced internal challenges to digitise and grow. Dietz (1992) highlights the inability of the government to develop a vibrant capital goods sector and technological autonomy, followed by Rodrik (2016) deindustrialisation despite a strong and deep industrial policy, and Maisiri and van Dyk (2021) reliance on labour intensity and the evolving adoption of technology.

In the 2000s and present time, MerSETA (2018) characterises the local manufacturing industry by significant numbers of unskilled and semi-skilled workers. According to Maisiri and van Dyk (2021), technology may generate additional chances by not eliminating existing occupations, and businesses will still require more workers, but at a different skill level. Nevertheless, Statistics South Africa (2020) the manufacturing industry increased at a rate of 21,1% in the fourth quarter and (PwC, 2016) sectors who were of traditional method rated their sectors as digitised and the value is expected to rise within the next five years. This is an improvement to be applauded which is a result of the responsiveness of the manufacturing industry to digital solutions. Also, it is further affirmed in the literature through the outcomes of the National Small Enterprises Act No. 102 (1996) with initiatives such as SEDA that there is positive outcome in how the SMEs are supported. Nevertheless, the challenges of the local manufacturing industry are still notable but have changed from what they were known to be in the 1900's which still may not be easily addressed considering that they innate from prolonged shortcomings within and outside the manufacturing industry.

2.11 Defining Digital transformation

Digital transformation changes the way of doing business, and in particular how enterprises as well as individuals and groups operate, communicate and create value through IT (Onay, Özdiñç and Çavuşyan, 2018). Digital transformation is the process of reinventing a business to digitise operations and form extended supply chain networks; the functional use of the internet in design, manufacturing, advertising, selling, and showcasing; and is data-based management model are all examples of what is meant by digital transformation (Schallmo, Williams and Boardman, 2020). Digital transformation should not be considered a technological leap and the management of operations should not just focus on softwarehardware updates (Ulas, 2019). According to McKinsey, digital transformation is rearrangement of technology, business models and processes to ensure new values for customers and employees in a constantly changing and developing digital economy. Digital

transformation, according to Rupeika-Apoga and Petrovska (2022), begins with the construction of a digital replica of an analogue or physical process or thing. This shift then leads to a shift in business operations, models, and competencies to adapt to available technologies, and it never ends. To ensure a successful outcome, continuous innovation, the capacity to adjust swiftly to change, and the ability to capitalise on difficulties and opportunities are essential.

The increased usage of digital transformation principles has been pushed by innovation accelerators, encompassing solutions like as Internet of Things (IoT), robots, 3D printing, artificial intelligence, augmented and virtual reality, new generation, security, simulation, horizontal/lateral software integration, internet of things, cyber security, blockchain, nanotechnology, cloud computing, big data (Moreira, Ferreira and Seruca, 2018). For the purposes of this study, the definition by Rupeika-Apoga and Petrovska (2022) is adopted to explain digital transformation. The definition highlights and includes an important objective of this study, to move from analogue or physical process to a digital version which is the literal meaning of digitisation. Also, the definition captures digital transformation as a holistic SME process, from business operations, models, and competencies and is not based on a particular business area or certain mode of technology. Therefore, the definition does not pre-empt the outcome of the research question, which business area or process has the SME identified for digitisation?

2.12 Predictors of digital transformation

The onset of COVID-19 and simultaneous hard lockdown rang the death knell for thousands of South African businesses. As the pandemic eased then surged again, provoking a tighter lockdown and additional uncertainty, many more had to close their doors (most reliable current estimates suggest between 15% and 19%) (Small Business Institute, 2021). A study conducted by Ngibe (2020) in KwaZulu-Natal manufacturing SMEs and digital literacy adoption by the entrepreneurs exposes an important contribution to the intention of this paper about the predictors of digital transformation. The research findings indicate that manufacturing SMEs are severely affected by a variety of challenges and that they face significant hurdles that negatively affect their performance. These have an influence on corporate executives' capacity to execute innovations that can promote, maintain, and sustain their companies' growth. According to the study's findings, education and training are important positive contributing variables influencing innovative business leadership. Furthermore, technical abilities, access to financial support, and ICT awareness were also identified as critical catalysts to business success. Expanding on Ngibe's (2020) contribution is Kyalangalilwa (2021), recommending a countrywide strategy. The innovative skills that are needed by business owners fall into three categories, namely, technical, managerial, and personal entrepreneurial skills. A more

comprehensive approach for the government to offer SMEs support, may include making technological advancements and innovations, whether managerial or technological, available to SMEs, as it is proven crucial to their success. Interestingly, much as these outcomes are not directly linked to the objectives of this study, the managerial capacity, financial and government support are the predictors of digital transformation in manufacturing SMEs and therefore ought to be considered when dissecting the existing body of literature around the study area.

While the advent of Industry 4.0 has heralded a new era in manufacturing, the extent to which existing literature has progressed towards clarifying the phenomenon is not clear, in particular, the degree to which the phenomenon has been embraced by business (Ramchander, 2019).

2.12.1 SME business-level perspective

Fatoki and Garwe (2010) identify internal factors, such as access to finance, management skills, networking, investment, information technology and cost of product as still a big challenge for South African SMEs' survival and growth. Similarly, to these issues, the literature reviews some of them in light of the South African and international context, namely the company culture and strategy, employee skill competency, management competency, business model and process and lastly financial resources.

2.12.1.1 Company culture and strategy

Mostly every industry is being digitally transformed during the fourth industrial revolution, including business, education, finance, governance, and manufacturing (Verina and Titko, 2019). Change and transformation are crucial for building an organisation that can thrive in the digital age. Furthermore, digital transformation requires fundamental changes in an organisation, including structure, processes, strategy and culture (Vial, 2019). A company's digital transformation necessitates a fundamental organisational shift. A digital transformation needs developing a culture that promotes the change while allowing the company's overarching strategy, according to researchers from Boston Consulting Group (Hemerling, Kilmann, Danoesastro, Liza Stutts, and Ahern, 2018). Managers should lead and encourage organisational change and the adoption of a digital culture (Schwertner, 2017; Hemerling et al., 2018). Most SMEs have difficulties related to organisational and cultural concerns when coping with increased external relationships, according to Christina, Neelufar and Al Amri (2014) and Alyafie and Al-Mubarak (2016).

There is a widespread consensus about the impact of culture in business transformations (Hartl and Hess, 2017; Karimi and Walter, 2015; Vogelsang, Liere-Netheler, Packmohr and Hoppe, 2019). Research literature suggests differences in organisational culture between large and small organisations (Gray, Densten, Sarros, 2003). SMEs are determined by having

limited internal resources, including a small number of employees (Klat and Matejun, 2012). SMEs share certain qualities that differentiate them from other more prominent organisations, including higher independence, more superficial organisational structures, direct company relations and their natural flexibility of action. These qualities may influence the organisational culture that arises in those organisations. On the other hand, Gray, et. al, (2003) SMEs' culture has greater flexibility and lower bureaucracy than larger organisations resulting in more straightforward decision-making processes and faster responses to the environment. Moreover, cultural factors can support or oppose digital transformation in large organisations and SMEs (Gurbaxani and Dunkle, 2018). On the contrary, small size has also shown to pose limitations for implementing digitalisation opportunities, including potential knowledge gaps and limited resources (Barann, Hermann, Cordes, Chasin and Becker, 2019a). On the other hand, Dehning, Richardson and Zmud (2003) identified missing cultural change and keeping up with traditional roles, principles or working conditions, hampers digital transformation in manufacturing businesses.

The core of digital transformation in manufacturing is the overall digitalization and crosslinking of the value creation process. Information and communication technologies integrate and alter manufacturing processes. To evolve, then, implies to fundamentally modify traditional business practises by redefining business procedures and connections (Dehning et al., 2003). South Africa's share of global manufacturing output has shrunk, falling by 1.3% year on year in 2018, falling short of market estimates of a 1% increase (Trading Economics, 2019). Small businesses account for only a tenth of South Africa's income but a fifth of employment creation (Ndlovu and Makgetla 2017). This shows how many factors SMEs in the manufacturing industry face (management skills, access to finance, technology adoption, and competitive pressure, the business environment, macroeconomic factors, and regulatory uncertainty) contribute to innovation, expansion, and sustainability due to slow transformation and a lack of a culture of innovation to confront the ever-changing economy (Organisation for Economic Cooperation and Development (OECD) (2017); Mutoko and Kapunda (2017); Sitharam and Hoque, (2016)). According to the research results of Francke and Alexander (2019), where South African enterprises did not appear to have much of an appetite for innovation, drastic changes were recommended by Ngibe and Lekhanya (2019), who urged innovation to sustain KZN SMEs growth in the manufacturing sector, with the strategic tool of education and skills training endorsed as a possible solution.

2.12.1.2 Employee skill competency

The process of changing something tangible or analogue to digital form is known as digitisation. It is not only transforming work within businesses, but it is also allowing it to spread outside them (Megha and Zaware, 2020). Digitalisation, in its broadest sense (Narula and Rana, 2017), refers to the application of digital technology to improve existing business models

and generate new value-based possibilities. Even though they play an important role in the economy, small and medium-sized businesses have struggled to digitise (Codreanu, 2021). To compete in today's global economy, SMEs in the manufacturing sector, according to the OECD (2018), will need to invest in and use new technology to keep their 8 employees competitive. Selamat, Alias, Hikmi, Puteh, and Tapsi (2017) reinforce this idea, arguing that the ultimate expertise is created through the partnership of technologies and people. Individual investments in new technology to accelerate digital transformation are clearly insufficient.

According to Beliski and Liversag (2019), leaders' ability to adopt digital technologies to develop value and enable speedier product manufacturing continues to be a barrier for them. It's worth noting that the technical skills gap in the adoption of digitisation has existed for many years. Zander and Kogut (1995) one of the numerous reasons why many African countries have yet to benefit from digitalisation is a lack of technological skills and a scarcity of qualified and technical labour. It's crucial to remember that knowledge has many dimensions, which will influence how well knowledge is transferred and adopted. Levinthal and Cohen (1990) explicit information is easier to explain, codify, and disseminate (through manuals, documentation, and so on, but tacit knowledge is more difficult to transfer, interpret, and learn from. The relevance of businesses' 'knowledge transfer,' which refers to their ability to not only absorb and integrate external information, but also to use that knowledge and produce profits, is highlighted by such a conceptualization of knowledge. According to Lall (2001), businesses must invest in 'technological capabilities,' which are defined as the skills (technical, managerial, or organisational) required to effectively use technology and complete any process of technology advancement or innovation. The problem has not gone away after all these years. Another important barrier, according to Megha, et al. (2020), is redefining the skill set necessary for digitisation rather than investing in new technology. The impact of digitization on personnel is currently insufficient to fulfil demand. In the digital world, the requirement for specialised skills will play a crucial role in meeting demand (Megha, et al., 2020). The amount of skilled labour has a direct impact on the failure rate of SMEs in South Africa. If skilled labour is not readily available and SMEs cannot attract and retain skilled employees, this will have a detrimental effect on the success of the SME and drive up the failure rate. The amount of skilled labour also affected the level of technological advancement. This is because when the labour force pool has a great number of unskilled labourers, this stifles technological advancement as in order to achieve this, one needs to be skilled and educated. The number of skilled laborers also affects the accessibility to finance due to the fact that if SME managers are not skilled and financially savvy, they will not have the knowhow regarding securing financing. Finally, the amount of skilled labour impacts the character suitability of the entrepreneur (Leboea, 2017).

Leg-Tero (2016) supports this claim, suggesting that around 65% of SMEs waste time and money owing to a lack of technical abilities, which includes inability to adopt and use technology to its full potential. As a result, among other things, a lack of skills has been criticised for the limited usage of digital potential (Plastic & Chemical Trading, 2019). People are at the centre of technology change, according to Accenture Consulting (2017), and their desire and preparedness to embrace digital transformation is critical to success. Modern manufacturing is highly capital-intensive, with an emphasis on improving output via the use of technology. New, and more efficient industrial equipment needs fewer but far more highly qualified personnel to operate; hence, the promise of a million jobs is illusory, at least for any country intending to be competitive on a global scale (Schwartzkopff, 2018). An important perspective into this challenge is presented by Sturgeon (2021) that the South African economy is at an important juncture and to benefit from the technological advances of digitalisation, South African-based businesses need to address the tensions highlighted above and fill the digital capability gap related to skills and infrastructure. Although most advanced digital technology will not be created in South Africa, its implementation—particularly in a manufacturing environment—typically necessitates a significant level of adaptability as well as incorporation and offers a solid platform for the development of local skills (Sturgeon, 2021). This proposal advances and protects the current standing of manufacturing SMEs and the cited skills incapacity which may be severely affected if the digitisation progress is not considered from a local skills capability level. Research by Andreoni, Barnes, Black and Sturgeon (2021) recommends the establishment of a priority skills list for essential industrial activities in digitalization, machine learning and Artificial Intelligence. The list needs to direct public digital skills expenditure and should be updated annually in recognition of the rapidly moving digital skills frontier. Also, technology scaling: This necessitates codification and dissemination of successful technology solutions and the provision of scaling-up facilities such as accelerators for digital start-ups and SMMEs.

2.12.1.3 Management competency

According to Tsang, Hui and Law (2012) self-efficacy of SMME owners/managers will definitely have an impact on and boost the confidence of these managers to adopt new technology. Individuals who are extrinsically and inherently motivated and feel highly confident about their skills to explore new technology, or to figure out how to utilise newly installed technology, are probably going to encounter less uneasiness when that new innovation is presented (Hausberg, Hülsdau, Moysidou and Teuteberg, 2017). However, the most significant challenges that most small and medium-sized enterprises' owners/top management experience are a lack of the necessary technical knowledge of the technology and the fact that they are not up to date with emerging information technology (Ghimire and Abo, 2013). SME managers in South Africa have been attributed to lack innovation drive, and the need of

building an innovation culture inside SMEs to maintain sustainability has also been underlined (Maladzhi, 2012).

According to Thong and Yap (2011), the likelihood of most SMME owners/managers considering the implementation and usage of emerging and sophisticated technology, depends on their level of knowledge of such technology. Therefore, SMMEs are unlikely to adopt and use technology that they barely know. In the research conducted by Mingaine (2013), it was discovered that most employees with limited knowledge of technology are unlikely to see the need to implement and utilise emerging technology. Strategy, culture, and people development are more important than technology in a successful digital transition (El Sawy, Kraemmergaard, Amsinck and Vinther, 2020). According to Sainger (2018), the manager is the one who thinks deeply about the relevant technologies required to maintain business success. Managers must recognise how to use the many tools and applications of the digital world, as well as the influence they have on their interactions with various stakeholders such as customers, partners, and workers, as stated by Bennis (2013), or they will be left behind in this digital realm. Taticchi, Tonelli, and Cagnazzo (2010) discovered that SMEs prioritise technical and technological skills above studying and establishing supportive management practices. However, Machado, Winroth, Carlsson, Almström, Centerholt, and Hallin (2019) discovered that problems or hurdles to digital transformation experienced by manufacturers might be avoided or reduced by a more organised initiation phase focusing on organisational and management practises. To encourage cross-functional interaction, Nosalska, Pitek, Mazurek, and Rzdca (2020) suggested that engineers and managers collaborate to build a shared vision and understanding of Industry 4.0. For SMEs, it is vital to secure top management support and to define the vision, goals, and investments at the strategic level, while also incorporating intermediate managers and operators / lower-level employees. Jumping into technology considerations, according to Machado et al. (2019), might cause managers and engineers to forget or just briefly address the aim of the digital transformation. It's easy to ignore how it relates to the company's goals or competitive advantages that may be gained by growing digitalisation.

2.12.1.4 Business model and processes

The management of operations should not just be focused on software-hardware updates. It is an adaptation of its institutional and operational ecosystems of any entity in terms of new business and thinking methods in an attempt to keep a pace with digitization by benefiting from digital factors. When digital transformation is mentioned, digitization should not only come to mind. It should be an application of a flexible business model (Ulas, 2019). Small and medium-sized businesses risk losing competitiveness, development and profitability if they do not embrace digital transformation (Ulas, 2019; Li, Su, Zhang, and Mao, 2018), and they frequently abandon digital initiatives because they do not know how to integrate them into their day-to-

day operations (Lehner and Sundby, 2018; Reis, Amorim, Melo, and Matos, 2018). Classic business models have been disappearing and substituted for business models which are flexible, changeable instantly, having real-time responses to consumers' habits and are knowledge-based. When the changes in the business world as a result of Industry 4.0 are reviewed, it is drawn attention that manufacturing, and manufacturing process become practical (Standard, 2016). It is not enough to embrace as many technologies as possible when it comes to digital transformation. The strategy is evolving; it must have a strong vision for the company's future, and it must be backed up by the limitless possibilities of the technologies that are relevant to the plan. Redesigning and optimising business operations in the most appropriate way for the plan tends to be associated with successful digital transformation. The digital transformation of business appears to be distinct for each business, and it is impossible to provide a plan that is applicable to all (Schwertner, 2017). Digital transformation is largely concerned with manufacturing processes in particular industries. This is especially common in manufacturing firms. It is critical to cut costs through digitising the processes of creating, testing, and manufacturing new products. Mobile apps are more significant for enhancing production processes and staff internal communications than for interacting with consumers who are typically not end-users. Production is increasingly focused on large databases and information computing (Bonnet and Ferraris, 2013). New technologies have sparked business model changes that have challenged and stretched the traditional value chain in order to provide consumers with new goods / services (World Economic Forum, 2016). Digital transformation necessitates a thorough examination of the organisation's present business processes and business strategy. The evaluation comes before the creation of a digital transformation plan (Schwertner, 2017). Nonetheless, based on current scholarship and location-specific context, more inquiry into the indications of digitalisation by SMEs is required. As a result, the goal of this study is to investigate SME digital adoption and involvement in the digital economy using an indicator method that is relevant to the industry's specific difficulties.

2.12.1.5 Financial resources

SMEs have a low survival rate, particularly during the first five years of operation (Hossain, 2020). According to Kgosana (2013), some small firms in South Africa fail during the first year of operation, resulting in five out of seven enterprises failing within the first year. Businesses that persevere at this rate of failure confront financial sustainability challenges (OrtizdeMandojana and Bansal, 2016). Instead of increasing and becoming more advanced, SMEs in industrialised nations have stayed stagnant (Maksimov, Wang, and Luo, 2017). Several of the major issues confronting the financial sustainability of SMEs include economic uncertainty, unreliable exchange rates, raised transaction fees, premature information

facilities, significant inequality, instability in politics, and rapidly worsening unilateralism in trade policy (Islam and Abd Wahab, 2021). Furthermore, SMEs in South Africa, as in the rest of the globe, are required to pay registration and licence fees, as well as taxes, as part of government regulation, which has an influence on their growth (Olawale and Garwe, 2010).

Financing of SMEs in the manufacturing sector has been debated by policy makers, researchers and stakeholders, propelled by the immense economic development contribution of these SMEs across the globe (Ayyagari, Juarros, Peria and Singh 2021; Naude and Chiweshe 2017). Despite manufacturing sector SMEs regarded as one of the major contributors towards the economy's GDP and formal sector employment (Malepe 2014), continuous obstruction and oppression by financial challenges, which hinder the intention of SMEs to innovate and grow (Abor and Quartey, 2010; Soni, et al., 2014; Pillay, 2006; Bernad, Stabilito and Yoo, 2010; Jafarnejad, Abbaszadeh, Ebrahimi and Abtahi, 2013; The Banking Association South Africa, 2017). The Small Enterprise Development Agency (SEDA) (2016) and Sibanda, Hove-Sibanda and Shava (2018) concurred and further indicated immense hurdles faced by SMEs in manufacturing when accessing finance and credit, mainly due to financial institutions' reluctance to invest in SMEs, as the sector is perceived as plagued with numerous challenges. This places severe stress on the manufacturing sector's SMEs, with the lack of funding and bank credit impacting overall firm performance and more specifically, innovation; since own funding and retained earnings are not sufficient to reach and maintain innovation that could secure a competitive edge within manufacturing sector SMEs (Gombarume and Mavhundutse, 2014; Ombongi and Long, 2018).

Business owners frequently consider digital transformation of processes as an expensive endeavour (Ebner and Bechtold, 2012). However, one of the issues that the small company sector in South Africa continues to encounter is finance. The global slowdown in economic growth has resulted in a reduction in small business lending (Msomi and Olarewaju, 2021). Furthermore, the present status of the economy in South Africa, as well as the rand's depreciation against other currencies and high unemployment rates, underscore the reality that bigger enterprises are also suffering survival issues (Small Enterprise Development Agency, 2019). As a result, experts and those directly involved in the industry have been interested in finding strategies to enhance the financial sustainability of SMEs (Kgosana, 2013; Tuffour, Amoako, and Amartey, 2022; Islam and Wahab, 2021).

Financial awareness in SMEs improves access to financial resources by delivering timely and accurate information. Furthermore, adequate access to financial information increases their access to financial resources to associated parties, such as bankers and borrowers (Asandimitra and Kautsar, 2017). Furthermore, he stated that having a strong financial knowledge enables SMEs to meet the challenges of changing business and financial markets. As a result, financial awareness improves SMEs' closeness and accessibility to financial

institutions, as well as making finance more accessible and encouraging the establishment of a healthy structure for capital, hence enhancing financial sustainability (Anderson, 2017). Gong, Gao, Koh, Sutcliffe, and Cullen (2019) revealed that financial knowledge, in both developed and emerging nations, is critical for the survival of SMEs.

2.12.2 Industry-level perspective

2.12.2.1 Industry workforce characteristics

South Africa's manufacturing industry is the country's fourth largest sector which comprises the metals industry, the automotive industry, and the plastic manufacturing industry are among the ten sectors (Republic of South Africa, 2018b; MerSETA, 2018). The manufacturing industry in South Africa is now characterised by a large proportion of unskilled and semi-skilled employees (MerSETA, 2018; StatsSA, 2015). Semi-skilled jobs account for 61.9% of manufacturing jobs, followed by skilled jobs (21.8%) and low-skilled jobs (16.4%) (The DTI, 2019). Manufacturing now employs roughly 11% of the overall workforce in South Africa, down from 14% in 2008. Two decades later, the local manufacturing economy still lacks adequate human capital to benefit from improved market access in high-technology industries. Before SMEs can adopt or use any digital solutions, employees with limited computer or digital literacy need adequate training (Richter, Vodanovich, Steinhüser, and Hannola, 2017). These issues may make digital solutions more difficult to accept or deploy. New technologies in the business, such as robotics and automation, may be to blame for the shift in skill levels. Manufacturers rely on trained workers to run new technology, which is a need in the industry. Businesses acquire, store, and analyse huge quantities of data on a regular basis as their dependence on technology grows (The DTI, 2019). As a result, the majority of SMEs do not contemplate implementing new technology into their operations. The impact of digitisation on personnel is currently insufficient to fulfil demand. In the digital world, the requirement for specialised skills will play a crucial role in meeting demand (Megha, et al., 2020). As shown below, the result of lack of effort in the South African manufacturing industry might be indirectly connected to rising unemployment. Employment in the industry has decreased as a result of the advent of digital and changes in manufacturing digital technology (The DTI, 2019). Because labour-intensive manufacturing is so important to economic development in emerging nations, this is especially concerning (Parschau and Hauge, 2020). In a study of the South African manufacturing industry conducted by Parschau and Hauge (2020), it was revealed that the overall impact of digitalisation on unemployment has been insignificant and is expected to remain so for the foreseeable future. However, increased digitalisation has and will continue to generate employment in some circumstances by increasing business output. Banga and Velde (2018) assert that resolving the constraints to digitalisation will broaden several important opportunities to improve output and exports; generate employment; reduce the cost of

production, allowing small and medium-sized enterprises (SMEs) to enter the industry; and reduce costs of trading, allowing larger international value to be created. The perspectives of The DTI (2017) and Parschau and Hauge (2020) are, however, in significant disagreement. As a result, the preceding arguments demonstrate a scholarly interest in this investigation, with the goal of expanding study into SME digital transformation and its implications for the progress of the digital economy.

2.12.2.2 Government support

According to Musabila (2012), the government plays an essential role in supporting SMEs by providing rules, regulations, and assistance through various organisations such as the Small Industries Development Organisation (SIDO). The government's lack of support has been the most noticeable obstacle in assisting SMEs in South Africa, according to Jere and Ngidi (2020). Similar concerns about the lack of government support are shared by Gareeb and Naicker (2015). The South African government has a number of programs aimed at assisting SMEs, but it does not follow through on its commitments to the public (Jere, et al., 2020). Small enterprises have limited resources and competencies, according to the resource-based view (RBV) of a firm. As a result, a small business cannot always compete with larger enterprises utilising only its own resources and competencies. Recognising the importance and vitality of SMEs' functions, many governments include programmes, financing, policies, and counselling in national economic plans to encourage SME growth and assist small enterprises in gaining a competitive advantage (Eniola and Entebang, 2015; Kraja, Osmani, and Molla, 2014). For example, in South Africa, the government has formulated the Small Enterprise Development Agency and supports annual events such as the Manufacturing Indaba to discuss and support SMEs by delivering inclusive solutions to probe the actualisation of SME potential in the country. Without disregarding the evident effort by the government, (Jere, et. al, 2020). Understanding the factors that drive digital adoption can help SMEs and the government figure out what they need to do to impact SMEs' adoption of digitalisation. However, the government is concerned about small service business competitiveness, and business performance, and growth (Chen, Lin, Chen, Chao, and Pandia, 2021) because of their contribution to the national economy. Therefore, the government needs to enhance the implementation of digital transformation in small service businesses.

In accordance with Koranteng, Osei-Bonsu, Ameyaw, Ameyaw, Agyeman, and Dankwa (2017), complications in tax regulatory systems are a significant impediment to the development and growth of manufacturing sector SMEs. This is also reflected in a survey conducted by the European Central Bank (2017), wherein European SMEs indicated tax compliance and regulations as the most pressing challenge. According to Inasius (2019), dealing with taxes issues remains a key barrier for SMEs in the manufacturing sector due to low knowledge and administrative abilities. Elly (2015) agreed that the most major obstacles

limiting the innovativeness of manufacturing sector SMEs are a lack of skills and tax awareness. In an OECD (2017) report, tax rates and registering for VAT were flagged as onerous challenges to small businesses that affected the development and growth of the business (Lekhanya 2015; Olla 2016). This means the attainment of SARS compliance certificates will continue to be a thorn in the side of new entrants to the market and existing SMEs in manufacturing, more specifically towards their growth and innovation, due to fluctuating tax rates that severely impact their profit margins (Tee, Boadi and Opoku, 2016). This complexity further develops the assertion by The Small Enterprise Development Agency (SEDA) (2016) and Sibanda, Hove-Sibanda and Shava (2018) about limited access to financial resources as a predictor to digital transformation in South African manufacturing SMEs. Nevertheless, Chen, et. al, (2021) many studies have been conducted to examine the government's roles in improving small businesses' productivity and growth, and they concluded that the government's roles in supporting small businesses are indispensable. In contrast, research into government responsibilities in the digital transformation process is scarce. Small firms rely heavily on government policies and programmes, a digital transformation research in small companies must incorporate government functions in order to provide a holistic picture.

2.12.3 Economic / Macro perspective

2.12.3.1 Infrastructure

Increase in the use of advanced information and communications infrastructure and technologies in industry, government and society are some of the key features of a digitally transformed society (Lom, Pribyl and Svitek, 2016). Investing in telecommunications infrastructure and technologies, such as bandwidth and other internet technologies, is therefore crucial for providing digital connection for efficient communication, cooperation, and the incorporation of people, systems, and technologies (European Commission, 2016). Reiterating the importance of reliable telecommunications infrastructure, Zhou and Zhou (2015) assert that industry 4.0 requires the establishment of a comprehensive and reliable industrial broadband infrastructure. Industry 4.0 imposes tight communication network standards, and its communication networks must match these criteria while also being dependable, thorough, and of high quality. For example, Ongori and Migiro (2010) through the use of ICTs infrastructure, SMEs can engage in e-commerce. Electronic commerce will help companies boost their efficiency in day-to-day operations and support their business development by establishing new market channels and enhancing the flow of information.

Reddy (2022) many SMEs have infrastructure difficulties ranging from load shedding to bad transit infrastructure, all of which can have an impact on their operation. Moreover, reduced access to connection, whether due to excessive pricing or inadequate infrastructure, also plays a significant role, affecting ordering, payments, marketing, and many other areas of a

business. This digital gap may impede how firms contact customers in local areas, making growing harder in the long run. For businesses in remote or hard to reach areas, this becomes even more unlikely (Reddy, 2022). Banga, et al. (2018) argues that, in addition to greater capital costs, African countries confront a slower dissemination of ICT and automation technology. This is due to various challenges that African countries continue to experience, including insufficient access to energy and a reliable power supply, poor logistics and infrastructural facilities, a reduced ability to adapt and maintain hardware and software, and a reduction in the positive externalities of having a joined network. Because of a combination of these challenges, African countries have a weaker systems infrastructure, making them less digitally prepared. When load shedding happens in the South African manufacturing sector, manufacturing operations are shut down, resulting in increased downtime, lost productivity, and, in some cases, equipment damage. Due to the limited income generated by such small firms, investing in alternative energy sources is also a difficult challenge, according to Dewa, Van Der Merwe, and Matope (2020). Despite all these challenges, there are many strategies suggested by various scholars in the literature on how to resolve barriers encountered by the SME owner managers in ICTs' adoption (Ongori and Migiro, 2010). The government often provides an infrastructure strategy to aid SMEs by granting subsidies and enabling ICT providers to give discounted services to SMEs at lower prices. The government interventions therefore tend to frame ICTs policy which is crucial in building infrastructure, investing in research and development, facilitating technological transfers, creating science parks and creating a legal framework (UNDP, 2007).

2.12.3.2 Digital economy

According to Banga and te Velde (2018), the digital economy encompasses a wide spectrum of technologies with significant potential to influence industrial organisation and efficiency. This would include (a) mobile networks, which are communication networks utilised by telecommunication operators where the last link (accessed by the consumer) is wireless; (b) cloud computing, which enables (c) automation, in which machines learn from data and algorithms without really being explicitly programmed and can actually interact with other machines using wired or wired-like communications systems. Banga and te Velde (2018) manufacturing is becoming highly automated as a result of expanding digitisation and the expansion of modern technologies such as 3D printing and robots, which is predicted to have a significant impact on the manufacturing process. According to Codreanu (2021), digital technologies are expected to have a significant impact on economic growth estimates in developing countries. Business activities will be transformed in a variety of ways as a result of digitisation. In terms of being ready to engage effectively in the digital economy,

Nevertheless, this is not the primary focus of this investigation but rather a significant outline of the barriers to digital transformation and digital economy participation by SMEs. There is little data available to adequately estimate the size and composition of South Africa's digital economy because every difficulty remains constant. Qualitative data suggests, nevertheless, that South Africa's digital economy is becoming more important. Department of Science and Technology (2020) estimates that the digital economy contributes somewhere between 2% and 19% of GDP in South Africa. Accenture (2017) believes that South Africa's digital economy may improve total GDP by 3%, or USD 12 billion. What is obvious without the necessity for a thorough examination of the digital economy official statistics in South Africa do not now distinguish between the digital and traditional economies. Therefore, there is a need to practically investigate the indication to participate in the digital economy by South African SMEs in the manufacturing sector in order to contribute to the existing body of studies.

2.12.3.3 Unemployment

According to research on this topic, automation and digitalization are some of the most relevant labour market topics today (Piątkowski, 2020) as the technological revolution brings about significant employment changes, the displacement of human employment by robots, and the necessity for employees and organisations to adapt to evolving conditions, as well as its social and economic implications. Digitalisation and the use of industrial robots are widespread; however, opinions are divided on their mass appearance, and the extent of their effects on employees and jobs (Hat and Stoegelehner, 2020; Sima, Gheorghe, Subić and Nancu, 2020). The digital transformation (Borges, Laurindo, Spínola, Gonçalves and Mattos, 2021) of SMEs produces many labour issues towards operational costs to decrease overall expenses, including marketing costs, COVID-19, which influences digitization throughout the world. However, Molchanova (2020) contradicts this notion, asserting that the integration of digital technologies in manufacturing, infrastructure and public services allows integrating digital technologies-based applications to search for solutions in the areas of digital transformation, security, data protection while gaining benefits from digital transformation at all levels and in all aspects of society. Support for start-ups, as well as greater industrialisation and scaling, will result in significant benefits in creative activities within the national economy and in job creation across the country.

European Foundation (2021) highlights the predicted trend in the manufacturing industry as a result of digitisation, bringing forth a result in positive job growth in occupational profiles linked with goods or services that benefit from increasing demand as a result of the adoption of new technology, as well as those affected by modified manufacturing or service providing processes. This is widely discussed in manufacturing in the context of higher-skilled profiles; it is likely to end up in skills transformation in manufacturing employment in addition to such

job creation; it is additionally anticipated that a greater utilisation of advanced technologies will make highly skilled employees more productive. Unfortunately, European Foundation (2021) job losses in low-skilled regular manufacturing work, such as blue-collar production work and basic administrative duties, have been observed in recent decades in the European Union, and will continue, owing to the possibility of automating a large number of the repetitive duties inherent in such jobs (European Foundation, 2021). Deriving from the experience of the European manufacturing industry where a noticeable change is negatively impacting the low skilled employees, the same result can potentially be possible in South Africa. For a better explanation, the manufacturing industry in South Africa is now characterised by a large proportion of unskilled and semi-skilled employees (MerSETA, 2018; StatsSA, 2015). Semiskilled jobs account for 61.9% of manufacturing jobs, followed by skilled jobs (21.8%) and low skilled jobs (16.4%) (The DTI, 2019). Manufacturing now employs roughly 11% of the overall workforce in South Africa, down from 14% in 2008. From Europe's experience, an interesting argument to highlight about South Africa is that (Kleynhans and Sekhobela, 2008) the manufacturing industry is identified as an employment generator. It has the potential of employing 1.7 million people (StatsSA, 2018a) if the country's installed capacity is fully utilised as opposed to the current 81% capacity utilisation (Plastic and Chemical Trading, 2019). Partially using capacity has been linked to a lack of expertise, among other problems (Plastic & and Chemical Trading, 2019). Therefore, it can be deduced from the experiences above that there may be a potential mismatch between digitally transforming SMEs in the manufacturing sector and the level of skilfulness in the general labour population of the industry. Nevertheless, this is not the intention of this study but rather an important distinction to better understand the predictors of digital transformation from different perspectives.

2.13 Review of digital transformation models

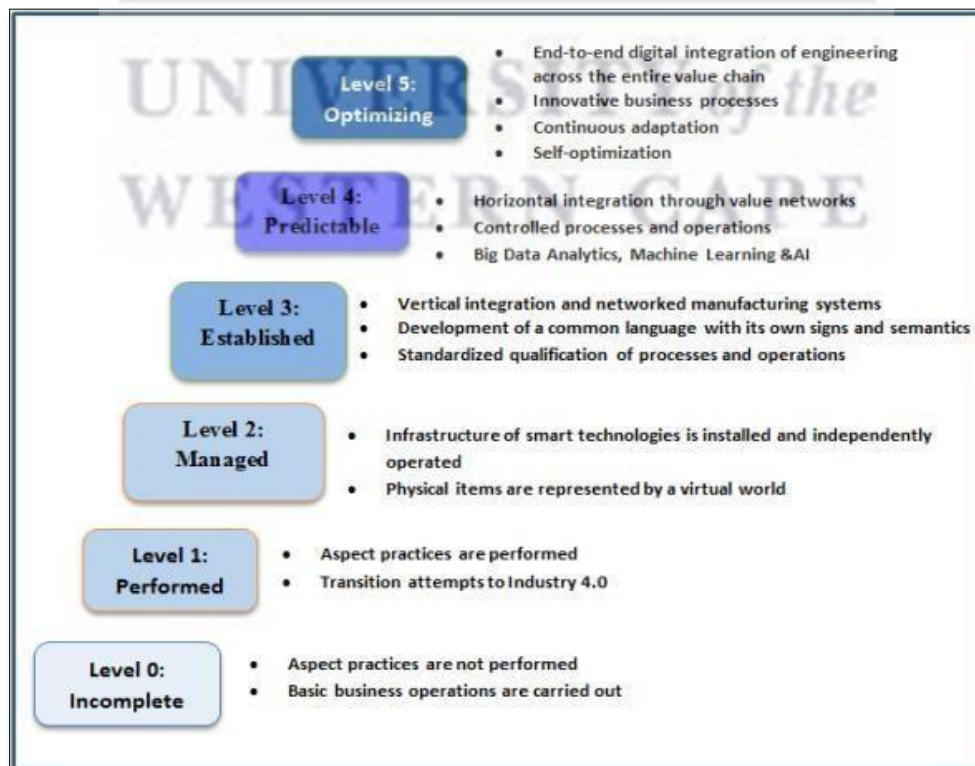
Digital transformation is a technology-induced change on many levels in the organization that includes both the exploitation of digital technologies to improve existing processes, and the exploration of digital innovation, which can potentially transform the business model. Gökalp, Şener and Eren (2017) structured techniques, such as maturity models (MMs) or frameworks, are intended to help organisations by offering detailed direction and establishing a road map. The concept of maturity is used to define, measure, and construct a guideline and a foundation for evaluating business growth (e.g., the maturity of an approach or a technology). The primary goal of employing Maturity Models is to express the amount of perfection for an item, such as a new business model implemented, or new software built. The basic assumption of employing MMs is that as the degree of maturity increases, better progress is made in many elements that contribute to the entity's maturation.

2.13.1 Industry 4.0 Maturity Model

Gökalp, et al. (2017) Industry 4.0-MM has a holistic approach consisting of the assessment of process transformation, application management, data governance, asset management, and organizational alignment areas. This model for manufacturing processes includes six readiness levels ((1) optimizing, (2) predictable, (3) established, (4) managed, (5) performed, and (6) incomplete). The model architecture consists of five dimensions ((a) organizational alignment, (b) process transformation, (c) application management, (d) data governance, and (e) asset management). The aim of the model is to provide a means for assessing a manufacturer's current Industry 4.0 maturity stage and for identifying concrete measures to help them reach a higher maturity stage in order to maximize the economic benefits of Industry 4.0. Also, the model is aimed to provide a complete and comprehensive guideline for enabling organizations to observe their problematic areas and weaknesses as well as practices for applying the transformation to Industry 4.0 in a consistent way.

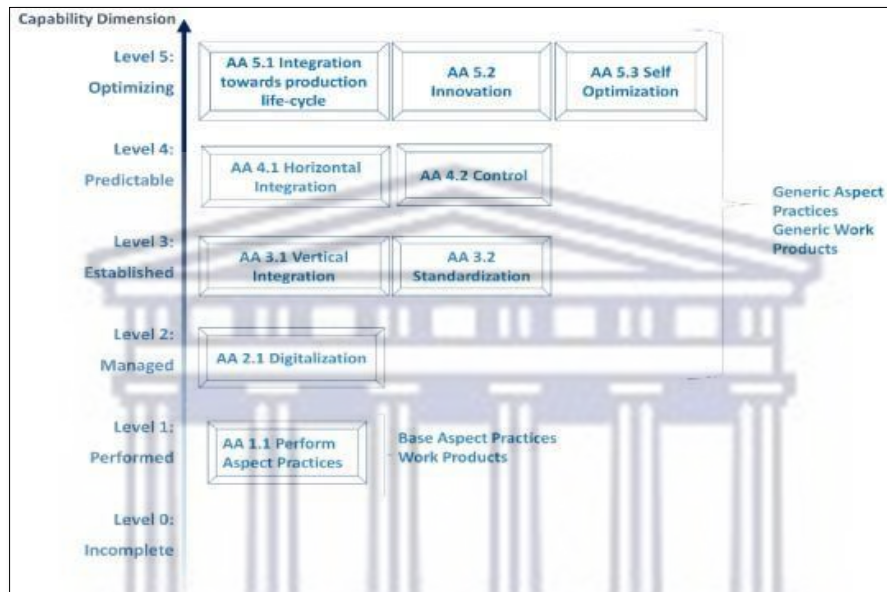
It is critical to understand that effective transitions occur in stages. This methodology results in the development of a roadmap in all important areas, with a step-by-step approach to achieving the advantages that lower the business's investment and implementation risks. The model's approach is based on a succession of capability stages, from the basic requirements for Industry 4.0 to the full implementation. Each stage builds upon the previous one.

Figure 2: Capability Dimensions of Industry 4.0 Maturity Model



Source: Gökalp, et al., (2017)

Figure 3: Capability Levels of Industry 4.0 Maturity Model



Source: Gökalp, et al. (2017)

Level 0 Incomplete: Base aspect practices are partially achieved, or there is no implementation yet. The organization only focuses on the fundamental operations such as requirements analysis, acquisition, production, and sales.

Level 1 Performed: The corresponding aspect practices are achieved. Transformation has started. Technological infrastructure for transitioning to Industry 4.0 is acquired, and the organization tends to employ smart technologies such as IoT. The vision of Industry 4.0 exists, and there is a roadmap for the transition strategy, yet it is not fully implemented. Aspect Attribute (AA) 1.1 Perform Aspect Practices are assessed at this level.

Level 2 Managed: A data set for each operation has been specified and begun to be gathered, but it has not yet been incorporated into the operations' various features. A virtual environment is beginning to represent physical stuff. At this stage, digitisation is appraised.

Level 3 Established: Key business functions and value-added operations are established, and process and operational credentials are consistent with relevant standardisation. The data set for each operation of the organisation is clearly recognised and gathered and methodically kept in a well-managed database. Vertical integration has been accomplished integrating

factory-internal integration of sensors and actuators within machines all the way up to Enterprise Resource Planning systems. At this level, AA 3.1 Vertical Integration and AA 3.2 Standardisation are evaluated.

Level 4 Predictable: Horizontal integration, including the integration of production networks at the business level is achieved by supply chain integration, but might include more in the future, when close-to-real-time and product- or process-specific information is exchanged to increase the level of detail and quality in distributed manufacturing optimization. Data analytics tools are employed to improve productivity of manufacturing organizations. The functionalities of whole enterprises are integrated in order to increase the efficiency of operations (i.e., the integration of SCM and CRM applications). Data is used to control the process and operations in real-time. AA 4.1 Horizontal Integration and AA 4.2 Control are assessed at this level.

Level 5 Optimizing: Integration towards engineering and product or production life to enable low-effort knowledge sharing and synchronization between product and service development and manufacturing environments has been achieved. The organization starts to learn from the collected data and tries to improve its business continuously. The company model is transforming into a novel framework. At this level, AA 5.1 Integration towards the manufacturing life cycle, AA 5.2 Innovation, and AA 5.3 Self Optimisation are evaluated.

As highlighted in the beginning of the study, the terminology Industry 4.0 is related to digital transformation and may be used interchangeably. However, this context of the maturity model is explained as a technical and industry-based transformation. Industry 4.0 is defined as a successful transition from on-premises production systems and processes to “Smart Production”, “Smart Manufacturing”, “Integrated Industry”, “Connected Industry” or “Industrial Internet”, which covers distributed and interconnected manufacturing equipment, and requires intelligent systems, a proper engineering practice and related tools (Gökalp, et al., 2017).

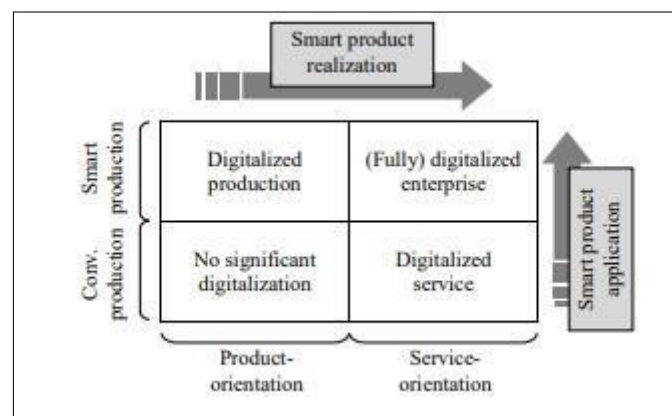
On the other hand, Rupeika-Apoga and Petrovska (2022) defines digital transformation as a holistic SME process, from business operations, models, and competencies and is not based on a particular business area, process, industry or certain mode of technology. Therefore, because the Industry 4.0 Maturity Model highlights the manufacturing SMEs from the two perspectives, technical and industry perspective, it cannot be adopted to formulate the conceptual framework. An important distinction of this study is to examine the digital transformation of manufacturing SMEs from a subjective perspective. This means that all SME individual experiences have to be understood from a critical and individualistic perspective before concluding a generalised Cape Town high level industry perspective of which this model switches the approach around and favours the latter.

2.13.2 Maturity Model for Digitalisation

Klötzer and Pflaum (2017) developed the Maturity Model for Digitisation and the objective was not only the development of a suitable, to a furthest possible extent generic, and comprehensive maturity model addressing digitalization within the manufacturing industry, but also the thorough, transparent, and accountable documentation of the process behind it. Maturity can be described as a state in which an organization is in perfect condition to achieve its objectives (Andersen and Jessen, 2003). According to (Fraser, Moultrie and Gregory, 2002) this condition has to be reached through the development of the object under observation over several intermediate states. According to Klötzer and Pflaum (2017), the model is a continuous method in which dimensions are not assigned to a single level, but rather each dimension travels through the five degrees of maturity. Regarding its purpose, a maturity model can aim at “as-is” assessments (descriptive), at indicating on how to identify and reach desirable future levels (prescriptive), or at enabling internal and external benchmarking (comparative), for example across industries (De Bruin, Rosemann, Freeze and Kaulkarni, 2005; Röglinger, Pöppelbuß and Becker, 2012). At the moment, the maturity model is mostly descriptive, but it has the ability to serve prescriptive and comparison goals as well.

The maturity model consists of two facilitators of digital transformation: smart product application and smart product realisation. Both lead to two maturity models and consist of five stages namely, “(1) the data-driven enterprise, (2) thinking in service systems, (3) the serviceoriented enterprise, (4) smart networked products, and (5) digitalization awareness) via nine dimensions ((a) innovation culture, (b) cooperation, (c) strategy development, (d) process organization, (e) complementary IT system, (f) smart product/factory, (g) offering to the customer, (h) competencies, and (i) structural organisation.”

Figure 4: Different perspective on smart products



Source: Klötzer and Pflaum (2017)

Table 6: Digital transformation with respect to smart product realisation

Smart product realization	Level of maturity				
	Digitalization awareness	Smart networked products	The service-oriented enterprise	Thinking in service systems	The data-driven enterprise
Strategy Development	Product roadmap defined and realized	Roadmap for smart products defined and realized	Roadmap for smart services defined and realized	Integrated roadmap for (smart) service systems defined and realized	Roadmap for a data-driven enterprise defined and realized
Offering to the customer	Portfolio of physical products	Smart products with data processing capabilities	(smart) product-service combinations	"Product as a Service" approach established	Services based on (B)DA ("data as a service")
"Smart" product	Conceptual framework for smart products defined	Product with embedded microelectronics	Product with embedded software services	Product with ES and open interfaces	Smart product embedded in a (B)DA infrastructure
Complementary IT system	Reference model for a digitalized enterprise defined	Standardized interfaces for smart products implemented	Complementary innovations implemented	Reference model fully implemented across companies	(B)DA implemented as key innovation
Cooperation	Exchange and transfer of knowledge through innovation networks	Cooperation with technology partners	Cooperation with service providers	Strategic service network (ecosystem) established	(B)DA provider integrated (into the ecosystem)
Structural organization	Promoter on board level	Internal R&D organization adapted	Internal (smart) service organization installed	Service ecosystem unit installed	(B)DA unit installed
Process organization	Defined business processes	PLM process adapted for smart products	CRM process adapted for smart products	SSM process defined and established	DLM process defined and established
Competencies	Competencies for TIM accessible	Competencies in ES accessible	Competencies in Service Engineering and Design accessible	Competencies in SSE accessible	Competencies in (B)DA accessible
Innovation culture	Openness for digital technologies	Focus on (smart) product-service combinations	Service innovation thinking established	Digital enterprise thinking established	Understanding of data as an important value carrier

Source: Klötzer and Pflaum (2017)

"Digitalisation awareness" constitutes a "typical" first level of maturity, as no significant developments took place at this juncture. The respective company nevertheless realizes imminent disruptive changes and corresponding challenges triggered by digitalization and takes appropriate preliminary measures. On a second level ("smart networked products"), the embedding of microelectronics into physical objects following the premises of CPS becomes implemented. Within a "service-oriented enterprise", those objects then provide the basis for "smart" services, whereby the actual ICT-component within such product-service combinations evolves into a rather enabling role. When furthermore "thinking in service systems", services become aggregated or interconnected to demand actuated, solution-oriented service systems (Bohmann, Leimeister and Möslin, 2014). This development certainly does not only take place internally, but also – in the sense of a digital enterprise – alongside the whole supply chain. Effectively, the target-condition of digital transformation can already be considered as reached during the fourth maturity level.

This Maturity Model for Digitisation as developed by Klötzer and Pflaum (2017) is applicable to the enterprises in the manufacturing industry which makes it relevant to review. However, the 9 dimensions for smart product realisation which they are innovation culture, (b) cooperation, (c) strategy development, (d) process organization, (e) complementary IT system, (f) smart product/factory, (g) offering to the customer, (h) competencies, and (i)

structural organization) are more inclined towards a developed and matured business instead of a Small Medium Enterprise which is the focus of the study. For example, the literature has characterised the manufacturing SMEs in South Africa as an industry with limited employee skilfulness, limited investment in digital transformation, less innovative management and culture. Furthermore, the dimensions are subjective to the internal capacity of the enterprise, excluding the external environment which SMEs operate in and are influenced by thereof. The scope in which the above-mentioned 9 dimensions measure is beyond the application of the present SME outline and if adopted to develop the conceptual framework may produce inaccurate accounts for the study. However, it was important to study the maturity model to obtain a better understanding of the different approaches to measure digital adoption and be able to reasonably adopt the appropriate model to substantiate the development of a suitable conceptual framework.

2.13.3 IMPULS Industry 4.0 Readiness Model

Developed by Lichtblau, Stich, Bertenrath, Blum, Bleider, Millack and Schröter (2015), this model is based on six maturity levels ((1) performer, (2) expert, (3) experienced, (4) intermediate, (5) beginner, and (6) outsider) and six dimensions ((a)strategy and organization, (b) smart products, (c) smart operations, (d) smart factory, (e) employees, and (f) data-driven services). The appropriate indicators are used to measure an aggregate of 18 things.

Small and medium-sized businesses, in particular, are particularly unsure about the path of development to be pursued as well as the current development potential in the Industry 4.0 environment. In order to cope with this situation, the concept of the maturity model offers a solution.

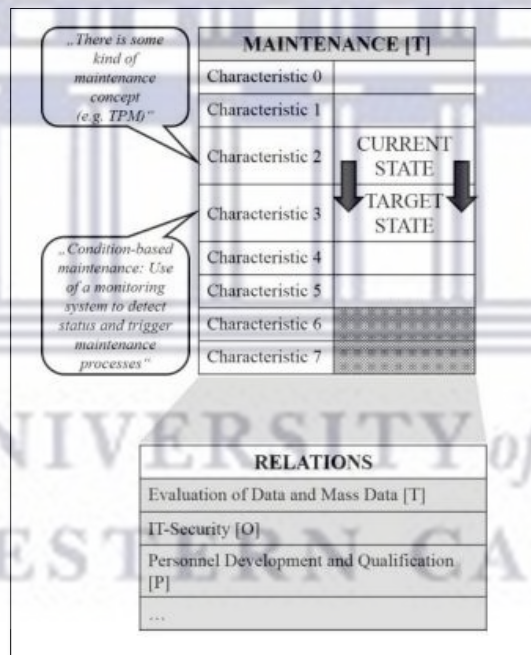
Table 7: Criteria within the maturity model concept

Criteria	Number of Characteristics	Main Dimension
Machine Data Acquisition	5	T
Maintenance	5	T
Evaluation of Data and Mass Data	5	T
...
IT-Security / Industrial Security	4	O
Deployment of Personnel	6	O
Personnel Capacity Data	6	O
...
Expertise	6	P
Methodical Expertise	6	P
Personnel Development and Qualification	5	P
...

Source: Stefan, et al., (2018)

The maturity model concept presented here is used for a detailed determination of the enterprise's current state as well as for the determination of desired target states in a variety of areas. Achieving a target status that the enterprise strives for is a process which successful realization often requires further progress in other areas. This implies that progress in one criteria of the model may also need an advance in other criteria in order to ensure the successful achievement of the target state. This is due to the socio-technical approach (Block, Freith, Kreggenfeld, Morlock, Prinz, Kreimeier and Kuhlenkötter, 2015; Hirsch-Kreinsen, 2014) as well as to the preceding approaches (Leavitt, 1965), which indicate that the overall system of production and the interdependencies that occur here must be taken into account when changing processes in technical, organizational and personnel areas shall be successful. The following example is based on one of the classifications carried out by the enterprises which are part of the research project Adaption (Fig. 2).

Figure 5: Visualisation of Relations using the criteria Maintenance as an example



Source: Stefan, et al., (2018)

In this example, an enterprise has the objective to achieve characteristic 3 within the criteria "Maintenance", starting from the currently determined characteristic 2. In this context the criteria "Maintenance" has Relations to further criteria, which could affect the achieving of the target state. These are, inter alia, the criteria: Technical Machinery and Equipment Documentation, Evaluation of Data and Mass Data, Human- Machine-Interface, IT-Security and Personnel Development and Qualification. Further information to special Relations to criteria of the dimension personnel will be discussed at a later point.

2.13.4 The DREAMY model

The DREAMY model, developed by De Carolis, Macchi, Negri and Terzi (2017) is used to evaluate the maturity indices of each business's process area. The model is important to help manufacturing companies assess their processes so to figure out how they are ready for the digital transformation, it also helps in developing their transformation roadmap. The goal of maturity models for this purpose is to evaluate the status of the organisation or process. The secondary goal is to identify a manufacturing company's strengths, limitations, and possibilities, as well as to develop a digitisation roadmap. A manufacturing company's digital readiness is then determined using a maturity scale. These levels represent the current 13 capabilities of the company. The maturity levels are based on CMMI framework principles (Fumagalli, Macchi, Pizzolante, Crespo, Márquez, and Fernandez, 2010; Macchi and Fumagalli, 2013). Per De Carolis et al. (2017), these maturity levels have been modified in order to collect the definitions, and hence the meaning, of the digital readiness levels for the DREAMY model.

Nonetheless, according to Geissbauer, Vedso, and Schrauf (2016) and Porter and Heppelmann (2014), the successful implementation of digital transformation in manufacturing is still dependent on the state of practice: it could slow down, or even block, implementation. Indeed, a minimum level of capabilities is required before implementing the digital technologies in a company. At the end, successful companies will become true digital enterprises, with physical products at the core, augmented by digital interfaces and innovative services (Geissbauer, et al., 2014). In a futuristic and disruptive vision, these digital enterprises will work together with customers and suppliers in industrial digital ecosystems (Geissbauer, et al, 2018). According to Bechtold and Lauenstein (2014), manufacturing organisations should conduct a full digital maturity assessment in order to have a clear picture of their present degree of digital readiness. A thorough awareness of the current condition of digitisation is, indeed, the first step towards a successful transition. Organisations should examine the corporate environment for possibilities generated by digital technology if they have a clear view on their digital maturity.

In fact, three application-specific purposes can be identified in literature (De Bruin, et al. (2005); Pöppelbuß, et al. (2011); Maier, et al. (2012), García-Mireles, et al. (2012)).

1. Descriptive purpose: maturity models with this purpose, want to assess the as-is situation of the organization or process
2. Prescriptive purpose: a prescriptive model focuses on the domain relationships to performance and indicates how to approach maturity improvement in order to positively affect business value

3. Comparative purpose: a comparative model enables benchmarking across companies; in particular, a model of this nature would be able to compare similar practices across organizations in order to benchmark maturity within different industries.

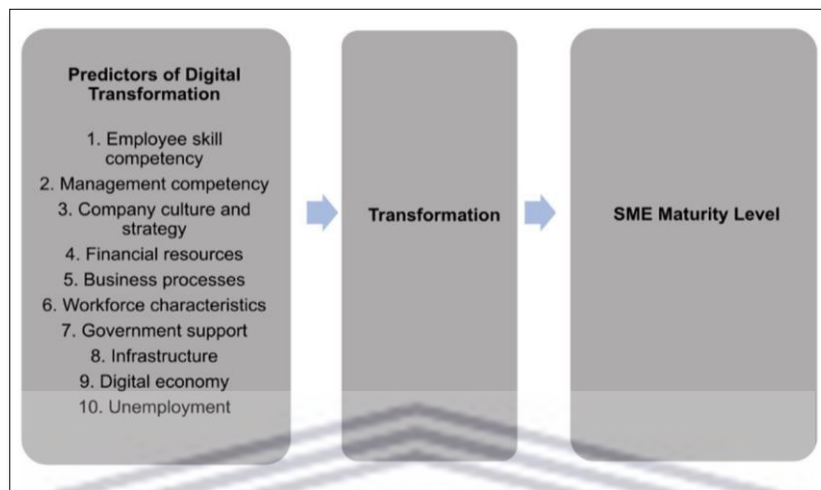
Even though these three types of maturity models can be seen as distinct, they are the evolutionary phases of a model's life cycle. In reality, a model is descriptive in its first phase in order to obtain a greater grasp of the present domain condition. A model may then be developed to be prescriptive, as significant and repeatable changes can only be done with a thorough grasp of the existing condition. Finally, in order to get adequate data for meaningful comparison, a model with comparative aims must be deployed in a wide variety of companies (De Bruin et al., 2005).

Table 8: Maturity Levels of digital transformation

Maturity Level	Description
ML 1 Initial	The process is poorly controlled or not controlled at all, process management is reactive and does not have the proper organizational and technological "tools" for building an infrastructure that will allow repeatability / usability / extensibility of the utilized solutions.
ML2 Managed	The process is partially planned and implemented. Process management is weak due to lacks in the organization and/or enabling technologies. The choices are driven by specific objectives of single projects of integration and/or by the experience of the planner, which demonstrates a partial maturity in managing the infrastructure development.
ML3 Defined	The process is defined thanks to the planning and the implementation of good practices and management procedures. The management of the process is limited by some constraints on the organizational responsibilities and / or on the enabling technologies. Therefore, the planning and the implementation of the process highlights some gaps/lacks integration and interoperability in the applications and in the information exchange.
ML4 Integrated and Interoperable	Being the process built on the integration and on the interoperability of some applications and on the information exchange, it is fully planned and implemented. The integration and the interoperability are based on common and shared standards within the company, borrowed from intra- and/or cross industry de facto standard, with respect to the best practices in industry in both the spheres of the organization and enabling technologies
ML5 Digital Oriented	The process is digital oriented and is based on a solid technology infrastructure and on a high potential growth organization, which supports – through high level of integration and interoperability – speed, robustness and security in information exchange, in collaboration among the company functions and in the decision making.

2.13.4.1 Conceptual Framework: The SME – DREAMY Model

Figure 6: Conceptual maturity model



The proposed conceptual framework considers the internal and external environmental predicting factors that are not unique to the South African manufacturing SME industry. As demonstrated by the literature, the micro, market and macro business level factors severely determine the digital transformation capacity of SMEs prior to the attention to industrially classify the operating sector. For the purposes of this study, the manufacturing SME circumstances of Cape Town have been generalised under the South African umbrella of findings in this subject and there is a need to segregate the outcomes accordingly so as to fulfil the study objectives. Hence, to develop the conceptual framework, the SME business level perspective, Industry-level perspective and Macro-level perspective have been adopted as a metric to conceptualise an inclusive research framework that is informed by a fair and substantiated scope of literature. Furthermore, the predictors of digital transformation, as renamed, will be perceived as the confirmed as-is state of manufacturing SMEs and the conceptual model has the role to prove whether or not the digitisation current circumstances and research objectives reflect the truest operating state of the SMEs within the Cape Town manufacturing context.

Table 9: The predictors of digital transformation at different levels

Business-Level Perspective	Predictor of Digital Transformation
SME Business-Level Perspective	Employee skill competency
	Management competency
	Company culture and strategy
	Financial resources
	Business model / processes
Industry-Level Perspective	Industry workforce characteristics
	Government support
Macro-Level Perspective	Infrastructure
	Digital Economy
	Unemployment

Adoption of the DREAMY Model

The partial application of the model is to provide an indication of where in the digitisation journey are the manufacturing SMEs or if they are ready to participate in the digitisation agenda. This means that the DREAMY model will not be fully applied, instead, the maturity levels will be adopted. The outcome will be the readiness to digitise which, according to the conceptual framework, will be evaluated and viewed as an indication towards the interest of digitisation.

In the predictors of digital transformation, the business process / model is an area that has been elaborated on, particularly the business areas which digitisation is likely to be approached. In developing this framework, integral levers of maturity measure such as the integration and interoperability are important to explain in order to highlight a better level of context. Along the maturity levels, it is worth remarking the relevance of integration, either vertical or horizontal one, as well as intra- or inter-companies, and of interoperability: they are two primary levers to enable digital orientation (Carolis, et. al, 2017). Integration is a commonly known concept: it is the first systemic paradigm used to organise humans and machines at different levels Vernadat (2002) such as, management and corporate level to produce an integrated enterprise system. It has been recognized since long in its importance for the manufacturing chain within the networked enterprise, in order to control and to manage the customised manufacturing of both goods and services as desired by the Internet society (Morel, Panetto, Zaremba and Mayer, 2003). Being the process built on the integration and on

the interoperability of some applications and on the information exchange, it is fully planned and implemented. The integration and the interoperability are based on common and shared standards within the company, borrowed from intra- and/or cross-industry de facto standard, with respect to the best practices in industry in both the spheres of the organization and enabling technologies (Carolis, et al., 2017).

The role of digital transformation is extended by the intention of this study and by the adopted definition of digitisation by Rupeika-Apoga and Petrovska (2022) which explains it as the process creation of a digital version of an analogue or physical process or item. This conversion process leads to a shift in business operations, models, and competencies to adapt to available technologies, and it never ends. Continuous innovation, the ability to respond quickly to change, as well as the ability to take advantage of challenges and opportunities are required to ensure success.

Relating to the maturity level assessment criteria with maturation as primary subject matter, maturity models are required to define central constructs related to maturity and maturation (Becker, Niehaves, Pöppelbuß and Simons, 2010). Although most maturity models do not define but circumscribe maturity (Kohlegger, Meier and Thalmann, 2009), it has to be defined what maturity means in relation to the class of entities and application domain under investigation. A multidimensional approach facilitates the definition of assessment criteria for a descriptive purpose of use and the classification of improvement measures for a prescriptive purpose of use. Maturity levels are central constituents of maturation paths. Moreover, the rationale behind maturation needs to be disclosed by means of the logical relationship between successive levels (Kuznets, 1965). According to de Bruin et al. (2005), maturity models can be structured hierarchically into multiple layers referring to different levels of granularity of maturation. Maturity models that operationalize maturity by means of multiple dimensions can refer to these dimensions for deducing and structuring assessment criteria. In order to ensure the comparability of maturity assessments, the criteria should exhibit a high level of intersubjective verifiability, i.e., the corresponding descriptions are precise, concise, and clear to discriminate between levels (Maier, et al., 2009).

2.14 Conclusion

This chapter outlined key constructs and findings from the relevant literature. The chapter outlined key challenges influencing the adoption of digital transformation by SMEs and the various models that seek to explain digital transformation. In the following chapter, the methodology adopted to address the research question is discussed.

CHAPTER 3: Research Methodology

3.1 Introduction

This research primarily probes to determine the direction of digital transformation in Cape Town manufacturing SMEs. Chapter 3 emphasises on the diversified small businesses and their experiences in the digitisation path, as guided by the objectives of the study. Also, this chapter is responsible for outlining the methodology and approach which the data will be collected and disseminated. Moreover, the guidelines that were followed when conducting the study, including the population, sample, demographics, and research design are all discussed. The questionnaire structure and method of question development is also discussed. Lastly, this chapter offers an approach and procedure for data analysis.

3.2 Research paradigm

A research paradigm, according to Kivunja and Kuyini (2017), is the conceptual lens through which the researcher evaluates the methodological components of their research project in order to identify the research methodologies that will be utilised and how the data will be examined. Based on Denzin and Lincoln (2011), paradigms are human creations that deal with basic principles or ultimate's that indicate where the researcher is coming from in order to generate meaning contained in data. According to Rehman and Alharthi (2016), there are three methods to educational research: 1) Optimism 2) Objectivism 3) Critical thinking. The interpretive paradigm is the most suitable technique for this study since Grix (2018) goal is to grasp social phenomena in their context.

The majority of the information that interpretivists obtain from participants over a period of time is qualitative. Inductive analysis is the method used to examine the data so produced. The inductive researcher, according to Creswell and Clark (2007), is someone who starts at the bottom and builds themes and a theory by drawing on the perspectives of the participants. To comprehend a phenomenon and develop a theory, the researcher for this study looks for patterns in the data that may be grouped under broad themes. Thus, by employing this paradigm, it is ensured that the data acquired is thematically analysed to comprehend the subjective experiences of SMEs that cannot be critically captured when generalised. For example, the outcomes of the data indicate various ways which the SMEs choose to adopt digital transformation such as the use of digital payment systems and social media to facilitate marketing. Although these are different internal business areas that are advanced using digital tools, the category is ascertained to a single conclusion, therefore result to a development of a new theme. Similarly, the data indicated outliers that fall outside of the determined theme that needed to be considered separately by the researcher.

3.3 Research design

The research model is organised using research design to create a structure that presents and connects every component of the research project and process. It demonstrates how each part of the study logically and step-by-step leads to an empirical conclusion that addresses the researcher's identified issues (Creswell, 1998). The research design is founded on the philosophical perspective of the researcher and the research paradigm the study follows; therefore, this research study employed an exploratory case study within a qualitative methodology. The data was collected through structured interviews to understand the current state of the SMEs as guided by the research questions and literature with the intention to discover new outcomes around their digitisation journey. Furthermore, the exploratory case study allowed the researcher to produce conclusions that are not confined to a set of predetermined outcomes as presented or understood in the literature review. Hence, this study is able to present practical recommendations that are beyond the scope of understanding as per the literature on how digitisation can be achieved in the Cape Town manufacturing SMEs.

3.4 Population and sampling

3.4.1 Population

Arias-Gómez, Villasís-Keever and Miranda-Novales (2016) the study population is defined as a set of cases, determined, limited, and accessible, that will constitute the subjects for the selection of the sample, and must fulfil several characteristics and distinct criteria before the selection of the study sample, selection criteria and sampling methods. The population of the study is derived from the topic of this study which focuses on the Cape Town geographical location, hence qualifies all the registered manufacturing SMEs in the Cape Town area as target population. The characteristics of the population includes the registration of the SMEs, which is by the strict definition of the National Small Business Act, No. 102 (1996) defined.

3.4.2 Sampling techniques

Bhardwaj (2019) defines sampling as the process of selecting a representative group from an individual or from a big population for a certain type of research goal. Bhardwaj (2019) a sample, as used in research, is a selection from a large population of individuals, things, or things for measurement. Purposive sampling was used in this study to apply non-probability sampling. Purposive sampling, according to Bhardwaj (2019), means that the samples chosen will be good responders for that specific study. The population of this study is all the manufacturing SMEs in Cape Town and includes formal and informal SMEs. Hence, the formality of the SMEs is an important characteristic for this study to respond to the research questions and can be achieved by the application of purposive sampling.

3.4.3 Sampling frame

A sample frame is a set of elements from which a sample will be chosen (DiGaetano, 2013). In order to draw conclusions from the population, the researcher chose the SMEs based on the broad range of commodities they manufacture. This was done in an effort to obtain an indepth understanding of the subject from various perspectives. The exploratory nature of the research necessitated a thorough understanding of the research problem, so the researcher gave careful thought to which SME was chosen. In particular, the SME that were interviewed are all located in Cape Town, manufacture actual goods, and not just provide services for already manufactured goods from other suppliers in their value chain. The products which they manufacture range from furniture, candles, jewellery to soap.

3.4.3 Sample size determination

Prior to analysis, the study follows the qualitative approach, which depends on data saturation to get the appropriate data. According to Glaser and Strauss (1967), saturation occurs when there is no more data available that would allow the researcher to further develop the characteristics of the category. The researcher develops an empirical finding that a category is saturated when he repeatedly observes cases that are identical to one another (Glaser and Strauss, 1999). Manufacturing SMEs were specifically sampled based on the numerous products they produce in order to have a thorough understanding of the digital transformation of the targeted sample. This means that some of the participants are likely to share a common or similar manufactured product with one another, which gives a better insight into the data generated as compared to one participant per line of manufacturing. The sample size of the participants could not be predetermined because the research applied data saturation to achieve the targeted number of participants unlike if the quantitative approach was applied. At the end of data collection, 8 participants were interviewed, and data saturation was achieved to fulfil the research objective and answer the research questions.

Before collecting the data, the following constraints were considered

- **SME unfamiliarity with the subject of digitisation:** From the literature conducted in Chapter 2, it is explained that many SMEs do not find digital transformation relevant to them due to various factors such as financial constraints. This meant that other approached SMEs participants would not be willing to participate due to the limited awareness about the subject
- **Budget constraints:** To take time away from a small business owner is money because they are responsible for almost many other business functions, therefore the researcher may have to purchase a product or two in order for the participant not to feel like the study is a waste of money to them. Also, for SMEs that the researcher

cannot physically visit, the interviews would have to be conducted telephonically which adds to the budget constraints.

- **Data saturation:** The sampled SMEs operate in the manufacturing sector but produce various goods. Therefore, it may be difficult for some questions to be similarly categorised. However, the focus remains the similar answers that assist the researcher to achieve saturation.
- **Time constraints:** Generally, many businesses do not operate during the weekend and the researcher having other commitments, the data collection may be delayed. Also, some SMEs may cancel at the last minute or reschedule the interviews.

3.5. Data Collection Instrument Development

The study adopts an open-ended interview facilitated by the researcher. The study adopted the research questions and guided by the gaps in the theory explored in Chapter 2 around the predictors of digital transformation in the conceptual model.

Table 10: Questionnaire development

Business-Level Perspective	Predictor of Digital Transformation	Research question
SME Business-Level Perspective	Employee skill competency	How far are manufacturing SMEs with digital transformation?
	Management competency	Which business areas do manufacturing SMEs target for the digitisation agenda?
	Company culture and strategy	Did COVID-19 affect manufacturing SME digitisation
	Financial resources	Did COVID-19 affect manufacturing SME digitisation
	Business model / processes	
Industry-Level Perspective	Industry workforce characteristics	How far are manufacturing SMEs with digital transformation?
	Government support	How can SMEs be supported to participate in the digital economy?
Macro-Level Perspective	Infrastructure	How can SMEs be supported to participate in the digital economy?
	Digital Economy	
	Unemployment	

Source: Researcher's own

3.6 Data collection

To ensure the safety of the data obtained, the questionnaire was saved on a cloud drive folder. The research questionnaire was not shared before the interview; however, the participant would have received the information and consent document. The transcribed data is also kept in a shared folder together with other relevant material for this research such as ethics committee approval.

3.6.1 The data collection method

The data collection was facilitated by the researcher using a questionnaire, and the process was completed via telephonic interviews and in-person interviews. The researcher scheduled appointments with the participants and the consent forms were distributed to the entrepreneurs ahead of the scheduled time of the interviews and were received back before the interviewees were conducted. The interviewees were reassured before the interviews about the confidentiality of their data and were given an opportunity to ask any other questions they might have. No other questions were raised before the interviews because the consent form was clear and the message of request for participation were translated in languages, they could understand such as English, Afrikaans and IsiXhosa. These messages were sent via different platforms such as Facebook, Email and WhatsApp.

The data was collected within and out of business hours because many of the entrepreneurs were unavailable during the day. The interviews were recorded using a mobile device (cell phone) and later transcribed using an application Otter. No raw data was filtered or paraphrased. However, some parts of the responses were given in native languages and needed to be translated to ensure the uniformity and integrity of the answers and research outcomes. Each interview took approximately 30 - 35 minutes on average since the structured questions allow the participants to provide as much detail as possible when responding to questions.

In terms of the in-person interviewees, only 1 participant was available to conduct the interview during business hours. No differences were noted in the responses between in-person and telephonic responses to the questions, the same asking approach was applied and the participants were at liberty to respond in their suitable manner. However, there were noise disturbances which necessitated the researcher to repeat the questions for clarity.

Below are the advantages and disadvantages of using telephonic interviews and in-person interviews for this particular study which were identified by the researcher. The table below is constructed by the researcher based on the experience during the data collection.

Table 11: Advantages and disadvantages of using telephonic and in-person interviews

Advantages of telephonic interviews	Disadvantages of telephonic interviews	Advantages of in-person interviews	Disadvantages of in-person interviews
Cost-effectiveness as there is no need to travel to the SME premises	The lengthier the interview the more expensive the costs are to the researcher	Better engagement, assurance and comfort for both parties	Load shedding duration may force the SMEs to close temporarily which may result to the cancellation of the interview
Allows for time flexibility considering unforeseen business commitments	Lack of in-person engagement which promotes assurance and comfortability for both parties	Depth in responses can be prompted by the researcher based on their facial expressions that suggest interest or confusion.	
Due to load shedding, temporary close of business premises does not affect the set interview			

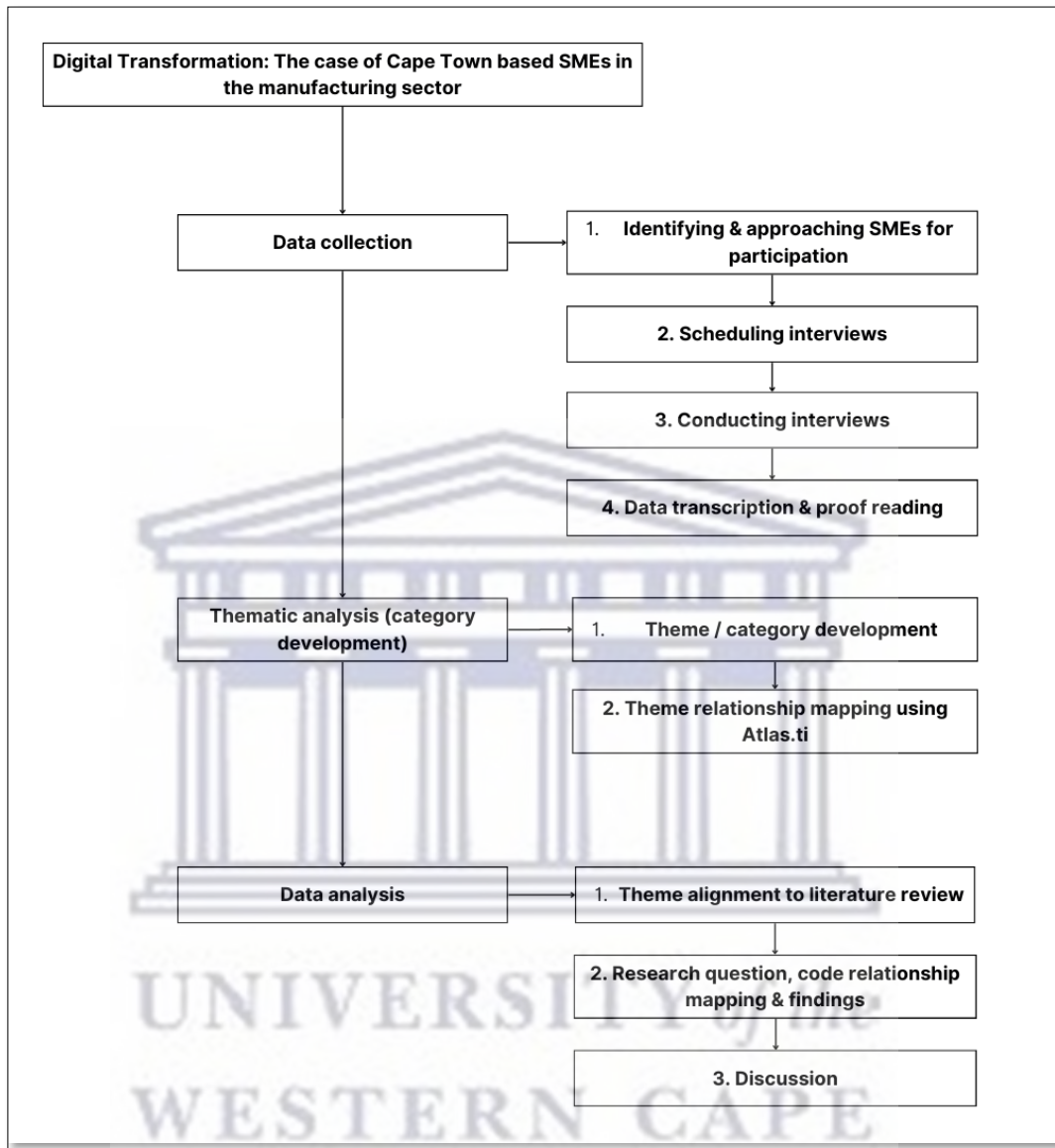
Source: Researcher's own

3.7 Data analysis

To ensure that the data is organised and flows in the sequence of the research and interview questions, the researcher transcribed the audio from the interviews word for word using the application Otter, thereafter, proofread and edited to eliminate any errors resulting from unclear audio or use of indigenous language. A step that followed was the creation of a new project in Atlas.ti by uploading all the interviews in preparation for thematic analysis. Using the Atlas.ti software, the researcher, according to the flow of the data collection instrument, identified then formulated codes and then themes encompassing the codes from all the interviews and an online back-up of the project was retained in the shared folder. For the case of outliers, the researcher highlighted them for further discussion in the following Chapter.

Below is a flow applied to thematically analyse the data to identify the categories (themes).

Figure 7: Flow of data analysis



3.8 Ethical considerations

Cacciattolo (2015) because human research ethical boards cannot provide permission for a study after the collection of data has begun, it is critical that the approval is obtained prior to the start of data collection from participants. Informed consent is still the backbone of ethical research. Participants should be thoroughly informed on what will be requested of them, how the data would be used, and the potential repercussions (if any). A crucial step in safeguarding people from potential damage is anonymity and secrecy (Cacciattolo, 2015). The Protection of Personal Information Act, No. 4 (2013) is strictly adhered to safeguard the information provided by the participants. Furthermore, the ethical permission procedures guided by the University of the Western Cape will be followed. To partake in this research study, members

needed to be sufficiently knowledgeable about the study, understand the information and had the freedom of choice to let them decide if they were included or not. A member's information sheet was given to additionally explain the study. The probable participants were given enough time (a day up to 1 week) to read the information sheet and then choose whether they wanted to partake in the study. Consent to record the interview was also obtained. The participant's information sheet and knowledgeable consent was available only in English. Data was stored in an encrypted cloud storage with password protection. Written, recorded and electronic data from this research is to be kept for 5 years. Nevertheless, the interview recordings will be destroyed once they are no longer wanted

3.9 Rigor

Lincoln and Guba (1985) rely on four general criteria in their approach to trustworthiness. These are credibility, transferability, dependability, and confirmability. We consider each of these factors and add perspectives from others who have written on trustworthiness in qualitative research. Other sources such as journals and reports were consulted to ensure credibility and trustworthiness of the research outcomes in comparison to newly published information around the investigated subject. Transferability was applied to evaluate the context which the study outcomes can and cannot be applied or assumed to reach a conclusion.

3.9.1 Credibility

Replicability in a prior empirical investigation is a distinct phenomenon than continually identifying comparable findings from numerous data sources. In order to assess the data, the researcher used (Patton, 1999) different hypotheses or theories to comprehend the data is commonly referred to as theory/perspective triangulation. To achieve credibility, the responses from the participants were not altered and were interpreted in a literal sense of understanding in order to protect the integrity of the participants and research outcomes.

- i. The researcher analysed the discovered facts from the data in tandem with the literature on the predictors of digital transformation. The themes discovered from the responses are referenced back to the different perspectives shared in the literature on Chapter 2.
- ii. The research was based on and refined from highly regarded preceding literature, where it resulted in the identification of an evident research problem.

3.9.2 Transferability

Transferability is showing that the findings have applicability in other contexts (Lincoln and Guba, 1985). To ensure transferability, this study applied a thick description which Lincoln and Guba (1985) define as a way of achieving a type of external validity. By describing a

phenomenon in sufficient detail one can begin to evaluate the extent to which the conclusions drawn are transferable to other times, settings, situations, and people.

- i. The researcher limited the study to only manufacturing SMEs in Cape Town, and all the participants were within the sampling frame of formal SMEs. Therefore, the outcomes may not be generally applicable to other industries, cities or South Africa at large.
- ii. The researcher did not consider the timeframe in which the manufacturing SMEs were founded or in operation, and whether it was before or after the COVID-19 pandemic. Hence, the researcher assumed that the SMEs who responded to the questions relating to COVID-19 had been directly or indirectly affected.
- iii. Based on the adopted definition of the SMEs for this study, the size was not considered by the researcher, bearing the assumption that all the small-medium enterprises were challenged by similar circumstances relating to digital transformation.

3.9.3 Dependability

According to Lincoln and Guba (1985), dependability is showing that the findings are consistent and could be repeated. Shenton (2004) a researcher can establish dependability if the work were repeated, in the same context, with the same methods and with the same participants, similar results would be obtained. Thus, because of the qualitative nature of this study, the saturation of the responses is used to ensure dependability. In the same breath, the research produced recommendations for further studies which can be investigated when investigating this topic to regenerate new insights which may or may not be similar.

3.9.4 Confirmability

Shenton (2004) describes confirmability as the qualitative investigator's comparable concern to objectivity. Miles and Huberman (1994) contend that a crucial measure for confirmability is the extent to which a researcher admits his or her own predispositions. Based on the nature of this research, particularly the literature review, it focuses on the predictors of digital transformation and the majority of the studies subjectively position SMEs as challenged by digital transformation. Hence to ensure an objective conclusion, the responses were analysed in tandem with the literature to highlight where there are similarities and differences against the newly discovered facts of this study in chapter 4. According to Lincoln and Guba (1985), this is referred to as theory/perspective triangulation; using multiple theoretical perspectives to examine and interpret the data.

3.10 Delimitation of the study

This study will be delimited to only a sample of manufacturing SMEs in Cape Town. Therefore, the results of the study might not be generalisable to South Africa and all other forms of SMEs.

In addition, the survey is conducted using structured research interview questions which could allow limited exposure to other issues concerning the subject of interest. For example, the research possibly omits other significant information that affects Cape Town based SMEs that manufacture different goods or operate within a certain area.

3.11 Conclusion

This chapter adopted an exploratory research design within the qualitative methodology to investigate the subject of digital transformation in Cape Town manufacturing SMEs. The questionnaire design was achieved using the research questions and guided by the theory explored in Chapter 2. Due to the qualitative nature of the research, thematic analysis is applied using the software Atlas.ti to understand the outcomes.



CHAPTER 4: Data analysis, Findings & Discussion

4.1 Introduction

Chapter four presents the discussion of the data obtained from the interviews with the research participants and categories and themes emerged from the research findings with the use of thematic analysis. The findings from the interviews are presented in a narrative descriptive form in relation to the research questions. The business profile of the research participant together with their product and number of employees are also described.

In an endeavour to find answers to the research problem, 4 main research questions are asked:

Research question 1: What progress has been made by manufacturing SMEs towards digitalisation?

Research question 2: Which business areas do manufacturing SMEs target for the digitisation agenda?

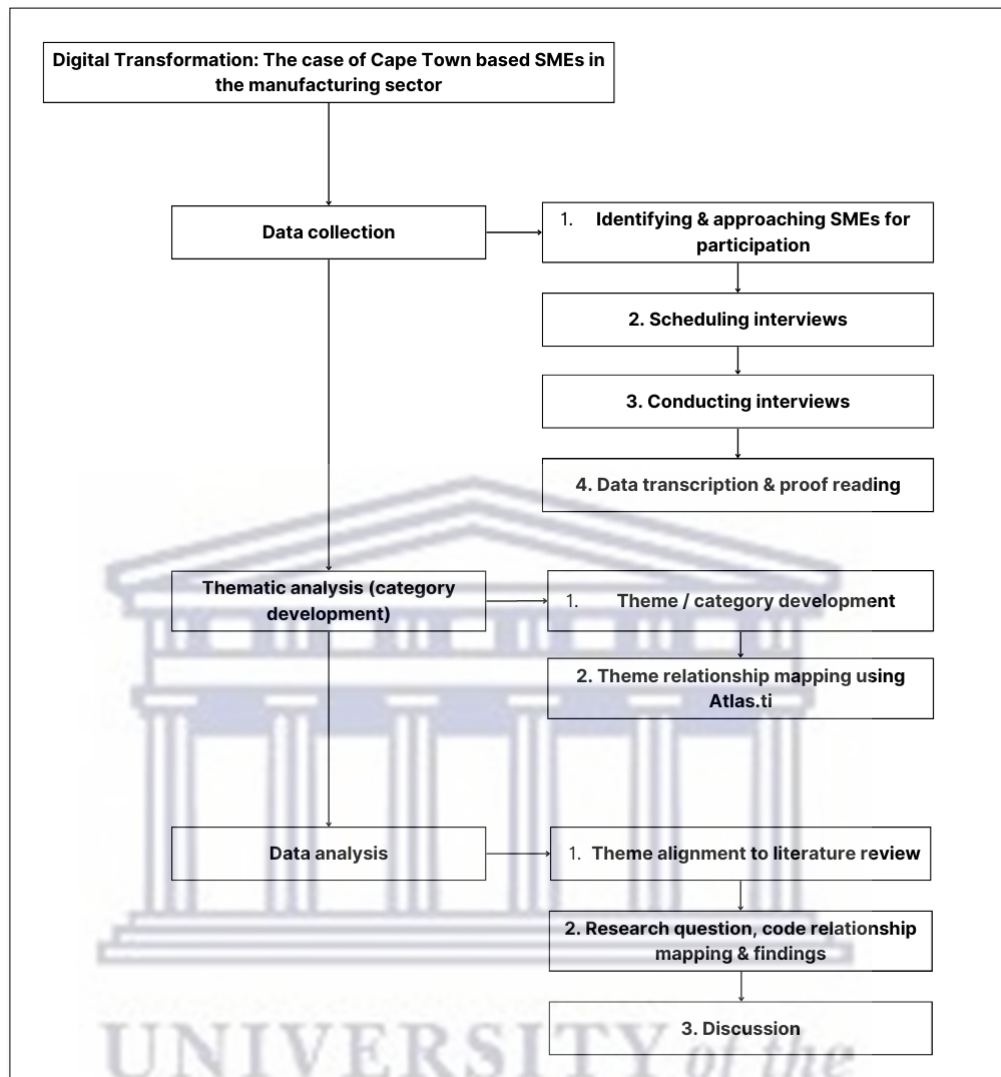
Research question 3: How has the COVID-19 affected manufacturing SME digitisation progress?

Research question 4: How can SMEs be supported to participate in the digital economy?

4.2 Analysis of interview responses

Interviews were used to determine the interviewees '(SME owners) understanding of digital transformation and how far they are with its adoption. The interviews were all conducted telephonically with the exception of one that was done at the premises of the business in Ravensmead Business Park, Parow. The location of the interviewees was spread across Table View, Durbanville, Khayelitsha, KwaLanga, Woodstock and Bellville, all situated within 50 kilometres of Cape Town City Centre.

Figure 8: Flow of data analysis



The interviews were conducted in a format convenient for the interviewee, which was mostly over the phone. The interviews were all recorded with written and verbal permission obtained from the interviewees. Eighteen (18) questions were asked; the average duration of the interview ranged between 30 - 35 minutes following the sequence of the interview instrument.

From a sentiment perspective, some interviewees displayed a feeling of detachment from the subject while others were excited about being part of the research to contribute with their experiences and opinions.

4.2.1 Sample and participant description

Eight (8) SMEs were purposely selected for collecting qualitative data by means of a semi structured questionnaire in an interview format. SMEs from an SME Business-Level perspective, Industry Level Perspective and Macro Level Perspective using the predictors of digital transformation.

The owners of the SMEs were the units of observation even though the managers would have also been considered. The interviewees had varying lengths of practice and experience in their specific sectors. Most of the interviewees can be classified as early majority and late majority according to Rogers (1995) because of their cautious predisposition and approach to new technology adoption and their perception of evaluating new technology for the benefit of the business.

Table 12: Participant description

Participant	Industry	Product	Area of operations
Participant 001	Manufacturing	Furniture	Cape Town, Northern Suburbs
Participant 002	Manufacturing	Jewellery / Clothes	Cape Town, Southern Suburbs
Participant 003	Manufacturing	Furniture	Cape Town, Cape Flats
Participant 004	Manufacturing	Ceramics	Cape Town, Cape Flats
Participant 005	Manufacturing	Soapery	Cape Town, Northern Suburbs
Participant 006	Manufacturing	Packaging	Cape Town, Northern Suburbs
Participant 007	Manufacturing	Candles	Cape Town, West Coast
Participant 008	Manufacturing & Supply	Packaging	Cape Town, Northern Suburbs

Source: Researcher's own

Participant 001: Is a Ravensmead, Cape Town (Northern Suburbs) based business with a branch based in a municipal business park amongst other various businesses. The business service is the manufacturing of custom furniture such as beds, tv stands and other wooden products and caters for the Cape Town market and outside areas in the province.

Participant 002: Is a Cape Town based SME in Woodstock, Southern Suburbs that manufactures bespoke jewellery pieces and clothing. The business is based in a single room studio and has 2 employees plus other temporary contributors.

Participant 003: Is an SME based in Khayelitsha, Cape Flats. The products made by the business are custom furniture such as tv stands, beds and other custom wood products. The business has one full time employee (the owner) and 2 other temporary assistants as per required.

Participant 004: This participant is based at a community center in KwaLanga, Cape Flats and manufactures ceramic products such as vases and other ceramic products using machinery and other crafting resources such as sculptors, painting and fire.

Participant 005: A manufacturing enterprise that deals in the production of soap for white and private labels at a small and large scale. The company employs between 2 employees and makes use of extra labour when necessary. It operates within Durbanville, Cape Town.

Participant 006: The company manufactures packaging solutions to other businesses using material such as cardboard including customisable branding. The enterprise is based in Stikland, Cape Town Northern Suburbs and supplies customers within and outside of Cape Town with 3 employees.

Participant 007: The company is a small company manufacturing in West Coast, Cape Town, producing candles and diffusers. The products are made on a large scale for special requests, daily retailing and the rotation nature of the retailing across various markets in and out of Cape Town including other provinces.

Participant 008: The business is based in Bellville, Cape Town Northern Suburbs and manufactures packaging for generic medical supplies. Previously, the business was responsible for being a 3rd party supplier from different producers but has ventured into manufacturing the packaging with 5 employees and others as required.

4.2.2 Category & theme development

For the convenience of the reader, the main research questions and objectives of the study once again stated below.

Table 13: Research questions and objectives

Research question	Research objective
What progress has been made by manufacturing SMEs towards digitalisation?	To determine the direction of digital transformation in Cape Town manufacturing SMEs
Which business areas do manufacturing SMEs target for the digitisation agenda?	To investigate the areas which manufacturing SMEs intend to digitise
How has the COVID-19 affected manufacturing SME digitisation progress?	To determine how COVID-19 pandemic has affected the digitisation of manufacturing SMEs
How can SMEs be supported to participate in the digital economy?	To determine how SMEs can be supported towards the digitisation agenda

As mentioned earlier, the study uses a deductive approach, which means that its themes are derived from the literature. This section provides an understanding of the categories constructed from the data analysis to respond to the main and sub-research questions by engaging both the data and literature, thereafter, using Atlas.ti to map the relationships. The categories were grouped into three main areas specific to the Level Perspectives used to underpin the development of the research questions and understanding of the presented phenomenon in Chapter 2. Under each of the perspectives, categories were identified and grouped based on the areas which they originate from. These categories were determined by grouping together similar responses from the participants. It is important to articulate that because of the number of participants and the qualitative nature of this study, the categories were developed after at least after 3 or 4 similar responses while others were developed from at least 2 responses. For these types of categories, the analysis in Chapter 4 explains the reasons which some include the type of manufactured product. Example is; a furniture manufacturing SME might not share the same codes compared to soap manufacturing SMEs.

After the categories were been determined, each was classified under the 3 level perspectives, namely SME level perspective, Industry Level Perspective and Macro-Level Perspective. Respectively, the perspectives are intended to be understood from an inside-out approach. The SME level perspective can be explained as the area which the business can control. The Industry Level Perspective is the degree which the SMEs can influence while the External Level Perspective is the operating atmosphere which the business has no control or influence over.

For example, 3D printing has been grouped under SME Level Perspective because it is a category that is within the control of the SME unlike Needs based assistance, which is a role or intervention that external parties will have to introduce in support of the industry, and SMEs have no control over.

Table 14: Theme or category alignment

SME Level Perspective	Industry Level Perspective	Macro Level Perspective
Digital transformation awareness	Post-pandemic digital transformation	Guidance & finance
3D Printing	Digitised market benefit	Needs based assistance
SMEs value digital transformation	Positive digitisation perception	
Digitisation journey initiated	Internal: Motivation to DT as a Cape Town SME	
Marketing & Manufacturing	Initiated digital transformation	
Internal business processes	Customer induced pressure	
Desired maturity level	External: Motivation to DT as a Cape Town SME	

4.3 Data analysis

4.3.1 Theme 1: SME Level Perspective

Research question 1: How far are manufacturing SMEs with digital transformation?

Code 1: Digital transformation awareness

From the responses of the interviewees, it is evident that all the businesses are aware of digital transformation as a concept and the benefits it yields thereof. This is supported by the mention of the digital tools that the SMEs use currently in the running of their daily operations, from digital applications to machinery.

The above statement is supported by the following examples from participants 001, 003 and 004 such as Facebook, Instagram and 3D printing. Participant 007 indicates that they have gone as far as completing courses online to make them aware of the many other technologies that are out there and how they could use the technology in their business.

Participant 005 states that - technology has definitely played a big role in manufacturing, doesn't matter what scale both commercial or you know. Artisan soap makers like myself, definitely, technology is a big part. We definitely do use technology.

Finding 1: Cape Town based manufacturing SMEs are aware of digital transformation and the impact that it has on their businesses.

Finding 2: The participants have, with the adoption of various technological tools, enabled their businesses to digitally transform, such as Facebook as a digital tool to digitise marketing.

Code 2: 3D Printing

A leading commonality from most participants is the adoption of 3D printing as a trend in the Cape Town manufacturing industry. Regardless of the manufactured product, for example, participants 006 and 008 both manufacture packaging and have identified 3D printing as a trend. Similarly, participants 002, 004 and 005 mentioned it, the latter stated that you can see it most days where people use 3D mold using 3D printers and stuff like that.

Participant 006 mentioned that, *“because of the service that we are giving to our customers to customise their packaging, we are forced to adopt expensive machinery like 3D printing to engrave and brand whatever they want.”*

However, participants 001 and 003 manufacture furniture and observe a different trend in their space which is not digitally related but rather specific to the kind of wood material required by their customers. *“So it's one of the trends like pine wood and other things like that.”*, mentioned participant 003.

Participant 007 has identified a digital payment trend, stating that they are an evangelist of YOCO, the payment system. They said that the technology and payments solution which the fintech company offers people is very advanced.

Finding 1: Manufacturing SMEs are aware of the trends in the industry and some have adopted the 3D printing solution to meet their customer needs. Also, 3D printing can be adopted across various products hence its commonality and understanding.

Finding 2: There could have been a misunderstanding of the question by participant 001 and 003. However, based on their responses, it can be assumed that the participants are not aware of any digitisation trends in the manufacturing industry which could be as a result of the products that they manufacture.

Code 3: SMEs value of digital transformation

Based on all the SME feedback regarding the extent if they see value in digital transformation, all the participants agreed that they all see the value. Using the adoption of technology as tools to digitise various business areas, examples in which the value is evident were mentioned. Participants 001, 002, 003 and 004 highlighted the use of the internet in the business, 3D printing, website and social media respectively. Similarly, participant 007 mentioned that, *“This technology makes me do more by myself.”*

An interesting perspective from participant 005 is worth noting, *“We do value the use of technology we do, but to an extent. There's this fine line of still preserving the traditional ways and protecting the art in it. And also having enough to produce for demand.”* Also, participant 002 agreed regarding the digitisation through technology adoption to increase production, *“Like for 3D printing, I think I see value in that because it would help increase production. The production time takes a bit longer. I obviously appreciate it but at some point the business will start picking up and producing more.”*

Finding 1: All the SMEs do see the value of digital transformation in their manufacturing businesses. Evidently, all the businesses have adopted digital tools to digitally transform certain functions within their businesses hence their positive perspectives and experiences regarding the value of digital transformation.

Finding 2: For some participants who produce on a small scale, there is an understanding of the value of digital transformation. However, because of the originality of the actual product idea, there is a concern around the eradication of the originality of the idea and the replacement of the actual manual manufacturing process which is perceived value to the customer.

Code 4: Digitisation journey initiated

Based on the question, what steps has the SME taken to digitise? Most participants have mentioned several digitisation steps they have taken to transform certain business processes. Participants 008, 005, 006, 003 and 004 indicated that they have taken certain steps to digitise their SMEs. The latter participant mentioned that, *“Like I said I have started the website which will allow the people to process their payments online. However, that step is not yet complete but in process.”*

Same as participant 005, *“These days, you know, like just creating a costing sheet. It is so much easier on Excel sheets to calculate everything by hand like I did five years ago when I started communicating with customers via WhatsApp and social media and letters.”*

Participant 008 noted that, *“Currently, we are using a couple of applications such as InDesign to conceptualise our products and machinery to prototype and produce the packaging including labels. Other than that we have not done much since this is a new side of the business we are exploring.”*

I believe that participant 001 might have missed the intention of the question because they indicated that they have not taken any steps to digitise. Yet previously, the participant indicated that they have adopted the use of Facebook marketplace to advertise, *“At the moment? Really, truly nothing.”*

Finding 1: Most of the businesses have initiated digitisation as a journey regardless of the different areas they choose to start on.

Code 5: Marketing and manufacturing

In terms of defining the areas which the SMEs would benefit from digital transformation, marketing and manufacturing were the most prominent areas. Like noted above under code 1, the SMEs indicated the various technological tools they adopted to digitally transform such as Facebook and Instagram. Similarly, here, it is obvious that SMEs have utilised social media to digitise and add value to their marketing. Participant 002, 003, 006 and 008 all mentioned marketing coupled by manufacturing, except for participant 007 mentioning finance.

Participant 006 highlighted that presently, *“Our focus is definitely marketing using less samples like I explained earlier. Also, the production because we want to also become smart so we can deliver timely to our customers which means we can cater to more clients in the future.”*

Respectively, participant 002 mentioned that, *“It’s marketing and production, my business would benefit a lot on that side. Obviously as a small business, and as like a person that works on his own I obviously have to do everything myself, that’s from production and all that but I need to start focusing more now when it comes to putting my work out there online and market myself and really push myself out there.”*

Differently, participant 007 had a unique value area to highlight, *“So I know that I still need some technology that would kind of manage my finances for me. Much as at this moment, I feel like I can do a lot of technology by myself. I still feel like finance is kind of standing on its own in terms of how connected everything is in my business.”*

Finding 1: Most participants perceive marketing and manufacturing as a prominent area that would benefit from the value creation of digital transformation. This commonality could be predicted based on the fact that the SMEs are all in the manufacturing industry therefore share likely similar challenges.

Finding 2: Manufacturing SMEs prioritise marketing and manufacturing as primary value areas when stimulating growth.

Code 6: Internal business processes

From the interviews, most of the businesses had intentions regarding which business processes would benefit from digitisation value creation. Particularly, participants 004, 005, 007 and 001 all indicated finance related processes that would benefit from the value creation as a result of digitisation. For illustration, participant 007 mentioned that, *“It’s definitely my finances, they are just a lot to keep up with now considering that I do all the operations.”*

In a similar manner, participant 004 highlighted that, *“I think payment processes, making it easy for people to pay you ngoba abantu (because people), things are on their phones, it's in their wrists eziwatch bazinxibayo (it's in the watches that they wear) so yes.”* This feedback from the participant suggests that before the digitisation of payments as an internal business value process, the need to digitise is also as a result of the digital adoption by the customers which the SME is subjected to.

A dissimilar response is also noted from participant 008, indicating that because of their short span in the manufacturing industry, they do not have sufficient experience to answer the question.

Participant 003 highlighted administration while participant 004 mentioned marketing and production, *“The marketing and production because those take the most time and work hand in hand to make sure that the business runs smoothly. So using technology to move them smarter would really open up the space to grow our business even better.”*

Finding 1: The financial processes of businesses are an integral intention of Cape Town manufacturing SMEs in terms of digitisation.

Finding 2: The internal business processes the SMEs wish to digitise are partially influenced by external forces which they cannot control such as changing payment processes or customer payment preferences as participant 004 indicated.

Code 7: Desired maturity level

Most of the participants have indicated an intention to digitally mature their SMEs in the next 5 years. Although not requested to expose their priority areas to digitise, participants 001, 002 and 004 explained the areas which they wish to digitise within the next 5 years.

Participant 001 mentioned that, *“A lot, a lot of planning making this at least in the next two years from tenfold. Wow, tenfold it will be that's a guarantee. Everything will be done by a digital expert employee, somebody who is going to run and to be in charge of promoting, marketing, sales and all those things there will be somebody that does that all the time.”*

Participant 002 mentioned that, *“For me being able to have that option where I can have a button on my website for people to just press on every piece, but digitally, that would be awesome for me.”*

Participant 004 explained that, *“Digitally I want to make it so easier for people to get the product and pay for it. Get to them. Without even being involved in the process.”*

Interestingly, participant 005 maintained an indifferent response to the question considering their somewhat in-between perspective about technology. Although they wish to adopt it in their business, they are not internally motivated to adopt it but are forced to as explained above. Hence, their stance on this question maintains that, *"I'm very much like I said, I'm actually not so much for technology I don't know."*

Finding 1: Almost all the SMEs have an intention to digitally mature in the next 5 years and some already have areas which they have identified such as finances or payments.

4.3.2 Theme 2: Industry-level perspective

Research question: Did COVID-19 affect manufacturing SME digitisation?

Code 1: Post-pandemic digital transformation

An interesting fact to share from the data is that the various SMEs encountered subjective experiences regarding how COVID-19 affected them and mostly outside the topic of digitisation. Categorically, digital transformation was adopted by most of the SMEs post the pandemic and not before.

Nevertheless, only participant 003 and 006 could capably respond to the question relevantly, i.e to include digital transformation as a subject. *"We had just started as a test concept so nothing really was there besides the free applications to do sketches for our clients and marketing to share. Production wise there was not much happening because we had just started."* shared participant 006.

Participant 003 shared regarding the success of their digitised marketing through social media, *"My business blew up during the pandemic with a lot of followers on social media. I got a lot of clients that I truly had time to actually grow my business to what it is."*

Participants 005 and 007 shared that at the time of the pandemic, their businesses were not formalised but rather starting off. However, the pandemic made them realise that actually they have businesses instead of just a side income. What is important to distinguish for these participants and except for 003 and 006 is that although nothing or very small digitisation occurred before or during the pandemic, much of their digital adoption occurred post the pandemic.

Participant 004 mentioned that, *"I think the pandemic just made people conscious, fastforwarded things digitally. Actually, you need to actually move with the times."*

Participant 002 mentioned that, *“It did well in the very first month and then COVID hit and everything just...I could not do anything at all until last year when I officially registered business and started deciding to take the risk and go with it.”*

When asked given COVID-19 and SME digitisation level, what business benefit or cost would be attributed to digitisation? Most of the SMEs mentioned marketing as an area that benefited as a result of COVID-19 using digital tools such as social media. Participants 002, 003, 004, 005 and 006.

Finding 1: Although production is proven to have been affected by the pandemic, the marketing component of some SMEs thrived.

Finding 2: The pandemic was an awakening for the SMEs to adopt digital transformation and for the entrepreneurs to see value in it. In other words, the adoption of digital tools to transform their SMEs became an integral journey post the pandemic because much of the journey started thereafter.

Code 2: Digitised market benefit

To try and understand digitisation in the SMEs, a reflective question was asked, *“Which business area(s) did COVID-19 expose their need to digitally transform?”*

Participants 001, 002 and 007 could not answer the question because the businesses either were formally established after the pandemic had hit or had little experience to identify the business areas.

Nevertheless, participants 004, 005 and 006 all identified marketing as an area that was exposed to digitally transform in their businesses.

Participant 005 said, *“The marketing area because I mean we couldn't see each other so that was the only way you could get to somebody else or probably digital marketing and the use of social media.”*

Distinctively, participant 003 mentioned that, *“The bookkeeping or financial side was definitely exposed because when my business blew up I had a lot to manage alone.”* This response from the participant is severally noted from others as well but under different codes above.

Hence, in the discussion it will be related back to the literature explored in Chapter 2.

Finding 1: Although easily accessible and cost effective, social media tools were under leveraged by some manufacturing SMEs before COVID-19 and when it started, it exposed their need to digitally transform the marketing area and potential to contribute to the survival of the SMEs.

Code 3: Positive digitisation perception

Gauging from the different responses, the participants have shared a positive sentiment or perception towards digital transformation based on their experience with COVID-19 or generally.

Participant 008 highlighted that, *“Although it comes at a price we have to see it in a positive light to make our businesses survive, that is what it means to be in business in the new age.”* Similarly, participant 006 mentioned that, *“It has not changed because I have always wished to see my business adopt technology so it could grow, that’s the only way I knew it would be successful.”*

Participant 002 mentioned that, *“Not so much. Okay. Not so much.”* and participant 003, *“Not really but it has added value because at the end of the day if it was not there, I would have not blown up the way I did.”*

Dissimilarly, participant 005 mentioned that, *“I don’t see it in a good way. I think digitally it paints a picture of glamour and it takes away human interaction. And it motivates comparison between businesses and people and makes them give you impostor syndrome.”* This feedback can somewhat be correlated to the pressures or costs associated with the need for the businesses to digitise in order to succeed or remain relevant. Participant 008 mentions *“price”*, participant 006 mentions *“only way”* which indicates that the business had to adopt else fail. In the same sense, participant 003 mentions *“...if it was not there...”* which is also indicative of the former pressure.

Finding 1: Most of the SMEs attribute social media as a digital tool that contributed to the digitisation of their marketing areas hence the positive perception. Yet, much of the positive sentiment is fueled by how technology had to be an integral adoption for them to succeed or at least survive during the pandemic.

Code 4: Motivation to DT as a Cape Town SME

In analysing the responses that underpin this code, the researcher has identified both internal and external factors that motivate manufacturing SMEs to digitally transform in Cape Town.

Sub-code 1: Internal: Motivation to DT as Cape Town SME

For participant 001, *“I also want to expose the business as well so I can get to employ more people in Cape Town so they can actually have more jobs available.”* The digital exposure of the business yields more income and work opportunities. Participant 003 shares a similar idea,

“What would motivate me is people actually taking notice like customers but also bigger structures or business establishments. So I feel like if those can notice other small businesses like us we would be able to actually have employment opportunities.”

Participant 005 highlighted that, *“I’m against all those advanced technological advancement because I think it takes so much out of the community and in one way, you know, but in other ways it does make stuff more possible.”*

From the above participants, particularly 001 and 003 which both manufacture custom furniture, it is established that the SMEs are motivated to adopt digital transformation by the internal factors which they highlighted, namely employment creation which is indicative of expansion and consequently more manufacturing outputs for participant 005.

Sub-code 2: External: Motivation to DT as Cape Town SME

The response from participant 003 overlaps with both internal and external motivation since they highlighted external recognition from established business establishments. Nevertheless, participant 004 highlighted that, *“Without getting consumed by the digital platform I think it has allowed us to connect with the world as needed more closely. It’s important to actually be aware of how you can put yourself out there without being swallowed by it at the same time. So definitely the exposure to the world as a Cape Town small business is what would encourage me.”* This feedback suggests that while the adoption of digital tools or platforms is an enablement of digital transformation, it exposes the SME to the world in which digitisation can either be beneficial or swallow the small enterprise. More of this idea will be explored in the discussion section.

Participant 005 mentioned that, *“The motivation does not really come from Cape Town alone but across all our clients because most of them are new age businesses with innovative products and ideas so we are always on our toes to try to meet their needs halfway.”*

Participant 007 responded that, *“Cape Town has an aesthetic that other cities don’t have and so when you’re able to capture that aesthetic, not just even to capture it but just being able to say that your product is made in Cape Town it seems more classier and more valuable in a way that’s just my perception. If you can use technology to capture that value, capture that aesthetic using technology to make it a part of your brand. I feel like it makes the brand more valuable.”*

Finding 1: Cape Town manufacturing SMEs have varying motivational reasons to adopt digital transformation which are either internal or external to the business. The reasons vary from customers, employment creation and the actual manufactured product. Hence, this finding is shared across the SME level perspective and Industry level perspective.

Code 5: Customer induced pressure

The interview question: How has the pressure been from the industry to the business to digitally transform? aimed at determining the indication of Cape Town manufacturing SMEs towards digital transformation. From the responses, varying feedback was gathered.

Participant 004, 005 and 007 all indicated a similar pressure, the move to online for both transactional facilitation and marketing reasons. Participant 005 highlighted that, *"It is no longer just a matter of brick and mortar, the online situation you know, especially COVID everybody flocked online."*

Participant 004 also shared that, *"From the industry it's more like accessible online platforms. Not more than like making, I think the industry still appreciates the fact that it's handmade, it's unique."*

Participants 002, 003 and 008 mentioned that they do not feel any pressure or it is not hard at the moment. Distinctively, 002 and 003 manufacture custom products such as furniture, jewellery, hence the former participant mentioned that, *"I get that going digital is very important, but still demand for even purely human. And so I'm not feeling the pressure at all taking my time, but I do prefer that direction."* This response partially explains the feedback from participant 004 above, they also manufacture custom products and their demand appreciates human, unique and unit production.

Finding 1: The SMEs who manufacture distinct unique products do not yet hardly feel the pressure to adopt digital transformation. Their customers still prefer human manufactured products which indicates how they interpreted the question, they related it to manufacturing than the holistic business perspective.

Finding 2: The businesses have rather highlighted the pressure as a result of customers, that is where they are in terms of technology adoption than it is from the industry which they operate in. The adoption of technology to enable easy purchasing and marketing are more of customer facing areas because of the convenience to facilitate the buying and selling than it is purely industry induced pressures. This finding is therefore classified here as something the SMEs cannot change, but can influence to a certain extent.

4.3.3. Theme 3: Macro level perspective

Research question 4: How can SMEs be supported to participate in the digital economy?

Code 1: Guidance & finance

From the SME years of existence, entrepreneurial education to the actual product, all the participants had suggestions on how they could be assisted which is largely influenced by

these encounters. Dominantly, guidance and financial support were identified as key areas to focus when intending to support the SMEs. This code was consolidated and identified from the questions: What practical measures can government institutions apply to ensure the success of digital participation in SMEs? and What kind of assistance would be appreciated from private sector established companies on assisting SMEs with digitisation?

Based on the feedback from the participants, guidance can be interpreted as hand holding or consistent support or follow up on the SMEs. Participant 001 mentioned that, *"All of those government institutions should actually help us by showing us what can be done."*

Participant 004 echoed a similar sentiment, *"For example, platforms like Shopify , if they can help to get me someone to help me set that up and guide me, give me the confidence that you can do this. You can move forward and obviously they would have to pay that person. I won't have to pay that person."*

Participant 007 shared that, *"So there's education but I am not supported by someone who I can bounce ideas off to immediately and advise me in terms of what to do, and I don't feel like there's a way where they are testing us all in terms of how are we successfully applying what we are learning so that can eventually help us dig deeper finding. We can also help you with a mentor that is in that industry."*

Participant 003 had a similar suggestion too, *"Like I said mentoring and be supported with new skills on how to grow our small businesses in terms of using the new ways of manufacturing using the machinery and other digital skills."*

Based on what the participants shared, the definition of finance can be deduced to financial support, SME investment and access to credit.

Participant 002 highlighted that, *"Be realistic when it comes to funding. We know that this new technology is not cheap at all."* and participant 006 also maintained, *"We need money and guidance because we already have the ideas. That is what we need from them because sometimes for us as small businesses to make it we need shielding from other pressures and the institutions could play a huge role in that while hand holding."*

Participant 008 shared a similar idea, *"Definitely financial support and business coaching is absolutely a need. I have had many opportunities to interact with small business owners that are attempting brilliant business ideas, however they do not know how to go about it and not having financial resources is a different challenge on its own."*

Finding 1: The manufacturing SMEs in Cape Town require guidance and financial support in order to thrive. This finding embodies the holistic needs of the SMEs outside the subject of

digital transformation which is a captivating perspective to understand the challenges that underpin their immediate operating atmosphere and hence, to a certain extent influence their reasons to digitise.

Code 2: Needs based assistance

Participants 002, 004, 006 and 007 mentioned that, *“Let us all be assessed to be given a platform where we can put ourselves so that is what I would appreciate now from the private sector, assess us and critique us.”*

Participant 006 further extended by mentioning that, *“I think this question is similar but we need support that is relevant to us and not just be their CSI projects. We need them to show us how it can be done or sit with us and have a look on how we can address the bottlenecks in our small businesses so we can become efficient.”*

Participant 004 also had a similar response, *“They need to understand that we need bangasifakeli nje iiservices (and not just give us services) but rather this is what we need. And also see where the gaps are in small businesses, where do we struggle and not just pitch up even if they do a survey in a few businesses and there would be the common points, things that are similar to understand ukuba ba-need ntoni kanye kanye ababantu (you get to understand exactly what these people need).”*

Participant 002 also shared that, *“I'd like to try out 3D printing because I've got designs sitting with me and are sort of very detailed designs that only a 3D machine can be possible. So I think for me personally, I think that's how companies could actually help me when it comes to my business and going digital. It's 3D printing right now.”*

Finding 1: For either the Western Cape government, manufacturing value chain or private sector, it is deduced that SMEs definitely need their assistance but should be subjective to cater based on their needs. Currently, the SMEs hold a perception that the assistance does not address the challenges which they need the most support.

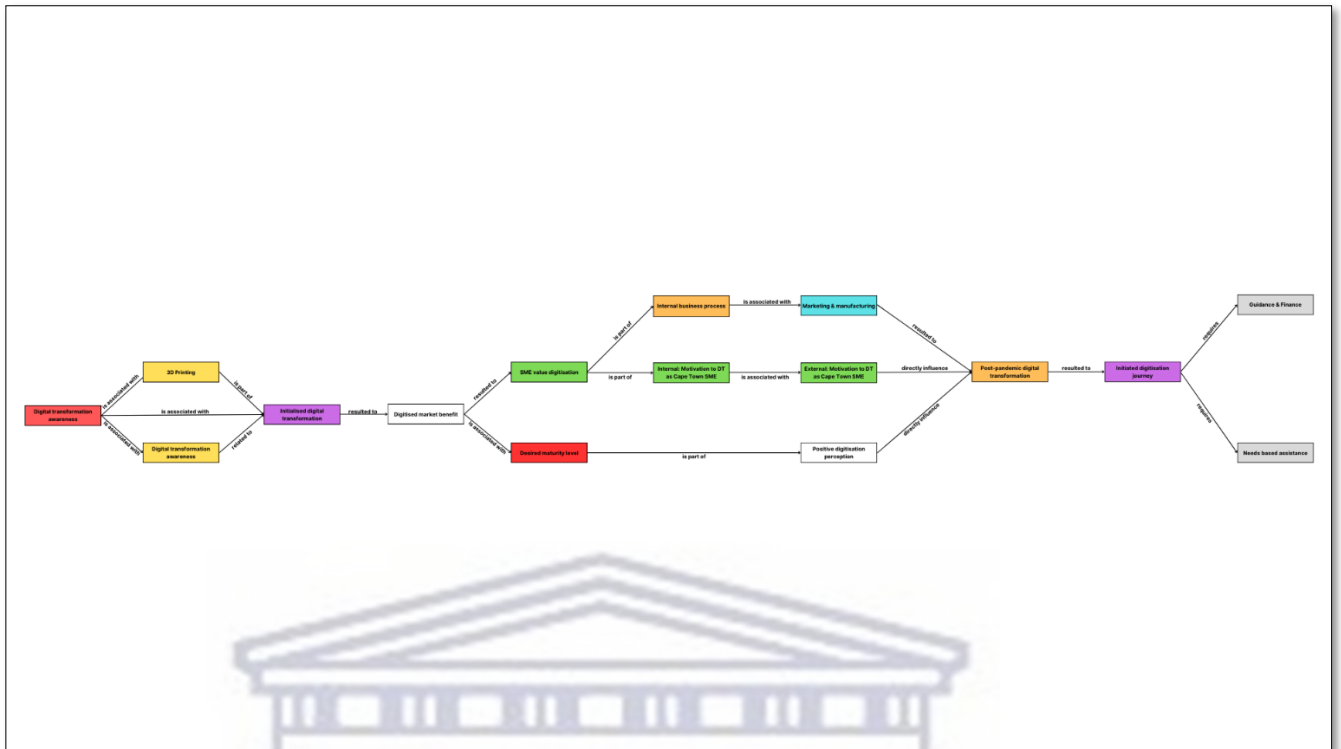
4.4 Classification of codes and findings

Below is a summary of the themes, codes and findings discovered in the data analysis.

Table 15: Codes and findings

Theme	Code	Finding
Theme 1: SME Level Perspective	Code 1: Digital transformation awareness	Finding 1, Finding 2
	Code 2: 3D Printing	Finding 1, Finding 2
	Code 3: SMEs value digital transformation	Finding 1, Finding 2
	Code 4: Digitisation journey initiated	Finding 1
	Code 5: Marketing & Manufacturing	Finding 1, Finding 2
	Code 6: Internal business processes	Finding 1, Finding 2
	Code 7: Desired maturity level	Finding 1
Theme 2: Industry-level perspective	Code 1: Post-pandemic digital transformation	Finding 1, Finding 2
	Code 2: Digitised market benefit	Finding 1
	Code 3: Positive digitisation perception	Finding 1
	Code 4: Motivation to DT as a Cape Town SME	Finding 1
	Code 5: Customer induced pressure	Finding 1, Finding 2
Theme 3: Macro level perspective	Code 1: Guidance & finance	Finding 1
	Code 2: Needs based assistance	Finding 1

To aid with the discussion, the relationships on how the codes defined from the data are demonstrated using a diagram or network analysis using the analysis tool Atlas.ti. A clear image of the network diagram is included in the appendices.



4.5 Discussion

The discussion from the SMEs' responses to the interview questions to explore the subject of digital transformation of Cape Town manufacturing small businesses. The findings are discussed in tandem to the literature discussed in Chapter 2. This method connotes crossinterpretation of findings from the interviews with prior existing literature to inform better clarity of the findings on the subject matter. The first part of this discussion presents the emerging themes from the categorisation of the research data and the second part presents the answers to the research questions and the validation of research findings.

4.5.1 Research problem statement

Businesses have a variety of problems when implementing digital transformation, and they must restructure their businesses to meet these issues in order to increase performance (Tarut, Duobien, Klovien, Vitkauskait, and Varanit, 2018). Among the problems, according to the Western Cape Government (2017), the manufacturing sector in the province was not exempt from the national manufacturing recession, making digital capabilities-based efficiency even more important to pursue. Digitalisation challenges in the context of SMEs, as well as variables impacting digitalisation processes and key activities to be handled in SMEs, are still understudied (Tarut, et al, 2018). Small and medium businesses lag behind in digitalisation, according to the OECD (2019). These businesses also have a difficult time making the additional investments in skills and organisational changes required to adopt and benefit from

technology. The 52.3% difference reveals that some organisations are on some stage of their digital transformation or are not at all (Gaffley and Pelsler, 2021). The economical contributions, challenges and the need for SME digital transformation have been explained, most importantly the effects of lagging digital transformation on both SMEs and the economy. However, as much as digital transformation is a lifelong journey for many SMEs, there is a wide gap that prompts the research need to study the present state of digital transformation in the manufacturing sector within Cape Town. This perspective is crucial to understand the holistic scope of the Cape Town manufacturing industry and to discover new business paradigms that direct SMEs towards the desired digital transformation.

From the above, the research problem statement is defined as follows:

The literature substantiates the claim of this thesis that the direct relationship between the predictors of digital transformation affects the digitisation journey of manufacturing SMEs in Cape Town. The evaluation of the predictors as guided by the literature demonstrates gaps in the understanding and value significance of the subject by SMEs and other parties, and therefore lacks practical measures towards supporting the sector to achieve digitisation.

This section examines and seeks to validate the findings to establish and synthesise prior identified factors affecting the adoption of digital transformation with the emerging findings from the case study to establish the elements at play. The section is organised and presented according to the order of the main questions in a concurrent form (see Section 1.3).

Themes developed

4.5.2 Theme 1: SME level perspective

Cape Town manufacturing SMEs have confirmed the awareness of digital transformation as a subject and process that affects them both directly and indirectly. This is proven by the adoption of digital tools such as Facebook and YOCO as enablers of the digital transformation process within the small enterprises. The founders and managers of the SMEs consider the digital tools that they adopted as a simplified understanding of digital transformation. Part of the digital tools or processes adopted by the Cape Town manufacturing industry is 3D printing regardless of the manufactured product hence its commonality and understanding from the research. Hence, this awareness and process is best aligned with the adopted definition of digital transformation for this study from Rupeika-Apoga and Petrovska (2022), explaining that digital transformation begins with the creation of a digital version of an analogue or physical process or item. This shift then leads to a shift in business operations, models, and competencies to adapt to available technologies, and it never ends. Moreira, Ferreira and Seruca (2018) the more significant use of the pillars of digital transformation has been driven

by innovation accelerators, which include, among other solutions, IoT, robotics, 3D printing and artificial intelligence.

The research has indicated that all the SME owners do see the value of digital transformation in their manufacturing businesses. Evidently, all the entrepreneurs have adopted digital tools to digitise certain functions within their businesses hence most uphold positive perspectives and experiences regarding the value of digital transformation. Participants 001, 002, 003 and 004 highlighted the use of the internet in the business, 3D printing, website and social media respectively. On the awareness about the value of digital transformation, participant 002 shared their perception,

“Like for 3D printing, I think I see value in that because it would help increase production. The production time takes a bit longer. I obviously appreciate it but at some point the business will start picking up and producing more.”

This finding is a true opposing reality of the arguments shared by Mingaine (2013), which asserts that most employees with limited knowledge of technology are unlikely to see the need to implement and utilise emerging technology. Strategy, culture, and people development are more important than technology in a successful digital transition (El Sawy, Kraemmergaard, Amsinck and Vinther, 2020). The entrepreneurs (which are also employees) in this study have indicated to be knowledgeable about technology hence their awareness and initiated adoption of digital tools as a step towards achieving digitisation.

Yet, it is also discovered that although awareness about digital transformation exists, there is a lack of skillfulness and resource incapacity to adopt it. Participant 001 supports this when asked their desired maturity level,

“A lot, a lot of planning making this at least in the next two years from tenfold. Wow, tenfold it will be that's a guarantee. Everything will be done by a digital expert employee, somebody who is going to run and to be in charge of promoting, marketing, sales and all those things there will be somebody that does that all the time.”

Similarly, participant 003 echoed a similar sentiment,

“Like I said mentoring and be supported with new skills on how to grow our small businesses in terms of using the new ways of manufacturing using the machinery and other digital skills.”

Amongst other participants, 004 also indicated a lack of resources,

“For example, platforms like Shopify, if they can help to get me someone to help me set that up and guide me, give me the confidence that you can do this. You can move

forward and obviously they would have to pay that person. I won't have to pay that person."

Evidently, this lack of skillfulness and resource incapacity proves the assertion by Ghimire and Abo (2013), arguing that the most significant challenges that most small and medium-sized enterprises' owners/top management experience, are a lack of the necessary technical knowledge of the technology and the fact that they are not up to date with emerging information technology which enables digital transformation. As a result, it can be concluded that although the SMEs could adopt other free digital tools to aid with digitisation, Zaware (2020) the amount of skilled labour also affects the level of technological advancement. Leg-Tero (2016) around 65% of SMEs waste time and money owing to a lack of technical abilities, which includes inability to adopt and use technology to its full potential. Sturgeon (2021) suggests that South African-based businesses need to address the tensions highlighted above and fill the digital capability gap related to skills and infrastructure.

Despite the skills and resource incapacity, Cape Town manufacturing SMEs commonly perceive marketing and manufacturing as prominent areas and internal business processes that would benefit from digital transformation. Like noted above, the SMEs indicated the various technological tools they adopted to digitally transform such as Facebook and Instagram. Participant 002, 003, 006 and 008 all mentioned marketing coupled by production or manufacturing, except for participant 007 mentioning finance.

Participant 002 mentioned that,

"It's marketing and production, my business would benefit a lot on that side. Obviously as a small business, and as like a person that works on his own I obviously have to do everything myself, that's from production and all that but I need to start focusing more now when it comes to putting my work out there online and market myself and really push myself out there."

Participant 007 has adopted social media as a part of digitising the marketing area but highlights another area,

"So I know that I still need some technology that would kind of manage my finances for me. Much as at this moment, I feel like I can do a lot of technology by myself. I still feel like finance is kind of standing on its own in terms of how connected everything is in my business."

These results prove that as much as various digital tools have been adopted by Cape Town manufacturing SMEs to digitise marketing, there is a desire to further advance the adoption to improve it together with manufacturing. Importantly, because of the small size of the SMEs,

there is a lack of technically skilled employees to share the technical responsibilities. It challenges the focus of the entrepreneurs hence impacts the growth of the SME. This conclusion is also highlighted in the literature by Barann, et al., (2019), explaining that the size of the SME has also shown to pose limitations for implementing digitalisation opportunities, including potential knowledge gaps and limited resources. Jere, et. al (2020) also elaborates from a resource-based view (RBV) of a firm, small businesses have limited resources and capabilities. Therefore, a small business often cannot compete with larger firms using their solitary resources and capabilities. Zaware (2020) as a result, the majority of SMEs do not contemplate implementing new technology into their operations.

Notwithstanding all the challenges the SMEs are facing, this research concludes that Cape Town manufacturing SMEs have initiated a digitisation journey. Most of them have indicated the adoption of digital tools which fits into the adopted definition of digital transformation by Rupeika-Apoga and Petrovska (2022). Reflecting on the conceptual model designed to understand this subject, the classification of the digitisation stage or maturity level which the SMEs are has to be determined to address research question 1.

It is important to understand that the classification of the maturity level or 'stage' of digital transformation in the industry is understood from a holistic perspective and not from an individualistic perspective of each SME. Although there are 008 participants in the study, the objectives and research questions are targeted at understanding the underpinning problem across all the SMEs that manufacture different products but use the interview questions to understand the challenges as per each small enterprise.

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Table 14: The DREAMY model explanation of maturity levels

Maturity Level (ML)	Description
ML 1 Initial	Process management is reactionary and lacks the necessary organisational and digital tools for creating a foundation that will enable the continuity, usefulness, and extensibility of the implemented solutions. As a result, the process is either poorly controlled or not controlled at all.
ML2 Managed	The procedure is being executed and planned partially. Due to deficiencies in the organisation and/or enabling technologies, process management is ineffective. The decisions are determined by the particular goals of individual implementation projects and/or by the planner's knowledge, which shows a limited level of maturity in coordinating infrastructure development.
ML3 Defined	The planning, adoption, and use of best practises and management practises help to define the process. Some restrictions on organisational duties and/or on supporting technologies put a cap on how the process can be managed. As a result, the process' planning and execution bring to light different applications' and information exchange's usability and integration limitations.
ML4 Integrated and Interoperable	Being a fully planned and executed process, it is based on the integration, compatibility, and exchange of information of several applications. With regard to the best practises in the industry both in areas of the organisation and enabling technologies, the integration and the compatibility are based on similar and accepted standards inside the company that are taken from intra- and/or cross industry or sector de facto standards.
ML5 Digital Oriented	The process is digitally focused and based on a strong technology infrastructure and a potentially high growth organisation, which endorses speed, reliability, and confidentiality in information exchange, in collaboration among the business functions, and in strategic planning through a high level of integration and interoperability.

From the understanding of the discussion above, the SMEs have initialised the adoption of digital transformation. Maturity Level 1 Initial is the stage where Cape Town manufacturing SMEs are presently. Although the SMEs are aware of it and its value in the businesses, the following attributes from the definition are lacking.

Process management is **reactionary** and **lacks the necessary organisational and digital tools** for creating a foundation that will enable the continuity, usefulness, and extensibility of the implemented solutions. As a result, the process is either poorly controlled or **not controlled at all**.

4.5.2.1 Breakdown of the highlighted key attributes

(i) Reactionary

Based on the reasons which the participants have adopted digital transformation, Cape Town manufacturing SMEs have not invented custom solutions to address their unique challenges. Instead, have been pressured to adopt already existing digital solutions to thrive during COVID-19 and beyond. This assertion is supported by participant 004,

"I think the pandemic just made people conscious, fast-forwarded things digitally. Actually, you need to actually move with the times."

Also, participant 003 mentioned,

"And then they requested for about 50 by advertising them on Facebook and people started wanting them so everybody all over South Africa was buying them, wherever everybody wanted. So that's when I grew up both in manufacturing and marketing."

This growth in adoption of existing digital tools as a form of digitally transforming certain business areas is mentioned by Maladzhi (2012), asserting that SME managers in South Africa have been attributed to lack innovation drive, and the need of building an innovation culture inside SMEs to maintain sustainability has also been underlined.

(ii) Lacks the necessary organisational and digital tools

When asked which business areas the SMEs wish to digitise, the feedback indicates that they lack the necessary (i) organisational tools such as skilled human resources and (ii) resources such as tangible and intangible digital tools. Participant 001 highlighted that,

"Everything will be done by a digital expert employee, somebody who is going to run and to be in charge of promoting, marketing, sales and all those things there will be somebody that does that all the time."

Furthermore, resourcefully and skillswise, participant 004 also shared,

"For example, platforms like Shopify , if they can help to get me someone to help me set that up and guide me, give me the confidence that you can do this. You can move forward and obviously they would have to pay that person. I won't have to pay that person."

Leboea (2017) argues that the number of skilled labour also affects the accessibility to finance due to the fact that if SME managers are not skilled and financially savvy, they will not have

the knowhow regarding securing financing. Hence, Ebner, et al. (2012) business owners frequently consider digital transformation of processes as an expensive endeavour. It is safe to argue that the limited skilled labour (due to finances) to attend to the digital needs of these SMEs has a direct relationship with the lack of organisational and digital tools and vice versa.

(iii) Not controlled at all

The process by which the manufacturing SMEs are adopting the digital transformation is not defined or controlled. It is worth mentioning that even though a leading commonality from most participants is the wish to fully adopt 3D printing as a trend in the Cape Town manufacturing industry, this is not indicative of a planned integrated digital transformation journey in the businesses or industry. According to Ulas (2018) and Li, et al. (2018), the shortcoming of this is that small and medium businesses risk their competitiveness, growth, and profitability if they fail to embrace digital transformation (Lehner, 2018; Reis, et al., 2018) often renouncing digital initiatives because they are unaware of how to incorporate them into their operations.

However, some participants believe that other components are connected in their businesses which are not necessarily from a digital perspective. Participant 007 mentioned that,

"My finances are not up to scratch. Everything is captured but it's not organized correctly. I still feel like finance is kind of standing on its own in terms of how connected everything is in my business."

Moreover, it is discovered from this research that social media is the most adopted tool to enable the digital transformation of the marketing function in the SMEs. Additionally, it is a fact that most of the SMEs adopted it as an attempt to save their businesses when the pandemic hit and have ever since used it in a similar manner with intentions to still advance how they use it. As such, only participant 004 was able to show their strategy around the integration of social media and YOCO (fin-tech for transaction processing) and how they are integrated in their business.

"I think really we are aware of where we could benefit and we are using platforms where we know like make sure you have your YOCO, whatever and then make sure we can scope only links for payment so a person doesn't need to be next to you. Also, you need to study how to make your life easy, but we don't know about that. I think it's also things like being aware of what's out there and how whatever's out there can help you make the most out of your resources."

Notably so, the integration that the SME has initialised is despite the fact that they are challenged by digital transformation. This assertion is shared on the question, Western Cape 2030 Digitisation agenda focus on to assist SME digitisation?

"Educational wise, what are the benefits of small businesses being part of this and then also the effect that there's something about being online that's very daunting. I'm also having access to people that are confident in digital platforms that are willing to be there and assist small businesses."

This reality of Cape Town manufacturing SMEs is captured by Schwertner (2017), it is not enough to embrace as many technologies as possible when it comes to digital transformation. The strategy is evolving; it must have a strong vision for the company's future, and it must be backed up by the limitless possibilities of the technologies that are relevant to the plan. Redesigning and optimising business operations in the most appropriate way for the plan tends to be associated with successful digital transformation. The digital transformation of business appears to be distinct for each business, and it is impossible to provide a plan that is applicable to all. This latter statement is true as realised from how participant 004 chooses to integrate their SME, yet because most of the participants have just initiated digitisation, it is clear that there is no digital transformation integration trend in the Cape Town manufacturing industry. Hence, it is very important that Davila, et al. (2012) performance management systems are adopted to broaden their focus beyond conventional functions like finance and manufacturing to include in-depth research and development, digitalisation, and innovation, where intangible resources like information and knowledge perform a greater role.

4.5.3 Theme 2: Industry-level perspective

In the previous theme, it is established that Cape Town manufacturing SMEs adopted what can be referred to as post-pandemic digital transformation. The COVID-19 pandemic compelled the manufacturing industry to adopt digital tools in order to maintain continuity of their businesses during the time. In the above digitisation phase of the SMEs, this is referred to as a 'Reactionary' adoption to adjust to the challenges. Be that as it may, it is also ascertained that although the digital transformation is reactionary, customer preferences are also a pioneering driver of this adoption.

For example, the participants were asked the question, 'How has the pressure been from the industry to the business to digitally transform?' and many responses suggested what is coded as customer induced pressure.

Participant 007 shared that,

"But at the moment I don't have a website but I can't afford it yet and I do feel pressured to have that currently right now I feel left behind because my stuff or my brand is not out there and when you google me you won't find me organised out there so I do feel that I am pressured that way."

Similarly, participant 005 said,

"It is no longer just a matter of brick and mortar, the online situation you know especially COVID everybody flopped online."

Beyond the customer induced pressure, this has further penetrated a gap in the internal business processes. The participants had to respond to the question, "Which business process(es) would benefit from digitisations' value creation?"

Participant 004 highlighted that,

"I think payment processes, making it easy for people to pay you ngoba abantu (because people), things are on their phones, it's in their wrists eziwatch bazinxibayo (it's in the watches that they wear) so yes."

Participant 002 also shared,

"I obviously have to do everything myself, that's from production and all that but I need to start focusing more now when it comes to putting my work out there online and market myself and really push myself out there."

The positive consequence of this customer induced digital transformation is classified under the code digitised market benefit. When the participants were asked the question, 'Which business area(s) did COVID-19 expose their need to digitally transform?', mostly mentioned marketing as the area. Customer induced pressure is explained by the relationship between leveraging digitised market benefit and the adoption of social media especially post-pandemic as a tool to communicate, sell and generate profits. This digitisation is indicative of the market congestion and availability of alternatives best explained in the bargaining power of customers by Porter's Five Forces (1979, 1980). The customers' bargaining power indicates how dominant the position of buyers against the firm is, and to what extent customers can claim the best possible quality to price ratio (Vlados and Chatzinikolaou, 2019).

Participants 004, 005 and 006 all mentioned marketing,

Participant 004 said,

"The marketing area because I mean we couldn't see each other so that was the only way you could get to somebody else or probably digital marketing and the use of social media."

Participant 005 said,

"It is the marketing because all of a sudden materials became expensive."

Participant 006 said,

"It's the part of marketing."

Based on the migration of the SMEs and manufacturing industry which they operate in, it is assumed that the intensifying pressure to digitise will, as a consequence, result in the bargaining power of customers due to the alternatives available. Therefore, each SME has to adapt in order to remain competitive and relevant because of the minor degree of influence they have in the market.

This post-pandemic digitisation as a result of customer induced pressure firmly agrees with the stance made by Bennis (2013). The scholar shared that managers must recognise how to use the many tools and applications of the digital world, as well as the influence they have on their interactions with various stakeholders such as customers, partners, and workers or they will be left behind in this digital realm. Hence, what Cape Town manufacturing SMEs should understand is that the adoption of digital tools to enable digital transformation is an integrated and game changing process. As such, World Economic Forum (2016) new technologies have sparked business model changes that have challenged and stretched the traditional value chain in order to provide consumers with new goods or services. Schwertner (2017) digital transformation necessitates a thorough examination of the organisation's present business processes and business strategy. The evaluation comes before the creation of a digital transformation plan.

The following that was asked to the entrepreneurs is, 'As a Cape Town based SME, what would motivate participation in digital transformation?' to study the direction of Cape Town SMEs towards digital transformation. In the responses, it is established that the SMEs digitise for two reasons, internal and external motivations.

In terms of the internal motivations, the manufacturing SME owners mentioned

Participant 001,

"I also want to expose the business as well so I can get to employ more people in Cape Town so they can actually have more jobs available."

Participant 003 shares a similar idea,

"What would motivate me is people actually taking notice like customers but also bigger structures or business establishments. So I feel like if those can notice other small businesses like us we would be able to actually have employment opportunities."

Participant 005 highlighted that,

“I’m against all those advanced technological advancement because I think it takes so much out of the community and in one way, you know, but in other ways it does make stuff more possible.”

The intention to create employment opportunities aligns with the stance by Maisiri and van Dyk (2021), on the perspective of the South African manufacturing sector, a sizable portion of participants highlighted that technology could expand opportunities rather than eliminate jobs, and those businesses would still need more workers but at a higher skill level. The latter subject of higher skill level is associated with the feedback from participant 001,

“Everything will be done by a digital expert employee, somebody who is going to run and to be in charge of promoting, marketing, sales and all those things there will be somebody that does that all the time.”

Small size businesses have shown to pose limitations for implementing digitalisation opportunities, including potential knowledge gaps and limited resources (Barann, et al., 2019). A well-known factor to this phenomenon is confirmed by Zander, et al. (1995), describing that one of the numerous reasons why many African countries have yet to benefit from digitalisation is a lack of technological skills and a scarcity of qualified and technical labour. The manufacturing industry in South Africa is now characterised by a large proportion of unskilled and semi-skilled employees (MerSETA, 2018; StatsSA, 2015). Hence, it is evident that internal factors are a source of motivation for Cape Town manufacturing SMEs to digitise and are reactionary to the conditions of their current reality. On the other hand, it can be expected that in the case of advancing Cape Town manufacturing digital transformation, many employees in the SMEs may lose their jobs as a result of the changing skills requirements. European Foundation (2021) deriving from the job loss experience of the European manufacturing industry where a noticeable change is negatively impacting the low skilled employees, the same result can potentially be possible in South Africa.

In terms of the externals motivations, the manufacturing SME owners mentioned

The response from participant 003 overlaps with both internal and external motivation since they highlighted external recognition from established business establishments. Nevertheless, participant 004 highlighted that,

“Without getting consumed by the digital platform I think it has allowed us to connect with the world as needed more closely. It’s important to actually be aware of how you can put yourself out there without being swallowed by it at the same time. So definitely the exposure to the world as a Cape Town small business is what would encourage me.”

Participant 005 mentioned that,

“The motivation does not really come from Cape Town alone but across all our clients because most of them are new age businesses with innovative products and ideas so we are always on our toes to try to meet their needs halfway.”

Participant 007 responded that,

“Cape Town has an aesthetic that other cities don’t have and so when you’re able to capture that aesthetic, not just even to capture it but just being able to say that your product is made in Cape Town it seems more classier and more valuable in a way that’s just my perception. If you can use technology to capture that value, capture that aesthetic using technology to make it a part of your brand. I feel like it makes the brand more valuable.”

The internal motivational factors are an explanation of the role of SMEs as employment creators in society. Although the interviewed small enterprises are not employing large numbers at the moment, they do acknowledge the role which they have to play in the society. Beyond that, what participant 004 highlighted above captures the inevitable circumstances which all the manufacturing SMEs in Cape Town find themselves in. Schwertner (2017) explains it, digital transformation necessitates a thorough examination of the organisation's present business processes and business strategy. The evaluation comes before the creation of a digital transformation plan. Nevertheless, because of the manner the SMEs are approaching digital transformation, there is no indication of a determined evaluation on how to gradually digitise. Also, the plan to create employment opportunities is a growth strategy at a micro-level of the enterprises and is simultaneous with digital transformation which might cause a mismatch considering the unskilled available labour in the manufacturing sector.

With everything else remaining constant, the SMEs reserve a positive perception towards digital transformation as an inevitable journey. This can be attributed to the initiated digitisation code explained above, starting from the social media platforms to digitise marketing to websites and fin-tech to facilitate payments. The participants were asked the question, ‘Considering the SME experience with COVID-19, how has the perception about digitisation transformed?’

Participant 001 mentioned,

“I can do so much more by actually expanding by promoting advertising properly and getting it out there for people to see physically on the internet, not just word of mouth.”

Participant 004 also mentioned,

"You know, my perception is I want to tell my story, I can connect with someone without them being in the space because I'm using a digital platform to show them how I create."

Although many of the participants adopted digital transformation at a time of crisis and are still lacking the adequate skills and information to maximise its advantages, the positive perception is a good indication about the direction of the sector as a whole. This positive indication contradicts the assertion by Thong and Yap (2011) that the likelihood of most SME owners/managers considering the implementation and usage of emerging and sophisticated technology, depends on their level of knowledge of such technology. Therefore, SMMEs are unlikely to adopt and use technology that they barely know.

4.5.4 Theme 3: Macro-level perspective

This section of the theme sought to discover how SMEs can be supported towards the digitisation agenda. Two codes were formulated from the responses which are (i) guidance and finance and (ii) needs based assistance.

On guidance and finance, the participants shared captivating insights into how; what practical measures can government institutions apply to ensure the success of digital participation in SMEs? One of the findings on this theme discovered that the manufacturing SMEs in Cape Town require guidance and financial support in order to thrive. This finding embodies the holistic needs of the SMEs outside the subject of digital transformation which is a captivating perspective to understand the challenges that underpin their immediate operating atmosphere and hence, to a certain extent influence their reasons to digitise.

Participant 002 mentioned only the funding aspect that,

"Be realistic when it comes to funding. We know that this new technology is not cheap at all."

Participant 004 also shared from both funding and guidance, "

For example, platforms like Shopify , if they can help to get me someone to help me set that up and guide me, give me the confidence that you can do this. You can move forward and obviously they would have to pay that person. I won't have to pay that person."

Participant 007 highlighted solely the guidance aspect,

"So there's education but I am not supported by someone who I can bounce ideas off to immediately and advise me in terms of what to do, and I don't feel like there's a way

where they are testing us all in terms of how are we successfully applying what we are learning so that can eventually help us dig deeper finding. We can also help you with a mentor that is in that industry.”

These are some of the perspectives into what the manufacturing SMEs wish the government institutions could support them with. Prior to discussing these findings, in Chapter 2 the avenues to support SMEs across all industries were discussed such as the Small Enterprise Development Agency, Small Enterprise Financial Agency, Manufacturing Investment Programme (MIP) and The Manufacturing Competitiveness Enhancement Programme (MCEP). The essentiality of these organisations is to provide support including funding to SMEs across the manufacturing sectors. Yet, what this study also discovered is that the processes to follow when applying for support are burdensome or too long.

Participant 005 shared,

“It just adds to the stress. At the end of the day, will it really make everything better? I don't know.”

Participant 007 also shared,

“There'll be so many hoops and forgetting that I'm responsible for manufacturing so I don't have the time to be grilled up and then jumping through all these hoops because I'm in charge of finance. I'm in charge of marketing. I'm in charge of this.

Like there's another company that I've been applying to for finance and they are asking for a whole ton of things and I gave them the whole information. And the funding they said they were gonna give me was R5 000 and I was like what? I make that myself in a week, so it's because in their minds they think I'm trying to survive trying but I'm not trying to survive. I'm trying to thrive.”

Participant 002 shares a similar experience,

“Like right now. I am busy with my first set of applications. Like it's going well, because they throw me a lot of follow up questions. Regarding my application, which are very quick questions, because it sounds like it's just R50 000 rands and it's just a couple of machines, like a sewing machine. It's not much, it's gonna take me quite a long way. I mean, I've already contributed R50,000 before.”

The fact that various organisations exist with the key mandate of providing finance to SMEs, it is true that Chen, et al., (2021) the government's roles in supporting small businesses are indispensable. And besides the financial aspect which the SMEs are challenged by, it is evident that there is a need for a more comprehensive approach for the government to offer

SMEs support, which may include making technological advancements and innovations, whether managerial or technological, available to SMEs, as it is proven crucial to their success. Without disregarding the evident effort by the government Jere, et. al, (2020), understanding the factors that drive digital adoption can help SMEs and the government figure out what they need to do to impact SMEs' adoption of digitalisation.

Furthermore, to what is the expected role of these various organisations, the SMEs maintain that what the Western Cape needs to get right is providing assistance based on what is coded as needs based analysis. Examples of the insights from the participants are shared below Participant 004 said,

“They need to understand that we need bangasifakeli nje iiservices (and not just give us services) but rather this is what we need. And also see where the gaps are in small businesses, where do we struggle and not just pitch up even if they do a survey in a few businesses and there would be the common points, things that are similar to understand ukuba ba-need ntoni kanye kanye ababantu (you get to understand exactly what these people need).”

Participant 008 also shared,

“It is like we are being done a favour most of the time but because we don't have the privilege to reject whatever they offer, small businesses accept it anyway. So the focus should be different, we want to be offered what will address our needs and not be part of a certain programme that will leave us hanging when its time has ended.”

Needs based analysis is not something that is noted in the literature hence no support from Chapter 2 is referenced. However, it is an integral contribution to the objectives and scholarship of this study and how the support for Cape Town based manufacturing SMEs could be supported.

4.6 Conclusion

The outcomes of the study, which were presented in this chapter, examine the themes and codes of the data that were gathered utilising an interview questionnaire and Atlas.ti. The themes that arose from the data were analysed, which addressed the research questions and related them to earlier research of established literature. From the response analysis and against the evaluation of the literature, the study has ascertained that Cape Town manufacturing SMEs are at Maturity Level 1 Initial stage of digital transformation. They have adopted various digital tools which they use to enable the digitisation of their small enterprises hence their positive perception. This discovery sought to respond to the main research question about the how far are Cape Town manufacturing SMEs with digitisation.

Within the SME functional areas, marketing and manufacturing have come top as the areas the businesses wish to advance through digitisation. This is evident in the responses as many SMEs have adopted other easily accessible tools such as social media and online payment systems to participate in the digital adoption. It is also established that Cape Town manufacturing SMEs were compelled by the pandemic to adopt digital tools as a reactionary strategy to the changed business environment. The results and recommendations based on those findings highlight needs-based assistance as a suitable approach for the Western Cape digitisation agenda.



CHAPTER 5: Summary, Conclusions and Recommendations

5.1 Introduction

This chapter discusses the contribution of this study to the current body of knowledge and all the results discussed in the previous chapter in the summary of findings. Subsequently, chapter 5 highlights the recommendations, implications for future research and limitations of the study.

5.1.1 Research questions

- (i) How far are manufacturing SMEs with digital transformation?
- (ii) Which business areas do manufacturing SMEs target for the digitisation agenda?
- (iii) How has the COVID-19 affected manufacturing SME digitisation?
- (iv) How can SMEs be supported to participate in the digital economy?

5.2 Summary of findings

The research undertaken on digital transformation in Cape Town manufacturing SMEs illuminated several points, including:

5.2.1 Theme 1: SME level perspective

i. Digital transformation awareness

Cape Town manufacturing SMEs have confirmed the awareness about digital transformation as a subject and process that affects them both directly and indirectly. This is proven by the adoption of digital tools such as Facebook and YOCO as enablers of the digital transformation process within the small enterprises. The founders and managers of the SMEs consider the digital tools that they adopted as a simplified understanding of digital transformation. Part of the digital tools or processes adopted by the Cape Town manufacturing industry is 3D printing regardless of the manufactured product hence its commonality and understanding from the research.

ii. SMEs value digital transformation

The research has indicated that all the SME owners do see the value of digital transformation in their manufacturing businesses. Evidently, all the entrepreneurs have adopted digital tools to digitise certain functions within their businesses hence most uphold positive perspectives and experiences regarding the value of digital transformation.

iii. Skills and resource incapacity / Internal business processes

It is also discovered that although awareness about digital transformation exists, there is a lack of skillfulness and resource incapacity to adopt it. Importantly, because of the small size of the

SMEs, there is a lack of technically skilled employees to share the technical responsibilities. It challenges the focus of the entrepreneurs hence impacts the growth of the SME.

iv. Marketing & Manufacturing

Despite the skills and resource incapacity, Cape Town manufacturing SMEs commonly perceive marketing and manufacturing as prominent areas and internal business processes that would benefit from digital transformation.

v. Digitisation journey initiated

Cape Town manufacturing SMEs have initialised the adoption of digital transformation. Maturity Level 1 Initial is the stage where Cape Town manufacturing SMEs are presently. Although the SMEs are aware of it and its value in the businesses, the following attributes from the definition are lacking.

5.2.2 Theme 2: Industry-level perspective

i. Post-pandemic digital transformation

The COVID-19 pandemic compelled the manufacturing industry to adopt digital tools in order to maintain continuity of their businesses during the time. In the above digitisation phase of the SMEs, this is referred to as a 'Reactionary' adoption to adjust to the challenges. Be that as it may, it is also ascertained that although the digital transformation is reactionary, customer preferences are also a pioneering driver of this adoption.

ii. Customer induced pressure

Based on the migration of the SMEs and manufacturing industry which they operate in, it is assumed that the intensifying pressure to digitise will, as a consequence, result in the bargaining power of customers due to the alternatives available. Therefore, each SME has to adapt in order to remain competitive and relevant because of the minor degree of influence they have in the market.

iii. Motivation to DT as a Cape Town SME

Cape Town manufacturing SMEs have varying motivational reasons to adopt digital transformation which are either internal or external to the business. The reasons vary from

customers, employment creation and the actual manufactured product. Hence, this finding is shared across the SME level perspective and Industry level perspective.

iv. Positive digitisation perception

With everything else remaining constant, the SMEs reserve a positive perception towards digital transformation as an inevitable journey. This can be attributed to the initiated digitisation code explained above, starting from the social media platforms to digitise marketing to websites and fin-tech to facilitate payments.

5.2.3 Theme 3: Macro-level perspective

i. Guidance & finance

One of the findings on this theme discovered that the manufacturing SMEs in Cape Town require guidance and financial support in order to thrive. This finding embodies the holistic needs of the SMEs outside the subject of digital transformation which is a captivating perspective to understand the challenges that underpin their immediate operating atmosphere and hence, to a certain extent influence their reasons to digitise.

And besides the financial aspect which the SMEs are challenged by, it is evident that there is a need for a more comprehensive approach for the government to offer SMEs support, which may include making technological advancements and innovations, whether managerial or technological, available to SMEs, as it is proven crucial to their success.

ii. Needs based assistance

The SMEs maintain that what the Western Cape needs to get right is providing assistance based on what is coded as needs based analysis. This is not something that is noted in the literature hence no support from Chapter 2 is referenced. However, it is an integral contribution to the objectives and scholarship of this study and how the support for Cape Town based manufacturing SMEs could be supported.

5.3 Applicability of the DREAMY Model

The literature explains three application-specific purposes namely descriptive purpose, prescriptive purpose and comparative purpose. From the experience of this study, it is proven that the applicability of this model is relevant. The outcomes realised do confirm that the stage which this research and the adoption of digital transformation process is at, is still descriptive. The model explains a descriptive purpose as an intention to assess the as-is situation of the organisation or process. De Bruin, et. (2005) even though these three types of maturity models can be seen as distinct, they are the evolutionary phases of a model's life cycle. As a matter of fact, a model is descriptive in its first phase, so that a deeper understanding of the current domain situation is achieved. A model can then be evolved into being prescriptive as it is only

through a sound understanding of the current situation that substantial and repeatable improvements can be made.

Separate from the application of this model to influence the conceptual framework, it also aided the response to the research question; How far are manufacturing SMEs with digital transformation? Corresponding with this research question is the research objective to study the direction of Cape Town SMEs towards digital transformation which captures the as-is state of the SMEs / industry. Hence, from the outcomes deduced from this iteration of the study, it can be expected that the following step of the application purpose is prescriptive.

5.4 Resolving the research problem

The research gap identified the problem statement for this dissertation, which reads: *Manufacturing SMEs experience challenges with digital transformation and as a result do not fully benefit from its economic opportunities. To digitally transform is a necessity, however, no Cape Town based research is available to assist in designing support and solutions for the SME manufacturing industry.*

The study sought out to determine the digital transformation of Cape Town based SMEs in the manufacturing sector. The literature assessed possible challenges to the adoption of digital transformation under these 3 themes, SME level perspective, Industry level perspective and Macro-level perspective. It is important to note that the literature reviewed considered the challenges from a high-level perspective and not necessarily immediate issues that are unique to Cape Town SMEs. Hence in resolving the research problem, it can be noted that there are mutually exclusive challenges, and some are a discovery from the study.

Theoretical problem

This study has fulfilled the purpose to provide credible, relevant and recent research into the challenges faced by the SMEs. In the theoretical discovery of new information, this study has defined what it means to Cape Town manufacturing SMEs to adopt digital transformation, most presently the adoption of digital tools such as social media and YOCO for simplified payments. Also, this research has determined the maturity level which these businesses have adopted the journey. Nevertheless, the lack of technical skills, financial and resource incapacity are some of the areas that have resurfaced in this recent research as areas that are still relevant and well documented. For example, authors like Moreira, et. al (2018) mention Internet of Things (IoT), robotics and artificial intelligence (AI) which at this point have not been adopted in the studied context. One of the reasons that can be accounted for this lag is the financial incapacity of SMEs which is discussed in Chapter 2 as a predictor of digital transformation.

The Western Cape government has earmarked 2030 with a mandate to achieve its digitisation agenda and it aims to use SMEs as significant drivers of this motive. However, this research has discovered that none of the SMEs are aware of this initiative by the government. This not only highlights a concern in the effectiveness around the awareness and benefits of this initiative to SMEs, but also the role of academia as a theoretical cornerstone to redress practical problems. Of course, the researcher also acknowledges that presently, the role of academia in this area has not clearly been researched and published or even worse documented. Hence, this study has initiated the path towards addressing the theoretical problem that exists.

The responses to the research questions have exposed novel facts, to some extent somewhat agreeing and contradicting what is generally understood by manufacturing SMEs, particularly that they are survivalist businesses, and that each entrepreneur could manage to run all its functional areas. Perhaps from a scalability and profitability point of view survivalist could be justified, however the continued advancements and competitiveness brought by technology necessitates the outsourcing of other critical skills to the survival of the SME that can almost not be embodied by one individual. Evidently, most of the entrepreneurs who participated in this study have varied challenges with digitisation, from understanding to skilfulness even though the digital tools have become a backbone of their income generation strategies. Therefore, this theoretical contribution hopes to aid the resolution of the misperception of SMEs, spanning from outside stakeholders, industry competitors and to uninformed founding entrepreneurs.

Practical problem

One of the solutions to the practical problems is that Cape Town manufacturing SMEs need to adopt the culture of implementing swift reactive ways in digital adoption. In the study outcomes, none of the SMEs indicated an invention of digital tools, and because of that, swift reactionary measures to adoption of digital transformation are necessary to steer the SMEs towards higher levels of digital maturity. Therefore, entrepreneurs themselves are mandated to self-educate about the emerging trends in the manufacturing industry and how these practical tools can be related to the local sector or businesses at less cost and skills necessity. This will assist the entrepreneurs to combat the challenges of employee skill competency which was discussed as one of the predictors of digital transformation. Even better, Gray, et. al, (2003) SMEs have greater flexibility and lower bureaucracy than larger organisations which favours a swift approach towards digital adoption. Fostering partnerships with the private sector such as YOCO as an emerging FinTech for payment services would be a great head start for a diversified and trusted payment facility. By adopting the shared culture of partnerships, the SMEs can advance at a better pace and benefit from early access to custom solutions specific to the industry. However, it is vital to stress that this is a shared responsibility and can only be

successful if the entrepreneurs invest time and interest in amplifying their business through digital adoption.

5.5 Answering the Research Question

The research question for the dissertation was formulated as: *Digital transformation: The case of Cape Town based SMEs in the manufacturing sector.*

The research questions were answered by determining the current state, challenges and factors that influence digital transformation in Cape Town manufacturing SMEs. The response to the research question can be summed up as follows

(i) How far are manufacturing SMEs with digital transformation?

Cape Town manufacturing SMEs are at Maturity Level 1 Initial stage of digital transformation. They have adopted various digital tools which they use to enable the digitisation of their small enterprises hence their positive perception.

(ii) Which business areas do manufacturing SMEs target for the digitisation agenda?
Manufacturing and marketing are the key areas which the SMEs are focusing on and wish to mature further through the advantages and business value delivered by digital transformation.

(iii) How has the COVID-19 affected manufacturing SME digitisation?

Similar to other businesses, Cape Town manufacturing SMEs were challenged by the pandemic and adopted digital tools as a reactionary strategy to the challenges faced. Also, it compelled them to explore other avenues to participate both in the consumer market and digital transformation adoption as an ongoing process.

(iv) How can SMEs be supported to participate in the digital economy?

The SMEs are not aware of the Western Cape 2030 digitisation agenda and require guidance and finance as means of support from the stakeholders (Western Cape government, value chain and private sector). Also, the SMEs have indicated needs based analysis as a solution to their challenges since they face dissimilar challenges or business needs.

5.6 Research implications on theory and practice

Countrywide, the outbreak of the COVID-19 pandemic has resulted in a shift on how business is conducted and across all sectors whether small, medium or large. SMEs in the Cape Town manufacturing sector are not exempt and as such, have been reactionary in adopting digital transformation both as means of remaining in business and as a long-term process of internal business transformation. As noted previously, the SMEs have since then benefited

enormously hence the positive perception and enlightenment around it. Initially, SMEs had limited digitisation even though they were aware of the enabling digital tools and as a consequence, have digitised and have intentions to mature their adoption before 5 years from now.

The scarcity of this nature of research on digital transformation of Cape Town manufacturing SMEs has been addressed, allowing future research to be done and subsequently build on the findings illuminated in the study. In Chapter 1, the Western Cape 2030 digitisation agenda is mentioned, and the outcomes of this study have a high potential in shaping the contribution made towards the SMEs to make it a success.

The applicability of the DREAMY model (De Carolis, et al., 2017) together with the integration of the predictors of digital transformation in the conceptual framework has undoubtedly been confirmed in determining the challenges, intention and support to adopt digital transformation. Therefore, increasing the ability of replication and generalisation back into the larger population due to the familiar versatility of the model in research (Ajzen, 2002; Farah, 2017).

The performance indicators and implications of technology in SMEs have attracted and generated considerable interest among academics and entrepreneurs (Boateng, Hinson, Heeks, and Mbarika, 2010; Mohamad & Ismail, 2009; Fink and Disterer, 2006; Beck and Demirguc-Kunt, 2006; Grandon and Pearson, 2004). For instance, marketing researchers have mainly focused on digital advertising and social media effects including attribution model developments (Lamberton and Stephen, 2016; Kannan and Li, 2017) and multi-channel and omni-channel developments (Verhoef, Kannan and Inman, 2015). The strategic management literature has mostly focused on the conceptualisation, operationalisation and renewal of (digital models) (Foss and Saebi, 2016; Osterwalder and Pigneur, 2010). In the information systems literature, researchers have traditionally paid strong attention to technical developments regarding adoption and use of digital technologies and resultant business value (Nambisan, Lyytinen, Majchrzak, and Song, 2017; Sambamurthy, Bharadwaj and Grover, 2003). To the best of the researcher's knowledge, there has been no recent management studies on digital transformation, specifically about Cape Town manufacturing SMEs. Various scholars such as (Nordås, 1996; Furawo and Scheepers, 2018; Gaffley and Pelsler, 2021; Jere and Ngidi, 2020; Parschau and Hauge, 2020; Richter, Vodanovich, Steinhüser and Hannola, 2017; Zaware, 2020) have shared discoveries on the outcomes of their respective studies but lack local contextualisation. Hence, this study considered the research from a cutting edge perspective of COID-19, Cape Town and manufacturing sector. This exploration segregates the manufacturing SMEs from the generalisation of all the small enterprises in terms of the understanding of the challenges and the support needed for them to thrive in Cape Town. Moreover, the scholars above focused on predetermined business areas linked to digital

transformation while this study attempted to understand it from a holistic perspective hence probe the discovery of other areas which the SMEs have integrated it with in the process of adoption.

5.7 Recommendations and implications for future research

5.7.1 Management studies recommendations

In future studies, it would be beneficial to study the topic using mixed-methods to get different perspectives. The progression of the topic should also look at longitudinal studies that can be covered over time to study the digital transformation journey of manufacturing SMEs in Cape Town. This will assist the targeted stakeholders, i.e Western Cape government, government organisations and private sector, in how they can apply a dynamic support model that is driven by the immediate needs of the SMEs and the changing market requirements. Perhaps, studying this topic in different cities, comparing Johannesburg, Durban and Cape Town as South Africa's top 3 advanced cities will produce even a better comprehensive strategy. On a broader scale, the research could be conducted in countries with a similar market saturation in the manufacturing sector. This may provide a new perspective into how the country can improve the support of SMEs operating in the sector and therefore, result in the multiplier effect for the benefit of cities such as Cape Town. In the previous chapter, SMEs also indicated that they would appreciate guidance from the private sector entities that have managed to adopt digital transformation. It is recommended that the same research is applied in private companies that are new in the market and have accelerated their growth through the integration of digital transformation. This would yield a significant benefit in the formulation of the SME support strategies.

5.7.2 Academic recommendations

From the outcomes of this research, it is established that manufacturing SME owners and managers were aware of digital transformation even before the pandemic, hence were reactionary. The adoption of digital transformation is a fast and everchanging environment and hence it is recommended that they are forced to remain inquisitive of new technology and skills to remain relevant. Moreover, SMEs need to understand that the adoption of technology implies a change in the entire growth strategy and cannot be excluded as an enabler of success when planning the future despite the challenges around costs and other aspects. At an employee level, a significant suggestion is to empower the employees with the basic digital skills and understanding or else the SMEs might find themselves consumed by the digital transformation agenda and reaping no benefits. At the end of the day, it is statistically proven in the literature that the South African manufacturing sector is largely characterised by an abundance of unskilled labour.

5.8 Limitations of the research

This dissertation, as with any research, is not free of limitations. The limitations associated with the research include:

- (i) SMEs are challenged with the limited understanding of the topic even when explained, and some pulled out of the study while some did not agree at all.
- (ii) Some SMEs perceived this study as a gateway to understand their internal operations therefore were not interested.
- (iii) The SME managers are responsible for most day-to-day tasks, therefore could not participate in the research due to limited availability.
- (iv) As the researcher, I had challenges with time because I am balancing both academics and daily work. Most of the weekend visits to the industrial parks resulted in nothing because the businesses were closed.

5.9 Conclusion

This final chapter concludes the entire body of the research by providing the summary of the research starting from the introduction, literature, methodology, analysis and it also provides the answers to the research questions. This thesis has achieved its main research question or inquiry about the journey which Cape Town manufacturing SMEs are with digitisation. Through the analysis of the participant's feedback and the application of the DREAMY model, it is concluded that the SMEs are at the Initial Maturity Level of digital adoption. The extensive comprehension of the literature had an immense contribution to the outcomes achieved, it is through the facts from the literature that the feedback from the respondents could be evaluated and varying outcomes were concluded. The thematic analysis and relationship mapping between the categories also added value in the construction of meaning from the data. Nevertheless, the path which Cape Town manufacturing SMEs have embarked on is indicative of the positive direction towards accelerated business growth because technology has become an integral business pillar beyond size or industry. The resolutions to theoretical and practical problems that exist in the manufacturing sector presented other value areas that could be applied to the sector and academia as immediate areas of redress considering that theoretical strategies result to practical problem resolutions or outcomes.

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Appendices

Appendix one: Information Sheet



Date: 13 September 2022

Information Sheet: Manufacturing SME owner / manager

Topic: Digital transformation: The case of Cape Town based SMEs in the manufacturing sector

Dear Participant,

I, Alutha Thandolwethu Tyali, am pursuing my Master of Commerce degree in the Department of School of Business & Finance at the University of the Western Cape, South Africa. I would like to invite you to take part in my research project. Please take time to read the following information carefully, and please feel free to ask questions if anything you read is not clear to you or if you'd like more information.

What is the study about?

This study is to discover more about the digitisation journey and challenges of Cape Town manufacturing SMEs using the predictors as barriers to digitise. Also, it is aimed at gaining a deeper insight into the previously identified challenges from both national and international perspectives and to provide recommendations in which the challenges could be addressed.

The objective of this research is to study the direction of Cape Town SMEs towards digital transformation and investigate the areas which manufacturing SMEs intend to digitise. Also, it is to understand if the COVID-19 pandemic has affected the digitization of manufacturing SMEs and determine how the SMEs can be supported towards the digitisation agenda.

Why are you being invited to participate in this study?

You have been invited to participate in this study because of the industry (manufacturing) and operating location of the SME (Cape Town) which you are associated with. Also, the

invitation is based on the managerial level which you are responsible for in the SME with a special focus

on the owner/managers as the decision makers in the business especially around the technology adoption and management section of the selected SMEs.

What will I be expected to do in this study?

As a participant, you are expected to provide the researcher with answers to the questions asked, subject to the rights and willingness to participate as provisioned in the consent letter.

What are the potential risks involved in this study?

This is a low-risk study. One of the anticipated risks is that the participants' views may be misinterpreted by the researcher in the process of analysing the similarities and differences in the responses. To minimise it, response validation will be done with the participants by sharing with them their transcribed feedback.

Otherwise, the researcher may lose the recorded data from the participants and may require another session to interview the participants. This process is time consuming for the participants and may dilute the responses which had been collected initially. To eliminate this risk, the researcher will record and back-up the data until it has been utilised and safe for back-up storage which no one outside the university has access to.

Furthermore, because of the short period which the researcher has to seek informed consent, participants may consider it as too short or little to think through the questions which they would have asked if they had more time. To minimise this risk, the information letter and the consent form will be verbally explained and signed at the beginning of the interview and another consent will be confirmed only verbally at the end of the interview which will form part of the recorded evidence. This at least gives the participants an opportunity to withdraw from the study should they feel uncomfortable at the end or anywhere during the interview.

What are the potential benefits involved in this study?

This study aims to contribute or benefit the Western Cape Provincial Strategic Plan and its 2030 digital transformation agenda. Extensively, the outcome of this study would be an important contribution into refining the policies and practises established towards supporting SMEs particularly within the manufacturing sector in Cape Town. At an SME individual level,

the outcomes of the study will be shared with the participants at their own willingness which may benefit them in addressing the predictors of digital transformation internally and externally.

What Covid 19 Protocols are in place? (If applicable)

The basic COVID-19 protocol is that the study will initially be proposed to take place online if the SME has the capacity to facilitate such or else in person. Else, the interviews will take place physically and social distancing will be maintained.

Will my details be kept confidential?

In terms of the requirements of the Protection of Personal Information Act (Act 4 of 2013), please note additional information:

What type of personal information will be collected?

Information such as names, surname, contact numbers, company information and email address will be collected and protected in accordance with the University's Code of Conduct for Research and Protection of Personal Information Act, Act No. 4 of 2013. The respondents will be granted anonymity should they desire so; or else be identified by coded names (including their companies).

Who at UWC is responsible for collecting and storing my personal information?

The researcher is responsible for collecting and storing the participant's personal information. However, the University has the sole ownership of the data. The identities and other personal information of the participants will not be disclosed, and no information

collected will be accessible beyond the researcher, supervisor and University.

Who will have access to my personal information outside of UWC?

The study participant has the right to request a copy of their feedback. Outside the University, including the researcher and supervisor, no other parties will be able to access the participant's information.

How long will my personal information be stored?

Electronic data i.e recordings and transcriptions will be kept on a shared researcher and supervisors password protected cloud storage for five years and deleted thereafter. Hard copies of the transcriptions will be stored by the researcher and destroyed after five years or after using it during the study.

How will my personal information be processed?

Transcription of the data and thematic analysis will be applied to analyse and process the feedback. No amendments can be made to the originality of the feedback which may misrepresent the meaning of the participant unless the researcher misunderstands the feedback (which has been addressed in the risks). The interview recordings will be formatted or destroyed after 5 years.

Who do I contact for further information?

Should you have any require any further information, please do not hesitate to contact me Alutha Thandolwethu Tyali on my cell phone (0844674547) or via email (3739307@myuwc.ac.za). Alternatively, may also contact my supervisor Dr Sibindi in the Department of Business & Finance, University of the Western Cape (UWC), nsibindi@uwc.ac.za, (cell/tel 0731342864) and the Humanities and Social Science Research Ethics Committee (HSSREC), Research Development, of UWC by telephone at 021 959 4111 or by email: research-ethics@uwc.ac.za.

This information sheet is for you to keep so that you can be aware of the purpose of the study. With your signature on the attached consent form, you indicate that you understand the purpose of the exercise.

Appendix 2: Consent form



Participant (interview)

Consent Form

University of the Western Cape

Project Title: Digital transformation: The case of Cape Town based SMEs in the manufacturing sector

Researcher: Alutha Thandolwethu Tyali

Please initial the boxes to show your agreement and understanding of what is expected for this study.

1. I confirm that I have read and understood the information sheet explaining the above research project and I have had the opportunity to ask questions about the project.
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without there being any negative consequences. In addition, should I wish to withdraw, I may contact the lead researcher at any time to do so).
3. I understand my responses and personal data will be kept strictly confidential.
4. I give permission for members of the research team to have access to my responses without revealing any part of my identity.
5. I understand that my name will not be linked with the research materials, and that I will not be identified or identifiable in the reports or publications that result for the research.
6. I agree for the anonymized data collected to be used in future research. (*Circle the appropriate answer*). Yes / No
7. I hereby agree to be audio recorded. (*Circle the appropriate answer*). Yes / No

In terms of the requirements of the Protection of Personal Information Act (Act 4 of 2013), personal information will be collected and processed:

- I hereby give consent for my personal information to be collected, stored, processed and shared as described in the information sheet.
- I do not give consent for my personal information to be collected, stored, processed and shared as described in the information sheet.

Name _____

Signature _____

Date _____

_____ Name of Participant (or legal representative)	_____ Date	_____ Signature
_____ Name of person taking consent (If different from lead researcher)	_____ Date	_____ Signature
_____ Supervisor	_____ Date	_____ Signature

Copies: All participants will receive a copy of the signed and dated version of the consent form and information sheet for themselves. A copy of this will be filed and kept in a secure location for research purposes only.

<p>Researcher:</p> <p>Alutha Thandolwethu Tyall E-mail: 3739307@mvuwc.ac.za Cell: 0844674547</p>
--

<p>Supervisor:</p> <p>Dr. N Sibindi E-mail: nsibindi@uwc.ac.za Cell: 0731342864</p>
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<p>HOD:</p> <p>Prof A Bayat E-mail: abbayat@uwc.ac.za Cell: 082 496 0356</p>
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Appendix 3: Ethics clearance



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23 September 2022

Mr AT Tyali
School of Business and Finance
Faculty of Economics and Management Sciences

HSSREC Reference Number: HS22/6/46

Project Title: Digital transformation: The case of Cape Town based SMEs in the manufacturing sector.

Approval Period: 19 September 2022 – 18 September 2025

I hereby certify that the Humanities and Social Science Research Ethics Committee of the University of the Western Cape approved the methodology, and amendments to the ethics of the above-mentioned research project.

Any amendments, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval.

Please remember to submit a progress report by 30 November each year for the duration of the project.

For permission to conduct research using student and/or staff data or to distribute research surveys/questionnaires please apply via: <https://sites.google.com/uwc.ac.za/permissionresearch/home>

The permission letter must then be submitted to HSSREC for record keeping purposes.

The Committee must be informed of any serious adverse events and/or termination of the study.

A handwritten signature in black ink, appearing to read 'Patricia Josias'.

Ms Patricia Josias
Research Ethics Committee Officer
University of the Western Cape

NHREC Registration Number: HSSREC-130416-049

FROM HOPE TO ACTION THROUGH KNOWLEDGE.

Appendix 4: Interview guide

INTERVIEW GUIDE



Research Question 1	How far are manufacturing SMEs with digital transformation?
Research objective	To determine the <u>indication</u> of Cape Town manufacturing SMEs towards digital transformation.
	How aware is <u>the business</u> about digitisation in the manufacturing industry?
	What digitisation trends are in the manufacturing SME industry in Cape Town?
	How has the pressure been from the industry to the business to digitally transform?
	What is the extent does the SME see value in digital transformation?
	What steps has the SME taken to digitally transform?
	As a Cape Town based SME, what would motivate participation in digital transformation?
Research Question 2	Which <u>business areas</u> do manufacturing SMEs target for the digitisation agenda?
Research Objective	To investigate the areas which manufacturing SMEs intend to digitise.
	Which business area(s) would benefit from digitisations' value creation?
	Which business process(es) would benefit from digitisations' value creation?
	Internally, what maturity level do you think the SME is with digital transformation?
	What is the desired maturity level would the SME like to reach in 5 years?
Research Question 3	Did COVID-19 <u>affect</u> manufacturing SME digitisation?
Research Objective	To understand if COVID-19 affected the digitisation of manufacturing SMEs
	Before the pandemic, how digitally transformed was the SME?
	Given COVID-19 and SME digitisation level, what business benefit or cost would be attributed to digitisation?
	Which business area(s) did COVID-19 expose their need to digitally transform?
	Considering the SME experience with COVID-19, how has the perception about digitisation transformed?
Research Question 4	How can SMEs be supported to participate in the digital economy?
Research Objective	To determine how SMEs can be supported towards the digitisation agenda

	What should the Western Cape 2030 Digitisation agenda focus on to assist SME digitisation?
	What practical measures can government institutions apply to ensure the success of digital participation in SMEs?
	How do you think the larger manufacturing value chain can assist SMEs to digitise?
	What kind of assistance would be appreciated from private sector established companies on assisting SMEs with digitisation?



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