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Research Proposal for the ARP:

Challenges Encountered in Reaching Digital Maturity by Road Freight Logistics Service Providers (RFLSPs) in Gauteng province

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Student number: 1232348

Declaration for research study

Under the leadership of my academic supervisor, I, Itumeleng Lanceford Gift Motshwari, solemnly declare that the research project "Exploring Digital Maturity among Road Freight Logistics Service Providers in Gauteng" is the product of my own intellectual achievements and represents original work conducted under the guidance of my academic supervisor.

I confirm that all participant rights were respected, confidentiality was maintained, and the research was managed in compliance with integrity standards and guidelines. All information sources, including published works, online databases, and direct interactions from the author, have been properly recognised and credited in the bibliography.

Moreover, I affirm that no portion of this study has ever been submitted for approval or evaluation by an academic institution before, nor does it violate any intellectual property rights or ethical guidelines of any other individual or entity.

I take full responsibility for the accuracy, authenticity, and completeness of the research results reported in this work. Any opinions, interpretations, or conclusions expressed herein are simply belonging to the writer and do not represent the views of the institutions or organisations associated with this research.

I certify with my signature that this research study is true and honest, and I have included the date below.

Name: Itumeleng Lanceford Gift Motshwari
Date: 07 February 2024

Acknowledgement

My sincere appreciation goes out to everyone who helped to finish the research project "Exploring Digital Maturity among Road Freight Logistics Service Providers (RFLSPs) in Gauteng."

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Finally, I want to acknowledge the academic community and everyone who has added to the collection of knowledge about logistics and digital maturity. Their intellectual contributions and ground-breaking work have laid a strong basis.

Name: Itumeleng Lanceford Gift Motshwari
Date: 07 February 2024

Abstract:

This research intends to evaluate the state of digital maturity among road freight logistics service providers (RFLSPs) in Gauteng, investigating challenges related to digital infrastructure, skills and knowledge, and technology adoption. The study employs a qualitative method approach by conducting interviews with experienced industry leaders. Findings reveal a remarkable commitment to progress, with a strategic focus on continuous development and knowledge empowerment. However, challenges include client resistance, financial disparities, and infrastructure issues, showcasing the complexities in the industry's digital transformation journey. Practical implications involve the need for comprehensive strategies, including client engagement, addressing financial gaps, and strengthen digital infrastructure. The study contributes to the field by providing insightful information about the challenges and opportunities specific to RFLSPs in Gauteng, offering valuable guidance for industry stakeholders navigating digital maturity.

Keywords: Digital maturity (DM), Digital transformation (DT), Digital technologies, Road freight Logistics Service Providers (RFLSPs).

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CHAPTER 1

1. Statement of purpose:

Fast paced development of new technologies in the road freight industry is forcing freight service providers to digitize as well as to compete and stay relevant (Cichosz, Wallenburg, & Knemeyer, 2020). Therefore, there is a common view in the freight industry that reaching both "**Digital Transformation (DT)** and **Digital Maturity (DM)** allows **Road Freight Logistics Service Providers (RFLSPs)** to secure a competitive edge through cost minimisation, enhancing customer satisfaction, fostering innovation, and optimising operational efficiency (Sumrit, 2021, p. 719). Therefore, the purpose of the research study on challenges and opportunities experienced by the Road Freight Logistics Service Providers (RFLSPs) in their efforts to achieve digital maturity in Gauteng Province is to identify key challenges to adopting **Digital Technologies** and to provide valuable insight and recommendations for RFLSPs, customers, policy makers, technology vendors and service providers.

In this way, the research aims is to evaluate the challenges encountered in reaching digital maturity by the RFLSPs in Gauteng province, including the state of digital maturity amongst the RFLSPs in Gauteng province; the specific challenge relating to the digital infrastructure, digital skills and knowledge, and the use of digital technologies in Gauteng province; finally the theoretical/conceptual framework. Moreover, it is crucial to note that many road freight service providers are changing their logistics systems to remain competitive in the ever-changing, innovative and technological environment (Rathore, Gupta, Biswas, Srivastava, & Gupta, 2022). However, there are various obstacles and benefits to achieve digital maturity. The common obstacles include factors like infrastructure, connectivity, skills shortage, and access to finance while the benefits include improved operational efficiency, increased customer experience, and increase competitiveness (Farquharson, Mageto, & Makan, 2021).

Author (year)	Organisational Problem	Research Problem	Conceptual Frame Used	Population & Sample	Research Gap
(Cichosz, Wallenburg, & Knemeyer, 2020)	To overcome barriers impacting digital transformation and be competitive.	The intention of the research is to point out barriers and best practices associated with achieving success in Digital Transformation initiatives.	Used a theory from: George Westerman, Didier Bonnet and Andrew McAfee based on 4 types of digital maturity. The theory covers digital intensity and transformation management intensity	The study examines data collected from 9 international and global logistics service providers (LSPs) through a number of case studies.	Future studies should examine possible differences in the obstacles and favourable outcomes related to Digital Transformation (DT), particularly in medium- and small-sized businesses.
(Rathore, Gupta, Biswas, Srivastava, & Gupta, 2022)	Companies need to give top priority to removing the crucial obstacles that have been found in the way of the logistics industry's effective adoption of disruptive technology.	The objective of the research is to pinpoint the key challenges inhibiting the effective adoption of Digital Technologies (DTs) within the logistics sector and to explore the interconnectedness among these barriers.	The research utilised Adner and Kapoor's framework in conjunction with the Theory of Disruptive Innovation, with a primary emphasis on two aspects: the issue of new technology's development and the possibility for technology's expansion.	A questionnaire was distributed to 15 logistics management experts in India, each possessing over a decade of professional experience in the field.	Future research ought to examine possible obstacles to the uptake of digital technologies (DTs) and the relationships between them. To create a thorough framework, researchers might also look at other cutting-edge technologies and carry out in-depth study.
(Sumrit, 2021)	For DT: organisations need to proactively address obstacles: lack of digital culture and insufficient managerial support. The key to success is overcoming these obstacles is acting decisively.	To examine the barriers to small and medium-sized businesses' (SMEs) Digital Transformation (DT) in Thailand's goods logistics service provider (LSP) market, a systematic strategy is required.	The study's theoretical foundation is based on two sources: J.C. Duperrin and M. Godet's MICMAC (Cross-Impact Matrix Multiplication Applied to Classification) and Warfield's 1974 invention of Interpretive Structural Modelling (ISM).	7 experts with a combined work experience of over 65 years were interviewed for the study.	One limitation of this study is its focus solely on Thailand's SMEs logistics service providers, which restricts the ability to draw direct comparisons with multinational companies in the industry.
(Farquharson, Mageto, & Makan, 2021)		This article aims to assess the potential impact of IoT on the road freight industry and explore the correlation between the causes and gains of IoT technology implementation.		Four companies with 300 top to middle managers were selected and only 81 responded to the questionnaire – 27%	Future studies could expand on this to include other industries, and it's critical to remember that this study's conclusions are based only on the views of employees in developing countries.

1.1 **Introduction:**

The Road Freight Logistic Service Providers (RFLSPs) are under pressure from customers, employees, suppliers and competitors to transform their business processes by providing quality services through digital technologies (Cichosz, Wallenburg, & Knemeyer, 2020). There is common view about traditional road freight services operating model in Gauteng province that it is unexpectedly old-fashioned, slow, inefficient with limited technologies (Heinbach, Beinke, Kammler, & Thomas, 2022). The RFLSPs using digital technologies are more likely to obtain and secure freight services compared to those who still use traditional operating model. Therefore, more RFLSPs prefer simpler technologies compared to a more advanced technologies, however, digital technologies has become a deciding factor by customers requiring road freight services (Rathore, Gupta, Biswas, Srivastava, & Gupta, 2022). The above statement support the view that the adoption of digital technologies has changed the logistics and transport service industry's competitive landscape (Sumrit, 2021).

Therefore, according to Cichosz, et al (2020), digital transformation (DT) and digital maturity (DM) is no more an optional transition to acquire digital technology but rather a fundamental part of the organisational process, business model and strategy that meant to challenge the current practices with the need to improve the customer value proposition. The digital maturity aim to address traditional complexities such as "long lead-times, increasing operational costs, limited end-to-end visibility, supply disruption created by unfavourable weather conditions" (Farquharson, Mageto, & Makan, 2021). Thus, it is crucial for businesses to leverage technologies through digital transformation and digital maturity. From this perspective, it is understandable to presume that many RFLSPs in Gauteng are forced to adopt digital technologies to compete with other players who constitute significant resources and capabilities. The resources and capabilities acquired by those who reached digital maturity gives them a competitive edge through their ability to reduce costs, improve customer experiences, innovate, and enhance efficiency (Sumrit, 2021, p. 719).

However, based on different studies conducted globally, it is believed that there are various obstacles hindering the change from conventional to digital technologies depending on the RFLSPs effort and resources to embracing technologies. Therefore, according to Cichosz, et al., (2020), the following obstacles are commonly experienced by RFLSPs when implementing digital technologies, namely, the complexity of underlying processes, resource limitations,

using changes in technology, dealing with reluctance to adapt, and resolving data security issues (Cichosz, Wallenburg, & Knemeyer, 2020, p. 219). Moreover, the study highlights while resistance to change is frequently pointed out as the main barrier to digital transformation, the primary hindrance is actually the quality of logistics service industry and its processes (Cichosz, Wallenburg, & Knemeyer, 2020).

Moreover, according to Sumrit, (2020), the main obstacles impeding digital transformation are (a) "lack of digital culture, followed by (b) insufficient assistance and dedication from upper management and (c) absence of risk taking initiative. However, from South African study perspective, the obstacles hindering digital transoframtion are (a) the costs of tehcnolgy, (b) employees skills gap, and (c) hacking and cyberattacks" (Farquharson, Mageto, & Makan, 2021). This verdicts may possibly assist RFLSPs who intend to achieve digital maturity to take appropriate steps to alleviate obstacles (Cichosz, Wallenburg, & Knemeyer, 2020).

Furthermore, according to Rathore, et al., (2022), (a) "legal and regulatory constraints, (b) resistance to change, (c) infrastructure limitations, (d) challenges in data management, (e) issues related to trust, (f), insufficient support from top management, (g) resource constraints, (h) reliability concerns, (i) privacy and security issues, (j) technical challenges are the obstacles to digital transformation experienced by RFLSPs" (Rathore, Gupta, Biswas, Srivastava, & Gupta, 2022).

However, the study by Cichosz, et al., and Sumrit were both conducted in 2020, and study by Rathore, et al., was conducted in 2022. Therefore, three of these studies have highlighted (a) insufficient support from top management, (b) resource constraints, (c) privacy and security as the common obstacles hindering digital transformation. It is important to note that in general view Cichosz, et al., (2020), urgue that the "intracacies of the logistics infrastructure and resource scarcity are the main obstacle hindering the digital transformaion while the major favourable outcome is a leader possessing and effectively executing a vision for digital transformation, alongside cultivating a suppportive organsiational culture" (Cichosz, Wallenburg, & Knemeyer, 2020, p. 209). On the contrary, Sumrit, (2020) argue that an "absence of digital culture, followed by insufficient support and commitment from management are the most obstacle hinderting digital transformation and maturity because it discount any efforts or resources aiming for organsaitional change while pointed out that main

beginning for success to digital maturity is the people competency when comes to information technologies capabilities, collaborative and well-informed people including digital leadership with a vision (Sumrit, 2021, p. 719 & 728).

South African road freight transportation is an essential logistics activity (moving goods and cargo from ports to door-to-door services) for most road freight LSPs and takes up larger portion of their logistics budgets (Farquharson, Mageto, & Makan, 2021). Despite numerous challenges in the South African road freight industry, "the need for trucking has been steadily rising, with a notable 3,6% increase in volume of goods transported by trucks in 2019 compared to the previous year. Morevoer, the industry plays a pivotal function in the South African local economy, contributing significantly to its growth and development. Specifically, road freight accounts for 76% of the total freight to the economy" (Farquharson, Mageto, & Makan, 2021, p. 2). South African road network is one of the longest in Africa and the road freight industry has accomplished a significant growth for the last 20 years (Farquharson, Mageto, & Makan, 2021). Generally, many organisations in South Africa prefer the use of road for moving the cargo around the country compared to other types of transport such as rail because of being relatively cheap, fast, adaptable, reliable with access anywhere (rural and urban areas) in the country.

South African situation is unique to other countries due to the prosperous history relating to Apartheid that is currently having a historical impact to the way the country is progressing. The political landscape is heavily clouded by corruption and mismanagement in both private and state-owned enterprises. On the other side, the South African economy is largely dominated by high unemployment rate, raising inflation and interest rate, dubious trade policies and labour costs and laws. From a social perspective, the country is dominate by a young population with good growth, multi-cultural and religious groups. From environmental perspective, the country is hardly judged by carbon emission relating to pollution rate and scarcity of raw materials. The legal factors include the regulatory aspect, health and safety factors, unequal opportunities and so on.

1.2 **Research problem**

The benefit of being agile and adaptive in adopting digital technologies allows to reach digital maturity that provides competitive advantage for organisation (Pinto , Salume, Barbosa, & de

Sousa , 2023). Therefore, the adoption of digital technologies and reaching digital maturity assist logistics managers to be able to see and think differently – this means digital technologies allows them to have an improved visibility and advanced analytics (Cichosz, Wallenburg, & Knemeyer, 2020). Therefore, the benefits include boosting operational efficiency and agility, enhancing customer satisfaction, and introducing novel services or innovative business models, including those with environmental benefits are key objectives that can be achieved through the implementation of technological solutions" (Cichosz, Wallenburg, & Knemeyer, 2020).

On the other hand, number of studies have found that there are opportunities and obstacles hindering RFLSPs to adopt digital technologies and to reach digital maturity. For example, the study in Thailand focusing on digital transformation by SMEs has identified thirteen (13) barriers and indicated that the absence of digital culture as the critical obstacle, followed by insufficient support and commitment from upper management and the absence of risk taking initiative (Sumrit, 2021). An exploratory study was conducted and their findings identified ten (10) barriers hindering the adoption of digital technologies including insufficient support from upper management, legal and regulatory framework and infrastructure as critical factors that requires immediate attention and scrutiny (Rathore, Gupta, Biswas, Srivastava, & Gupta, 2022).

However, little is known regarding the challenges encountered by RFLSPs in Gauteng to adopt digital technologies and reach digital maturity. Therefore, it is inherent to conduct a qualitative study to assess the challenges encountered. The findings of the study will assist the RFLSPs to fashion out an effective strategy to mitigate the challenges identified.

1.3 **Research Question**

There is a growing need for a research that can identify the main drivers and obstacles to achieving digital maturity among RFLSPs in Gauteng province and provide practical recommendations for these challenges to be addressed. The primary research question that will guide the study is the following: ***What are the challenges encountered in reaching Digital Maturity by Road Freight Logistics Service Providers (RFLSPs) in Gauteng province?***

This research study aims to investigate in depth the following research questions:

a. What is the **state of digital maturity** among the RFLSPs in Gauteng province?

b. What are the challenges encountered in reaching digital maturity regarding **digital infrastructure, digital skills and knowledge, and digital technologies** in the province?

The subject or theme around challenges and successful outcomes to digital transformation has been studied before in other parts of the world. However, despite the benefits that comes with digital transformation, many RFLSPs in Gauteng are still struggling to achieve digital maturity due to different challenges. Covid-19 pandemic has hastened the adoption of digital technologies (IoT, AI, Data Analytics, Robotics, Drones, XR) in forms of remote collaboration, working-from-home, teleconferencing, online training and on-boarding. Understanding the rational of this particular investigation including the research questions will provide significant insights to different stakeholders, especially to the road freight service providers in Gauteng intending to digitalise their organisational process. The insights addresses matters encompassing digital threats, challenges, limitations or risks when adopting digital technologies and translate that to growth opportunities to stay competitive and relevant.

Furthermore, the study could help RFLSPs who aim to reach digital maturity to take appropriate steps to alleviate obstacles (Sumrit, 2021). This could also be beneficial to the logistics practitioners and companies, particular for those who faced with lack or limited resources and capabilities to compete and stay relevant. Thus, the logistics practitioners will be in a leading position to adopt the best practices to execute their organisation digital transformation compared to those who are not exposed this particular or related study. From a policy perspective, the study will contribute in raising awareness and governance on information system management (data breaches and hacks – cyber security), especially in uncertain environment dominated by new changing behaviours, technologies and innovations accumulating at progressive speed. Such focus will assist RFLSPs to embrace digital culture in their organisations with digital leadership vision.

Moreover, policymakers, practitioners, and academics should take note of the study for a number of reasons. First of all, the study's conclusions can help guide policy decisions on the creation of laws and rules that encourage digital transformation in the trucking industry. The study can provide light on the obstacles that RFLSPs must overcome in order to adopt digital technology as well as the policy measures that can be taken to overcome these obstacles. The

results may be used by policymakers to create efficient measures that will support the digital transformation of the Gauteng province's road freight logistics sector.

The study's conclusions can assist practitioners in comprehending the obstacles to digital technology adoption and in creating plans to overcome them. The findings may be used by practitioners to pinpoint the preferable approach for using digital technologies and enhance their digital transformation decision-making. The study can also promote academic research by assisting to advance knowledge on digital transformation among small to medium-sized road freight logistics service providers. This may offer fresh perspectives on the difficulties that RFLSPs in the province of Gauteng face as well as possible solutions. Thus, it can also aid in the creation of fresh, adaptable digital transformation plans for small-medium sized trucking service providers.

1.4 **Delimitations of the study**

The research focus is on the road freight services and exclude operations covering the use of rail, air and sea freight. The study includes road freight services across different sectors such as food and beverage, retail, telecom, agriculture, construction, cold storage and e-commerce operating within Gauteng logistics and transport space. The population size will mainly cover large road freight service providers with slight focus on small and medium road freight services varied from transporters, logistics service providers, freight forwarders, e-commerce and courier services. Their profiles are notable and covering both locally and internationally freight service providers.

The research is limited to road freight services operating only in Gauteng province and not taking into account of the challenges of other RFLSPs in other provinces or countries, and future research covering all four types of freight and other provinces is recommended. The other limitation is based on the view that the study focus only on the private enterprises with no attempt to public or state-owned enterprises, thus further study is recommended in this space to be able to generalise the findings. further research is recommended to make comparison between South Africa and any African or other foreign countries to also be able to generalise the findings.

It is important to note once more, the study aims to assess the challenges encountered by the RFLSPs to reach digital maturity in Gauteng province, including the state of digital maturity amongst the RFLSPs in Gauteng province; the specific challenge relating to the digital infrastructure, digital competencies and expertise, and the use of digital technologies in Gauteng province.

1.5 **Operational Definitions**

a. **Digital Maturity (DM)**, according to Dong et al., (2023), a company's strategic ambition is to achieve digital maturity, which is a long-term goal that requires constant adaptation to the constantly evolving digital ecosystem. (p. 4). It is not only the adoption and application of new technologies but also the adoption of digital culture with the ability to evaluate and unite the whole business with the digitally enhanced improvement (Dong, Akram, Andersson, Arnäs, & Stefansson, 2021).
b. **Digital Technologies** refers to digital devices, systems, and resources that help create, store, and manage data, for example, internet of things (IoT), artificial intelligence (AI), block chain, digital twins, etc. This technologies are used to transform the business from old-fashioned approach (normally paper-based) to digital approach https://www.studysmarter.co.uk/explanations/business-studies/business-development/digital-technology/.
c. According to Sumrit (2021, p. 1), **Digital Transformation (DT)** refers to the process of digital technology integration into organisational business processes to improve business efficiency and create new delivery values for customers (Clohessy et al., 2017; Mathauer and Hofmann, 2019).
d. **Logistics Service Providers (LSP)** is an outsourced company that provides supply chain management services such as transportation, warehousing or distribution services. https://www.penskelogistics.com/insights/logistics-glossary/what-is-a-logistics-service-provider#:~:text=to%20Logistics%
e. **Road Freight Services**: Transporting products and cargo on public roads using commercial vehicles—usually trucks—is known as road freight services. Because of this form of transportation's efficacy, efficiency, and relative affordability as compared to air freight, it is frequently used worldwide. https://www.seatram.com.au/what-is-road-freight/

1.6 **Structure of the Thesis**

This section will be indicated better as the study progressed. However, it is presumed that the paper will structured as follows: critical review of literature separated into (a) systematic literature review starting with introduction section, followed by definition of the topic / background discussion; then (b) analytical literature review separated into theoretical framework and conceptual framework, and (c) conclusion of literature review; followed by research methodology section divided into (d) research approach; (e) research paradigm; (f) research design; (g) population and sample; (h) sampling design; (i) data collection instruments and procedure; (j) data analysis and interpretation with findings; (k) research validity and trustworthiness; (l) followed by the ethical consideration section.

CHAPTER 2

2 Systematic Review Literature

2.1 Introduction

Considerable literature was accomplished through the accepted academic databases, namely; Emerald Insight, Science-Direct, Taylor & Francis and Growing Science among others. Therefore, for the purpose of this paper, the literature review will be structured into two approach, namely; empirical review and theoretical/conceptual framework. The use of literature review is to provide related empirical evidence to the topic of this paper. The empirical evidence will assist to identify areas of improvement from other sources relating to the digital transformation that can be used by RFLSPs to overcome the challenges encountered to reach digital maturity in the road freight industry in Gauteng. The second approach of the literature review will focus on the theoretical/conceptual framework used relating to digital transformation journey towards reaching digital maturity.

This section of literature review is structured as follows; first part will cover several definitions of digital transformation and digital maturity by different scholars, academics, and authors to understand the connection between these two terms. The second part will cover the state of digital maturity by RFLSPs in Gauteng, then followed by a synthesis on the drivers and obstacles encountered by RFLSPs to reach digital maturity in Gauteng; incorporating the potential benefits of achieving digital maturity for RFLSPs and others in the logistics industry in Gauteng province (this will assist to answer the research questions). A systematic literature review, from the perspective of Resource-Based View (RBV) and a theory on Digital Maturity Model (DMM) will be utilized to assess digital maturity by RFLSPs in Gauteng to answer the following review question: "***What are the challenges encountered in reaching Digital Maturity by Road Freight Logistics Service Providers (RFLSPs) in Gauteng province?".*** **"**The assumption, from the rationale developed in the introduction, is that digital maturity is the result of digital transformation that allows RFLSPs to secure a competitive edge through cost minimisation, enhancing customer satisfaction, fostering innovation, and optimising operational efficiency (Sumrit, 2021, p. 719). The intention of the structured literature review is to connect the research gaps from a resource-based view and digital maturity model

perspective and provide a motivation for the theoretical/conceptual framework to be used as a guide in the study.

2.2 **Definition of topic or Background discussion**

The road freight logistics service providers (RFLSP), particular in Gauteng province are going through significant technology transformation and encounter numerous challenges to compete and to reach a desired level of digital maturity that is crucial for their survival. They are forced to make significant investment to digital technologies such as IoT, Data Analytics, AI, including digital infrastructure, training and development that may require exorbitant costs that they may not have. They are also concern about the current state of economy (negative growth, energy crisis and high unemployment), politics (increasing level of corruption, protest and unrest) and regulatory (cybersecurity and data privacy) affairs that are putting the country under enormous pressure including being greylisted and downgraded the country's economic outlook by the rating agency.

The term digital transformation and digital maturity are interrelated but they are different. Therefore, it is reasonable to state that the last phase of digital transformation is known as digital maturity that business strive to reach with the expectation to improve their operational process and enhanced customer experience (Aslanova & Kulichkina , 2020). Furthermore, according to Alslanova & Kulichkina (2020), digital maturity refers to the progressive assimilation and execution of organisational procedures, human capital, and other resources into digital processes, and vice versa. (p. 443).

They further mentioned that for businesses to reach maximum level of digital maturity they need to formulate a strong digital strategy that will act as their compass, and if not they will achieve unsuccessful implementation with negative outcomes for the business (Aslanova & Kulichkina , 2020). In addition, there is an emphasis that factors such as infrastructure, relevant structure and units are required for attaining impressive extent of digital maturity, however, the human factor is the crucial element above others such as management support, staff willingness, digital skills and competencies to successfully achieve both digital transformation and maturity (Aslanova & Kulichkina , 2020).

According to Dong et al., (2023), since reaching digital maturity is a long-term goal for an organisation, it necessitates constant adaptation to the ever evolving digital landscape. (p. 4). It is not only the adoption and application of new technologies but also the adoption of digital culture with the ability to evaluate and unite the whole business with the digitally enhanced improvement (Dong, Akram, Andersson, Arnäs, & Stefansson, 2021). The result of constant adaptation to a dynamic digital environment is digital maturity. Thus, "an organisation must encompass the complete company—its workers, procedures, communications, and both hardware and software" in order to be considered digitally mature (Dong, Akram, Andersson, Arnäs, & Stefansson, 2021, p. 4). On the other hand, according to some academics, the growth of leadership (e.g., governance, change management, and culture) as well as digital (e.g., strategy, technological competence, business models, and customer experience) capacities is correlated with digital maturity. (Dong, Akram, Andersson, Arnäs, & Stefansson, 2021, p. 4).

Digital transformation (DT) is a popular expression liked in many industries such as banking, telecom, education, logistics, supply chain, and so on. However, digital transformation has come up as a key trend in the logistics industry and organisations are urged to take the opportunities that comes with digital transformation to incorporate them into their strategies, business models and cultures (Sumrit, 2021). Therefore, digital transformation can be a difficult term to many because it may mean different things to different people. there is no "collaborative definition" for digital transformation that both practitioners and academics agree on.

Digital transformation is more than a transition to digital technologies but rather than changing the entire business process to meet and improve customer expectations (Verhoef , et al., 2021). According to Verhoef, et al., (2021, p. 890), a change in how a firm employs digital technologies, to develop a new digital business model that helps to create and appropriate more value for the firm is the definition given to digital transformation. (Kane et al., 2015, Liu et al., 2011, Schallmo et al., 2017). In summary, according to Verhoef, et al, (2021, p. 892) "digital transformation is a process that supports the use of digital technologies to pursue a digital business model to create value for the organisation".

On the other hand, according to Sumrit, (2021, p. 719) the process of integrating digital technology into organisational business operations to increase corporate efficiency and develop new customer delivery values is known as "digital transformation" (DT) (Clohessy et al., 2017;

Mathauer and Hofmann, 2019). Basically, digital transformation is about process change in the organisation to start digital technology and focus on customers and their needs as part of value creation. Therefore, digital transformation can enhance the organisation customer value proposition to obtain competitive advantage. This means that the business will change and enhance their operational approach to satisfy customers while maximising stakeholders value.

Based on the above definitions there are sort of common understanding of digital transformation i.e. adoption of digital technologies, development of business model and enhance processes, and create value for all stakeholders. Therefore, according to Cichosz, et al (2020), value creation is the results of digital transformation associated with achieving productivity, costs savings, improved customer experience and stakeholder relationship. **Therefore, for the purpose of this study, we will often use the definition of digital transformation supported by Sumrit, (2021) and at the same time use Dong et al., (2023), definition on explaining digital maturity.**

(a) What is the state of digital maturity among the RFLSPs in Gauteng province?

South Africa borders Botswana, Lesotho, Mozambique, Namibia, Swaziland, and Zimbabwe. It is located at the southernmost point of the African continent (Global edge, 2023). The President is the head of state and government in a republican form of government (Global edge, 2023). South Africa's economy is diversified, blending governmental control and centralised economic planning with different kinds of individual freedom (Global edge, 2023). The Southern African Development Community, or SADC, is an organisation that includes South Africa as a member (Global edge, 2023).

As per the Index of Economic Freedom (2023), South Africa has a mature economy and sophisticated infrastructure. It is a significant exporter of natural resources, including gold and platinum, and has some of the most advanced financial, legal, communications, energy, and transportation systems in Africa (Index of economic freedom, 2023). But the nation also has high rates of both formal-sector unemployment and criminal activity (Index of economic freedom, 2023).

Gauteng, KwaZulu-Natal, North West, Limpopo, Free State, Mpumalanga, Eastern Cape, Northern Cape, and Western Cape are the country's nine provinces. Therefore, Gauteng is regarded as the biggest province in terms of GDP contribution. With the exception of mining

and agriculture, Gauteng controls every industry and contributes more than one-third of South Africa's GDP (Alexander, 2021). Mining is the main industry in the Northern Cape, Mpumalanga, North West, and Limpopo (Alexander, 2021). Although KwaZulu-Natal boasts the biggest farming sector in the nation, the province's main industry is manufacturing, which is only surpassed in size by Gauteng's manufacturing (Alexander, 2021).

Gauteng province with Johannesburg as a central theme, “a fast-paced province that leads the nation and is the first port of call for every big-thinking businessman is where the money is—where the deals are struck” (City of Johannesburg, 2018). Gauteng as an economic epicentre has a modern information and communications technology infrastructure including sectors of financial and business services, logistics and communications, and mining; and with emphasis that it is the largest GDP contributor in the country (City of Johannesburg, 2018). Gauteng province is well-known as a densely populated area because many people are continuously migrating from other provinces (mostly from rural areas) to seek employment and residency. Gauteng province has the vast container terminal in City deep, the nation’s largest inland port, is connected to the rest of the country via Johannesburg metro (City of Johannesburg, 2018). Gauteng is the only province in South Africa consisting of three Airports, namely, OR Tambo International Airport, Lanseria Airport and the Rand Airport.

On the other hand, referring to figure. 1 below, “GDP from Transport in South Africa increased to 373099.90 ZAR million in the fourth quarter of 2022 from 370570.68 ZAR million in the third quarter of 2022” (Statista, 2023). According to Statista (2023), the transport, storage, and communication industry in South Africa made up around R333.8 billion of the nation's GDP in 2021. Over the following five years, a compound annual growth rate (CAGR) of more than 4% is anticipated (Mordor intelligene, 2023).

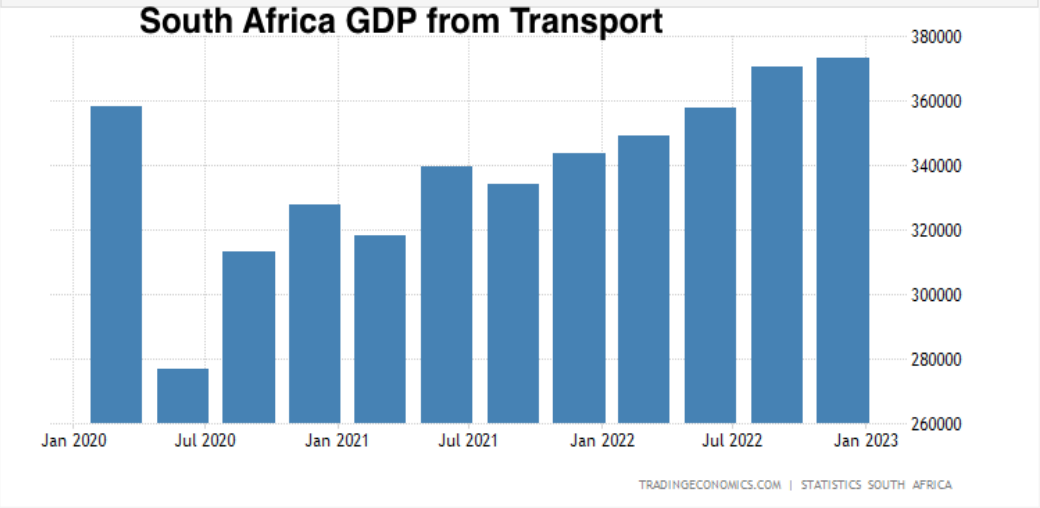


Figure. 1 : GDP from Transport in South Africa increased to 373099.90 ZAR Million in the fourth quarter of 2022 from 370570.68 ZAR Million in the third quarter of 2022. source: Statistics South Africa

It is crucial to keep in mind that in terms of road freight competition across South Africa, there exists a high level of concentration among the key players, as fewer than 10 companies dominate over 40% of the regional road-based logistics market (Research and Markets, 2023). The top two operators command over 80% of the domestic market share, signifying significant market dominance. (Research and Markets, 2023). This will definitely guide the research methodology section, particular the sampling design part.

On the other hand, for the purpose of understanding the state of digital maturity and the challenges encounter by RFLPSs in Gauteng to reach digital maturity, it is important to scrutinise them to a greater extent. Therefore, it is crucial to remember that the size of the organisation may likely affect the RFLSPs to invest in digital infrastructure, skills and adoption of technologies, while the type of industry may influence the intensity of competition and the need for digital skills, knowledge, experience and talent.

The size of the organisations are likely to play an important part for organisation to reach digital maturity. For instance, small-medium sized organisations may lack the financial resources to invest in digital and leadership capabilities compared to larger organisations. Therefore, it becomes logical to deduce the view that the small-medium sized organisations may encounter greater obstacles impeding them to reach digital maturity versus the larger organisations. In addition, the small-medium sized organisation may find it less complicated to implement and integrate digital technologies into their systems and processes compared the to the larger

organisations. This is reinforced by the belief that, in a larger business, more stakeholders must be engaged, informed, and made judgments, which typically delays and takes too long before a path ahead is decided. At the same time, larger organisations are likely to have greater influence or bargaining power when reaching agreement with suppliers providing digital infrastructure, services and other resources.

Furthermore, the type of industry are also likely to impact the organisations ability to reach digital maturity. The need to adopt technologies and attain digital maturity may differ based on industry sector. For example, organisations operating in courier services industry (dynamic planning) are more likely to adopt digital platform including the use of e-commerce compared to those solely in transportation services (static planning). Thus, the RFLSPs utilising e-commerce are more likely to requires modern infrastructure, technologies, and skills versus those utilising common methods of moving goods from one place to the other. Therefore, industries that are highly regulated regarding the use of digital technologies (e.g. courier services, freight forwarding services, etc.) are more likely to encounter greater challenges to reach digital maturity compared to those who are less regulated (e.g. long-distance transporters) to meet compliance requirements. However, the same analogue applies to competitive environment i.e. the ability to set oneself apart through digital skills may be difficult for RFLSPs functioning in a highly competitive industry. RFLSPs in less competitive industry, on the other hand, could have less pressure to embrace digital technology.

On the other hand, there is a popular view that small-medium-sized RFLSPs are finding it challenging to adopt the use of digital technologies up to reaching digital maturity because they typically operate on a small scale, lack resources and a plan to adopt digital technologies, along with the belief that they are not prepared for the circumstance (Sumrit, 2021). Thus, Sumrit (2021) alluded that small-medium logistics service providers are resistant to adopting new technologies. This view is substantiated by an empirical study conducted in Thailand discovering that most of them (small-medium-sized) are lagging behind (less likely to use digital technologies) in digital transformation (Sumrit, 2021). However, according to Farquharson et al., (2021), in South Africa there is only a few of the RFLSPs (especially the larger road freight service providers) that have partially implemented digital technologies i.e. IoT.

Furthermore, others argue that there are many larger RFLSPs using digital technologies like Enterprise Data-Interchange (EDI), Warehouse Management System (WMS), Transport Management System (TMS), however, they may lack functionality relating to transparency of the supply chain from beginning to finish or the personnel with the required skills and knowledge to utilise them effectively (Farquharson, Mageto, & Makan, 2021). These organisations may also lack the capabilities or resources to collaborate with the technology service providers to enhance their capabilities to reach digital maturity. The study aims understand the state of the RFLSPs (small-medium and large) in Gauteng province by conducting in-depth interviews and focus groups discussions.

(b) What are the challenges encountered in reaching digital maturity regarding digital infrastructure, digital skills and knowledge, and digital technologies in the province?

Technology infrastructure is undoubtedly essential for the use of digital technologies in the road freight industry. The view is supported by Sumrit (2020), stating that the success of digital transformation relies on the availability of digital infrastructure. Rathore et al., (2022) emphasised the view that technical challenges such as networking problem and reliability of the system pose a threat to the adoption of digital technologies. Thus, the issues of digital connectivity is prevalent not only in Sub-Sahara Africa but also in South Africa including the Gauteng province due to its impact on the RFLSPs use of digital technologies including reaching and maintaining the digital maturity. Thus, in general digital connectivity refer to capability to acquire and utilise technologies to connect to the internet and share digital information. The reliable access to electricity is a critical factor to the success of digital connectivity, transformation and maturity. However, South Africa is experiencing a significant energy crisis that is unlikely not going to be resolved anytime soon given the slow progress and commitment government has made thus far. This situation has the potential to cause reluctance for the RFLSPs to adopt digital technologies, especially advanced technologies into their operations.

In addition, according Farquharson et al., (2021), there are concern from RFLSPs regarding the huge investment in digital technologies and infrastructure prior to them reaping the rewards, hence, it is imperative for these challenges including digital connectivity, data privacy and security be resolved. However, South African government has demonstrated a good intention to connect its citizens to the Internet – this was publicly announced in November 2021 by the

Minister of Communication and Digital Technologies, Khmbudzo Ntshavheni, that the government is considering a programme to bring internet access to all South Africans (Monzon, 2022). The initiative demonstrates South Africa's commitment to embracing digital transformation, which will open up prospects for a digitally driven economy in addition to facilitating access to internet services. (Monzon, 2022). However, up until then, the current energy crisis coupled with inadequate digital infrastructure will be seen as a barrier for RFLSPs, especially the small-medium enterprise who lack the financial resources to access and upgrade both the digital technologies and infrastructure including those who will struggle to maintain greater level of digital maturity.

Nevertheless, a good digital infrastructure will bring some positive and encouraging wins for the RFLSPs implementing digital transformation and reaching digital maturity. For instance, data analytics and insights may help new product or service development and acquire better understanding of the competitive landscape, mitigate the supply chain risk and disruptions, improve overall operational efficiencies and agility.

Thus, the lack of adequate digital infrastructure may hamper the quest to attain digital maturity. The initial investment costs, implementation costs and maintenance costs will be the main factors impacting them. The larger RFLSPs are more likely to reach digital maturity compared to the small-medium RFLSPs. The electricity issues (loadshedding) that the country is currently experiencing are likely to be a derailer or central theme that negatively impacting the digital transformation leading to digital maturity.

Furthermore, the way that digital transformation affects knowledge and skills pushes digital technology to take centre stage in business operations. Consequently, the acceptance of digitalisation and the transmission of knowledge, creativity, and innovation depend heavily on digital learning. In the new digital era, those lacking information communication technology skills, knowledge, and qualifications will be left behind. The lack of digital skills will affect individual private and professional life including training and development. For example, in South Africa, particular Gauteng province, there are popular view that some road freight organisations employs ageing workforce (e.g. Delivery truck Drivers) because they believe they are loyal, committed and not interested in changing jobs like the millennials and generation Z. However, this comes with the disadvantage that the ageing generation struggle to operate the digital technologies.

According to Sumrit (2021), it is critical for organisation to integrate digital transformation in their strategy with the objective to hire and develop employees with digital skills, knowledge and talent. This may pose a challenge to small-medium sized RFLSPs because of lack of resources to acquire and afford those with sought-after digital skills and experience (Sumrit, 2021). Thus lacking digital skills and experience is one of the major obstacles to reach digital transformation and maintain digital maturity. According to Farquharson (2021), it is crucial for the organisations in the road freight to make certain that the management have the required skills and experience to be able to support and provide resources during the implementation phase and during the digital maturity life-stage – this is critical for learning and for decision-making process (Farquharson, Mageto, & Makan, 2021).

The digital skills and knowledge is more likely to be a challenge to both small-medium and large RFLSPs because the logistics industry in Gauteng may not have done enough to develop and upskill their talent pool. They may find that lack of digital skills and experience is caused by resistance to change and fear of technology taking over their jobs. The other challenging outcome from the RFLSPs in Gauteng may be due to employees having a long service history with the organisation including lack of formal education or qualification in digital technology or the organisation is not able to afford to hire and compensate employees with digital talents.

On the other hand, RFLSPs that have employees with the required digital skills and knowledge tend to stand a better chance to enhance their processes and increase efficiency and productivity in their organisation. The skilled workforce also provide the opportunity to make better and insightful decision to outsmart their competitors. They also tend to stay abreast of the latest trends and technologies needed to achieve and maintain digital maturity.

Furthermore, today's ever-changing logistics and supply chain environment requires organisation to adopt the use of digital technologies i.e. AI, Blockchain, IoT, 3D printing, Big Data, Drones, Autonomous Vehicles (AV), etc. to stay competitive and sustainable (Sumrit, 2021). Hence, it is crucial for the road freight industry to embrace cutting-edge technologies like RFID tags, navigation systems, smart room controls, smart route sensors, fuel management sensors, activity trackers, and smart load sensors. This list is not exhaustive, as new technologies continue to emerge regularly (Farquharson, Mageto, & Makan, 2021). It is imperative to note that instead of implementing more sophisticated technology, cargo logistics

companies would rather use simpler ones. (Janjevic et al., 2019), for example the use of drones are too risky in a densely populated urban area like Gauteng (Rathore, Gupta, Biswas, Srivastava, & Gupta, 2022).

We are observing the influence of digital technologies in the way the business operate and creating digital transformation. For example, in an effort to expand its delivery services throughout Africa, UPS and Jumia, the continent's first fintech start-up and current e-commerce giant, have announced a new partnership that will grant UPS access to Jumia's "last mile logistics" infrastructure and capabilities (IT News Africa.com, 2022).(IT News Africa.com, 2022).

The benefits of adopting digital technologies and maintaining maturity comes with opportunities like raise productivity and save expenses, strengthen flexibility and traceability, and improve customer satisfaction (Sumrit, 2021). The opportunities for the road freight companies to use digital technologies is influence by the requirement for real-time actionable information exchange and end-to-end asset transparency (Farquharson, Mageto, & Makan, 2021). For example, advanced predictive techniques can optimise service delivery time. DHL Smart Trucks use real-time traffic, weather, and geographic data to dynamically plan delivery routes (Rathore, Gupta, Biswas, Srivastava, & Gupta, 2022). However, the challenges include data privacy and security, network issues, system compatibility, uncertain financial returns on investment, and others. Therefore, little is known what the use of digital technologies will create to the South African RFLSPs in Gauteng to reach digital maturity given that the process is unavoidable with high risks and opportunities involved (Farquharson, Mageto, & Makan, 2021).

Organisation may see adoption of digital technologies leading to digital maturity as the free invitation to business threat and risks. Thus, cyber security and data privacy was highlighted a major challenge for implementing digital technologies in the road freight industry (Farquharson, Mageto, & Makan, 2021). According to Rathore, et al., (2022) privacy have to do with the individual right to decide how much information should be shared with others, while security is about the protection of the very same information against cyberattack. According to Farquharson et al., (2021), digital technology such as IoT can easily store immense confidential information and is not immune to the risk of cyber-attacks (Farquharson, Mageto, & Makan, 2021). For example, according to Mimecast, South Africa had 14

significant cyberattacks in the last quarter of 2019 that affected a number of businesses, including IT, retail, insurance, finance, and transportation (Milo & Dela, 2020, p. 1).

Rathore, et al., (2022) and Farquharson et al., (2021), shares the same view that challenges relating to lack of data privacy and security threats are hindering the implementation of new digital technologies. In addition, according to Sumrit (2020), "according to a research by Vaidya et al. (2018), a lack of trust in the digital business environment and security concerns were the main reasons why many firms refused to accept digital businesses" (p. 720). Rathore et al., (2022) reiterate that privacy and security issues must be given greater attention to gain customer trust. Thus, Walters (2023), endorsed the view by stating that privacy is seen as a challenge by many South African brands during the adoption of digital technologies. Based on the sensitivity of the data collected and stored by RFLSP it is critical for them to ensure they assemble a toolkit to address the privacy and security issues including compliance to the Protection of Personal Information Act (POPIA) around digital technologies.

There is high possibility that many RFLSPs will raise cyber security and data privacy as the main challenge for adopting digital transformation. This factor is more likely to be the second barrier after the lack of financial resource impeding organisation for adopting digital technologies. In addition, it is likely that the electricity issue will be used as stumbling block to reach digital maturity. However, Gauteng province has a modernised ICT infrastructure, and RFLSPs should be in a good position to adopt digital technologies compared to those in other province like Eastern Cape.

Analytical Framework

a. Theoretical framework

In today's ever-changing environment, it is time for every organisation to embrace digital transformation if they want to stay relevant and productive. The trend is not an exception for the road freight logistics services providers (RFLSPs). Thus, organisations that embarked on digital transformation journey tend to reap the rewards such as creating value for their customers, enhancing customer experience, and creating a new sources of income. However, obtaining digital maturity necessitates overcoming a number of obstacles, including those related to digital infrastructure, digital expertise, and the efficient use of digital technology.

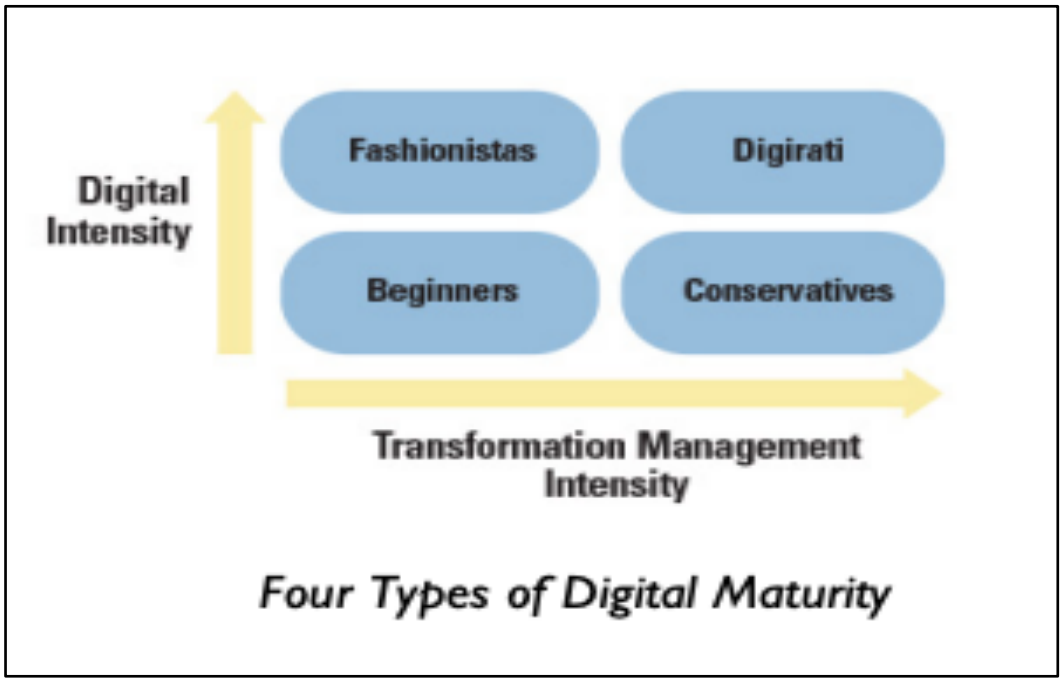
The purpose of this study is to examine the digital maturity among RFLSPs in Gauteng and the difficulties they encounter in doing so.

The continual growth of the industrial sector needs the development of high-competitiveness skills in the context of road freight logistics service providers (RFLSPs) in Gauteng. RFLSPs must cultivate an innovative culture in order to thrive and compete in this competitive industry. The use of the **Resource-Based View (RBV) theory** is one beneficial strategy that can help RFLSPs acquire a competitive edge (Lubis, 2022). The RBV approach emphasizes the relevance of digital capabilities for RFLSPs in the digital era, such as digital infrastructure, digital skills, knowledge, and efficient use of digital technology. RFLSPs in Gauteng may acquire insights into how these internal elements can serve as useful resources for establishing a competitive advantage by embracing the RBV theory and concentrating on their internal resources and skills (Lubis, 2022). Establishing a framework that fits with the RBV approach would give RFLSPs with a thorough knowledge of their capacity and resource management, eventually strengthening their competitive edge and strategic capacity within the Gauteng logistics industry (Lubis, 2022).

In summary, RFLSPs may examine and use their internal assets, skills, capabilities, and intangible resources, including their unique internal resources, by using the RBV method. RFLSPs may use this strategic review to uncover their unique capabilities and build plans for creating considerable value. Therefore, we will use the resource-based view to assess and understand the RFLSPs allocation of resources and capabilities in order to gain competitive advantage in Gauteng. The RBV implies that businesses may have a long-lasting competitive edge over their competitors because of their distinctive resources and competencies. In the context of digital transformation, RBV highlights the significance of a firm's digital capabilities, such as digital infrastructure, digital skills, and knowledge, and the efficient use of digital technology.

On the other hand, we will use the **Digital Maturity Model (DMM)** that was put out by Westerman et al. (2012) to categorize organisations according to their level of digital maturity and capability. Thus, Westerman et al. (2012) created a digital maturity model to demonstrate how various firms are responding to technology opportunities and gives advice for how they may progress and strengthen their digital approach. According to Westerman et al. (2012), the following four categories of organisations, each with a different level of digital maturity,

namely, Beginners, Fashionistas, Conservatives, and Digirati including two crucial elements called digital intensity and transformation management intensity are identified under this model.



Source: (Westerman, Bonnet , & McAfee, 2012)

Digital Intensity (also known as digital capability according to Dong et al., 2021) refers to the extent of an organisation's adoption of digital technologies and how they are utilized to transform business processes and improve customer experiences (Westerman, Bonnet , & McAfee, 2012). This includes aspects such as technological expertise, business models and customer experience.

Transformation management intensity (also known as leadership capability according to Dong et al., 2021) on the other hand, relates to an organisation's capacity to manage the digital transformation process successfully including having the appropriate leadership, digital strategy & vision, culture, governance, change management and procedures in place (Westerman, Bonnet , & McAfee, 2012).

Beginners: These companies are only beginning to adopt digital technology and they still haven't fully implemented digital technologies into their daily operations. This means these

companies have weak leadership capability and low level of digital capability (Westerman, Bonnet , & McAfee, 2012).

Fashionistas: These companies are fast to adapt the newest trends and have an excellent knowledge of digital technology. They are active on social media and have a great online presence, yet their digital approach can be unfocused and disjointed. This means these companies have weak leadership capability and high level of digital capability (Westerman, Bonnet , & McAfee, 2012).

Conservatives: When it comes to digital innovations, these institutions are more hesitant. Although they could have some digital capabilities, companies may be more interested in using traditional means of doing business and are extremely slow to accept new technology. This means these companies have a strong leadership capability and low level of digital capability (Westerman, Bonnet , & McAfee, 2012).

Digiratis: These businesses are digital leaders and have completely incorporated digital technology into their operations. They are always seeking for new ways to use technology to enhance company operations and beat out the competition because they have a strong digital vision. This means these companies have strong leadership capability and high level of digital capability (Westerman, Bonnet , & McAfee, 2012).

b. Conceptual Framework

The adoption of technology, digital skills, and infrastructure are some of the challenges that RFLSPs in the province of Gauteng deal with. The size of the RFLSPs and the type of the industry both significantly affect the challenges encountered.

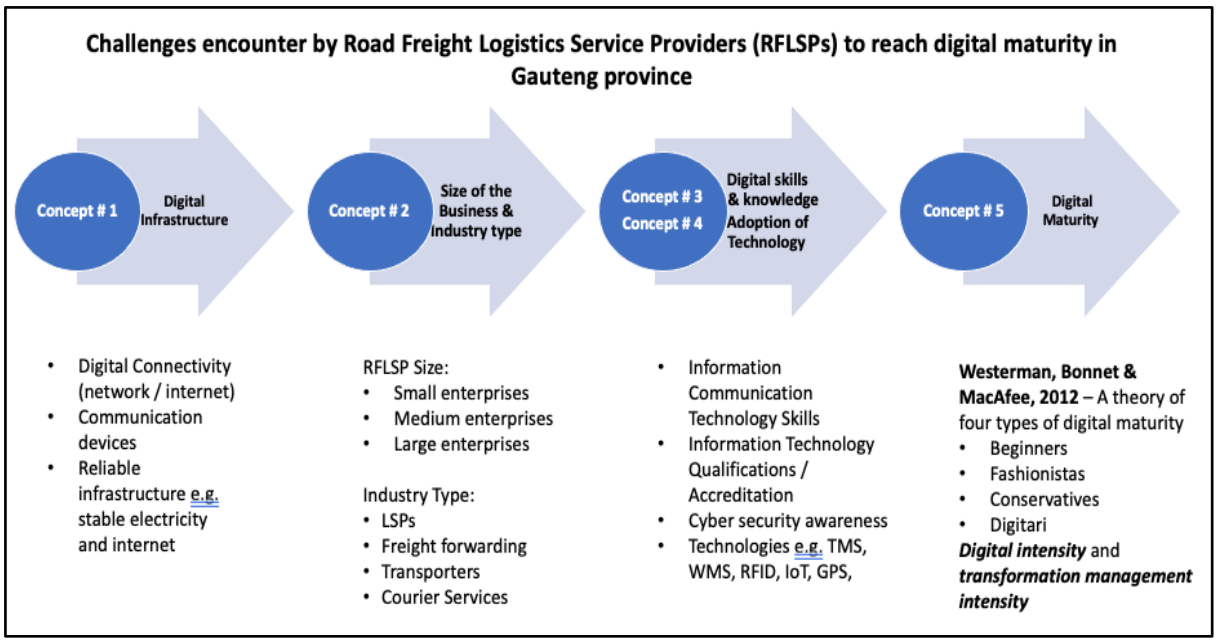


Figure. 2: A Conceptual Framework: a visual representation of the important concepts and how they are related to one another.

Without a doubt, technology infrastructure (concept # 1) is critical for the adoption of digital technologies in the road freight business. So, in general, the capacity to acquire and use technology to connect to the internet and share digital information is a necessity for RFLSPs to survive in this digital era. Therefore, electricity and internet reliability is a vital aspect in the success of digital connection, transformation, and maturity. Therefore, it is worth mentioning that the size of the organisation (concept # 2) will most likely influence RFLSPs' investments in digital infrastructure, skills, and technology adoption, whereas the type of industry (concept # 2) will influence the intensity of competition and the need for digital skills, knowledge, experience, and talent.

In addition to the view that the logistics business in Gauteng may not have done enough to grow and upskill their talent pool, digital skills and expertise (concept # 3) are more likely to be an issue for small-medium RFLSPs. They may discover that the lack of digital skills and expertise is due to the workforce aversion to change and apprehension about technology taking over their profession. Another hard effect of RFLSPs in Gauteng might be a lack of formal education or qualification in digital technology, as well as the organisation's inability to acquire and reward individuals with digital abilities. Finally, it is important to highlight that adoption of digital technologies (concept # 4) are most likely to bring hurdles including data privacy and security, network difficulties, system compatibility, and unclear financial returns on investment

among other hurdles (Farquharson, Mageto, & Makan, 2021). As a result, nothing is known about what the current use of digital infrastructure, digital skills and knowledge, and adoption of digital technologies would bring to South African RFLSPs in Gauteng in terms of reaching digital maturity, given that the process is inevitable and associated with significant dangers and potential. (Farquharson, Mageto, & Makan, 2021).

On the other hand, considering the illustration above the conceptual framework will be developed to demonstrate how they related to each other. Therefore, it is imperative to note the interaction between digital infrastructure, skills and knowledge, and technology adoption is complex and interrelated. The foundation for developing digital skills and knowledge and implementing digital technologies is digital infrastructure. But, in order to effectively use digital infrastructure and implement modern digital technologies, it is essential to develop digital skills and expertise. Use of digital technologies, in turn, may increase the usefulness of digital infrastructure while also encouraging the development of digital skills and knowledge. As a result, in order to reach digital maturity, RFLSPs must invest in all three areas at the same time. RFLSPs may struggle to build digital skills and knowledge or successfully utilize digital technologies in the absence of a solid digital infrastructure. RFLSPs may be unable to make the most of their digital infrastructure or adopt advanced digital technologies if they lack digital skills and expertise. RFLSPs may be unable to fully use their digital infrastructure or digital skills and expertise if digital technologies are not adopted.

Moreover, in every type of industry regardless of the rapid advancement of technology and increased competition there are organisations that are digital leaders and have already started to reap the rewards of the digital transformation (Westerman, Bonnet , & McAfee, 2012). However, building digital maturity takes time, especially in the transformation management complexity domain (Westerman, Bonnet , & McAfee, 2012). For instance, RFLSPs that are beginning to adopt digital technologies are behind the digital leaders who area always finding ways to innovate and maintain digital maturity (Westerman, Bonnet , & McAfee, 2012). Thus, digital maturity is the outcome of digital transformation. Digital transformation is unlikely to be achieved without adequate infrastructure, skills, and adoption of digital technologies among other imperative factors. Therefore, adequate digital infrastructure, required digital skills and knowledge, and adoption of advanced digital technologies are the foundation for digital transformation and ability to reach and maintain digital maturity. Therefore, “to be digitally

mature, an organisation must incorporate the entire company—its employees, processes, communications, and ” (Dong, Akram, Andersson, Arnäs, & Stefansson, 2021, p. 4).

c. Conclusion of Literature Review

The study intentionally focuses on RFLSPs based in Gauteng Province, which is widely regarded as South Africa's economic epicentre and the country's largest GDP contributor, with a modern information and communications technology infrastructure that includes financial and business services, logistics and communications, and mining. This should make it less difficult for the researcher to interact with smaller, medium-sized, and larger RFLSPs from different industries and gather information on them. Some studies have shared a common view that small-medium logistics service providers are resistant to adopting new technologies. However, just a few RFLSPs (particularly the major road freight service providers) in South Africa have partially adopted digital technology such as IoT.

The success of digital transformation is reliant on the accessibility of digital infrastructure, digital skills and expertise, and the adoption of digital technologies among other factors. Firstly, the technical constraints such as networking issues and system stability pose a threat to the adoption of digital technology. Thus, the drive for digital maturity may be hampered by a lack of adequate digital infrastructure. Secondly, people lacking in ICT skills, knowledge, and qualifications would be left behind in this new digital era to avoid being liabilities to RFLSPs. Therefore, it is highly recommended that RFLSPs to incorporate digital transformation into their strategy in order to acquire and develop individuals with digital skills, knowledge, and talent. However, it is important to note that this may provide a barrier for small to medium-sized RFLSPs due to a lack of resources to acquire and compensate individuals with desirable digital skills and expertise.

Thirdly, use of digital technology leading to digital maturity may be viewed by organisations as a free invitation to business threats and risks. Thus, some studies identified cyber security and data privacy as significant challenges for deploying digital technology not only in the road freight business but across different industries. Given the sensitivity of the data gathered and held by RFLSP, it is vital that they create a toolkit to handle privacy and security problems, including compliance with the Protection of Personal Information Act (POPIA) in relation to digital technologies.

Fourthly, RFLSPs must have digital and leadership competencies to achieve digital maturity. To begin, a successful digital transformation process, as well as competent leadership, digital strategy and vision, culture, governance, and change management, must be in place. Second, sustainable adoption of digital technology and how it is utilized to modernize organisational processes and improve customer experiences, as well as technological skills and business models. Therefore, based on a comprehensive analysis of the literature, one determines that digital maturity is the consequence of digital transformation (embraces adequate infrastructure, digital skills and expertise, and adoption of digital technologies), which enables RFLSPs to obtain a competitive advantage by lowering costs, improving customer experience, innovation, and efficiency. Yet, it is worth mentioning that developing digital maturity takes time, particularly in the arena of transformation management complexity.

Finally, according to the literature on digital transformation in logistics, more study is required to comprehend the numerous challenges and success factors for small and medium-sized businesses (SMEs) in various fields and industries. To understand the difficulties and motivating factors behind the implementation of digital transformation, logistics managers must be interviewed more thoroughly and systematically. To fully understand the many stages of digital transformation and how they affect organisations, further study is also necessary. Although it is acknowledged that digital technology has the potential to completely transform the road freight industry, barriers to IoT adoption include high implementation costs and worries about data security and privacy. The literature also emphasizes the need for research into how leadership and culture impact digital transformation, pointing to a potential knowledge gap about organisational characteristics that can influence the success of initiatives for digital transformation. Overall, the body of literature indicates that more study is necessary to comprehend the difficulties faced by various types of logistics service providers under various conditions.

Literature Review Matrix

Author (year)	Method	Arguments	Who do they agree with?	Who do they disagree with?
1.(Cichosz, Wallenburg, & Knemeyer, 2020)	Multiple case studies: (n= 9)	Argue that DT is a multifaceted and complex process that needs the whole organisation to unite and be behind it. Argue that DT is crucial for logistics industry and can create growth and innovation for organisations They identified barriers that LPSs faces and success factors and leading practices to take to overcome these barriers when implementing digital transformation	(Agrawal, Narain, & Ullah, 2020)	
2.(Rathore, Gupta, Biswas, Srivastava, & Gupta, 2022)	Survey: (n=15)	Argue that disruptive technologies in the logistics industry comes with considerable opportunities and benefits but there are important barriers that needs prior attention to have a successful implementation; however, critical barrier is lack of top management support, and followed by other barriers such as lack of infrastructure, legal and regulatory structures, resistance to change, and shortage of digital skills and knowledge are the drivers hindering the implementation of digital disruption in the logistics industry		
3.(Sumrit, 2021)	Interview Panel experts (n=7)	They argue that DT provides LSPs with competitive advantage (especially larger ne compared to SMEs); to support the argument they used ISM that indicated that absence of digital culture being the most important	Prakash Agrawal, Rakesh Narain and Inayat Ullah. (2020)	

		obstacle hindering DT, followed by insufficient of support and commitment from upper management and lack of risk-taking initiative		
4.(Farquharson, Mageto, & Makan, 2021)	Survey: (Companies -n=4) (employees responded-n=81)	They argue that digital technology i.e. IoT has the capability to transform the road freight industry by improving efficiencies and remain competitive. The study identified several challenges to the adoption of IoT in the road freight industry, including the high cost of implementation, concerns about data privacy and security, and the need for industry-wide formalized standard	(Dong, Akram, Andersson, Arnäs, & Stefansson, 2021)	
5.(Dong, Akram, Andersson, Arnäs, & Stefansson, 2021)	Literature reviews - Publication: (n=415 articles; n=165 journals)	They argue that emerging technologies have the potential to transform the way freight transportation is managed and delivered. Discuss the challenges face when implementing these emerging technologies	(Farquharson, Mageto, & Makan, 2021)	
6.(Heinbach, Beinke, Kammler, & Thomas, 2022)	Multiple case studies: (n= 40)	Argue that digital platforms are transforming the road freight transport industry by enabling data-driven forwarding		
7. (Furr, Ozcan, & Eisenhardt, What is digital transformation? Core tensions facing established companies on the global stage, 2022)	Survey: (n=11)	Argue that digital transformation is not about implementing new technologies but rethinking the whole business process, model and strategies. Identifies 4 core tensions business experience when implementing DT	Verhoef , P., Broekhuizen , T., Bart, Y., Bhattacharya , A., Dong, J., Fabian , N., & Haenlein , M. (2021).	
8.(Verhoef , et al., 2021)	Literature reviews – Publication: (n=84 articles; n= 42 journals)	They argue that DT is a complex & multidisciplinary phenomenon that requires a holistic and integrated approach to research. Further argues that the implementation	Furr, N., Ozcan, P., & Eisenhardt, K. (2022).	

		of digital technologies offers a fundamental change to the organisational business models, process, and operation, thus, these fundamental changes offer an opportunity for the business to innovate, be competitive, and address the changing customer behaviour while they also bring new challenges to the leadership and organisational culture. Therefore, DT is a three-phase approach: digitization, digitalization, and digital transformation.		
9.(Agrawal, Narain, & Ullah, 2020)	Literature review : Publications	They argue that DT comes with considerable opportunities and benefits but there are important barriers that needs prior attention to have a successful DT. The study applied the ISM approach to rank barriers to Digital Transformation (DT) in the supply chain, highlighting mutual dependence among them. Key obstacles include a lack of urgency, industry-specific guidelines, digital skills, and high costs. The paper offers managerial insights to overcome these barriers and foster DT.	Detcharat Sumrita. (2021)	
(Taufani & Widjaja, 2022)	Survey: (n=70)	They argue that the implication of digital transformation can provide performance improvement and competitive advantage, however, this depends on the maturity level of the logistics industry – this are not automatically given – central theme are enablers from innovation, orchestration of		

		firm's resources and innovation capability.		
11.(Pinto , Salume, Barbosa, & de Sousa , 2023)	Survey: (n=200)	Argue that companies need to be agile and adaptive because digital maturity provides competitive advantage taking into account the resources of the organisation	Uses similar argument and DMM as (Westerman, Bonnet , & McAfee, 2012)	
12.(Duganovaa, Novikova , Novikovb, & Zagorodni, 2022)		They argue that DT has the potential to provide operational efficiency including transport safety, however, there are several challenges that must be addressed prior to achieving DT. Furthermore, they argue that the implementation of digital technologies in the transport industry faces obstacles such as regulatory barriers, poor infrastructure, lack of investment, etc, and they must be addressed to achieve full benefits of DT They continue to argue that the assessment of digital maturity of the company makes it easy to understand the strength and weakness, risk, and opportunities to expedite the DT process	(Agrawal, Narain, & Ullah, 2020)	
13.(Da Costa, Munhozb, Pereiraa, & Akkaria, 2022)	Survey:(346)	The authors argue that digitalization is crucial for the growth and competitiveness of small enterprises, and there is a need to assess extent of digital maturity to identify gaps and opportunities for improvement. They concluded that digital transformation is a highly integrated and multifaceted process		
Research gap: 1) (Cichosz, Wallenburg, & Knemeyer, 2020): further research on SMEs, different context and examine barriers for the importance of DT and able to assess level of digital maturity. 2) (Rathore, Gupta, Biswas, Srivastava, & Gupta, 2022) : require a questionnaire based-survey, extend to other innovative technologies, and use empirical analysis to generalise the study.				

3) (Sumrit, 2021): further research to make comparison with other multinational companies, use SEM or DEAMTEL for further analysis.
4) (Farquharson, Mageto, & Makan, 2021): The article's scope should be expanded in future studies to include other businesses including manufacturing, public transportation, and maritime transportation. It should also explore the possible economic and customer satisfaction gains that commercial and public road freight carriers in Southern Africa stand to gain from the use of IoT.
5) (Dong, Akram, Andersson, Arnäs, & Stefansson, 2021)
6) (Heinbach, Beinke, Kammler, & Thomas, 2022)
7) (Furr, Ozcan, & Eisenhardt, 2022)
8) (Verhoef , et al., 2021): Further research to understand phases of DT; investigate and measure organisational readiness, empirical research to understand to what degree should companies transform digitally; how the roles of leadership and culture influence DT
9) (Agrawal, Narain, & Ullah, 2020): a need for statistical validation using SEM; the need to understand the broader connection between DT for organisation and stakeholders.
10) (Taufani & Widjaja, 2022):
11) (Pinto , Salume, Barbosa, & de Sousa , 2023): a need for research in digital maturity in emerging economies; extended the study beyond Brazil retail industry to be able to generalise.
12) (Duganovaa, Novikova , Novikovb, & Zagorodni, 2022): Further research needed to focus on identifying strategies to overcome the barriers and ease the successful implementation of digital technologies; To support their views they used empirical evidence from a survey in the transport industry in Russia that identified the barriers and challenges.
13) (Da Costa, Munhozb, Pereiraa, & Akkaria, 2022):The research gap is lack of empirical evidence on digital maturity for micro and small enterprise in emerging economies.

CHAPRTER 3

3 Research Methodology

3.1. Research Approach

There are various forms of research methodologies that can used in a research process, namely, quantitative, qualitative and mix-approach of both qualitative and quantitative.

The quantitative approach comprises the measurement and analysis of phenomena using statistical techniques and empirical data (Braun & Clarke, 2020). Because it relies on quantifiable data rather than subjective opinions or experiences, this strategy is thought to be more objective than other research methodologies (Braun & Clarke, 2020). The quantitative method makes it possible to measure variables and their interactions precisely (Patton, 2020). The quantitative technique enables other researchers to replicate the work (Patton, 2020). Since other researchers can repeat the study to confirm or refute the findings, this increases the validity and reliability of the findings (Braun & Clarke, 2020). Overall, because it offers an objective, generalisable, exact, reproducible, and policy-relevant basis for understanding the phenomena, the quantitative method is normally used by researchers interested in numbers and trends for analysing data.

Secondly, qualitative methodologies may also be utilised to gather comprehensive data on the difficulties RFLSPs have in implementing digital technology. Organisational culture, a lack of skills, and infrastructural constraints are just a few examples of the unique barriers and enablers of digital adoption that may be identified using qualitative techniques such as focus groups and in-depth interviews. Qualitative information can give a more in-depth and new knowledge of the difficulties faced by RFLSPs in Gauteng. This method is subjective and allows elements of biasness from the researcher with focus on the experiences, emotions, opinions of the individuals to provide further information.

Moreover, researchers may evaluate their findings, triangulate the data, and paint a more complete picture of the difficulties RFLSPs in Gauteng have in becoming digitally mature by combining quantitative and qualitative methodologies (Braun & Clarke, 2020). The shortcomings of each technique, such as the insufficient depth of quantitative data and the

potential bias in qualitative data, can also be solved by the hybrid approach (Braun & Clarke, 2020). Therefore, a mixed approach using both qualitative and quantitative methods is appropriate for researching the difficulties RFLSPs face in becoming digitally mature in the province of Gauteng.

3.2. **Research Paradigm**

Research paradigm can be viewed as a guiding framework that shapes the entire research process and dictates the choices made by researchers during the study (Creswell & Poth, 2021). There are various approaches to research paradigms, including positivism, interpretivism, critical theory, constructivism, and hybrid methodologies (Hennink, Hutter, & Bailey, 2020). Each paradigm has its own set of assumptions and philosophical foundations that influence how knowledge is gained, created, and interpreted (Hennink, Hutter, & Bailey, 2020). Researchers when planning and carrying out their investigations, they must consider the presumptions and ideals of the research paradigm they have chosen (Hennink et al., 2020). The choice of a study paradigm may have an impact on how data is collected, analyzed, and how the findings are interpreted (Creswell & Poth, 2021).

For instance, positivism holds that there is an objective world that can be investigated through quantitative research methods using techniques such experiments, surveys, and statistical analysis, to test hypotheses and establish causal relationships (Creswell & Creswell, 2017). Critical theory aims to expose and destroy societal power systems while advancing social justice, and they often use qualitative research methods, such as discourse analysis and ethnography (Hennink, Hutter, & Bailey, 2020). Constructivism asserts that interactions between people and their environments are how knowledge is created, and they often use qualitative research methods, such as participant observation and grounded theory, to explore the ways in which individuals construct meaning and interpret their experiences (Creswell & Poth, 2021).

For the purpose of this study of "Challenges encountered in reaching Digital Maturity by Road Freight Logistics Service Providers (RFLSPs) in Gauteng Province," an interpretivist approach could be used to explore the subjective experiences of RFLSPs in relation to digital maturity. The interpretivism emphasized the need of interpreting people's subjective experiences and perspectives as well as the social and cultural environments in which they originated, and often

make use of qualitative research method utilising techniques such as interviews, observations, case studies or documents analysis (Creswell & Poth, 2021). The goal of this research is to gain a deep understanding of the subjective experiences of RFLSPs and to interpret their experiences in the context of their social and cultural backgrounds.

The study intends to use an interpretivist approach to data analysis, such as thematic analysis, where the study identifies themes and patterns in the data that relate to the research question (Hennink, Hutter, & Bailey, 2020). The study will use coding to categorise and organise the data and to explore how different themes are related to each other. (Hennink, Hutter, & Bailey, 2020)

One of the key advantages of an interpretivist approach is that it allows the researcher to gain a rich and detailed understanding of the research topic (Hennink, Hutter, & Bailey, 2020). By exploring the subjective experiences of RFLSPs, the study will gather insights into the challenges and opportunities that RFLSPs face in reaching digital maturity and how these challenges and opportunities are shaped by their social and cultural contexts (Hennink, Hutter, & Bailey, 2020)

However, one of the limitations of an interpretivist approach is that it can be difficult to generalise findings beyond the specific context of the study (Creswell & Poth, 2021). Interpretivist research tends to be context-specific and subjective, which makes it challenging to apply the findings to other contexts or to generalise about the broader population (Creswell & Poth, 2021). Therefore, it is important to note that the study will acknowledge the limitations of the findings (Creswell & Poth, 2021).

3.3. **Research Design**

The purpose of the study is exploratory since the issue of digital maturity in the Gauteng province's road freight logistics sector is still quite new and complicated (Heinbach, Beinke, Kammler, & Thomas, 2022). Thus, the study is likely to collect rich data that captures the contextual intricacies, experiences, and viewpoints of RFLSPs in connection to their path toward digital maturity using qualitative approaches including interviews and focus group discussions (Creswell & Poth, 2021).

However, challenges are likely to be numerous and complicated, combining technological, operational, organisational, and human variables. This is due to the complexity and subjectivity of the issues at hand. A qualitative method would enable researchers to investigate these difficulties in more detail and holistically, capturing the complexities of the problems at hand (Creswell & Poth, 2021). Additionally, issues with digital maturity are probably subjective, influenced by organisational and individual perspectives, and may necessitate an understanding of RFLSPs' actual experiences (Creswell & Poth, 2021).

In summary, given the exploratory nature of the research, the need for contextual understanding, the significance of capturing participant perspectives, the complex and subjective nature of the challenges, and the potential for practical implications, a qualitative research approach is justified in studying the difficulties faced by RFLSPs in achieving digital maturity in Gauteng province (Creswell & Poth, 2021). This is likely to give a complete knowledge of why and how by collecting rich data, encouraging reflexivity, and allowing for contextual insights that aid in justifying and comprehending the study topic's underlying components.

3.4. Data Collection Methods

3.4.1 Population and sample

It is worth noting that the leading participants in the road freight services business in South Africa are highly concentrated. According to a survey by Research and Markets (2023), a few number of businesses dominate the competitive landscape, with less than ten of them accounting for more than 40% of the overall market share in regional road-based logistics. This suggests that these market leaders have a strong grip on the market.

Furthermore, according to the research report, the two main road freight logistics service providers (RFLSPs) control a sizable piece of the domestic industry, accounting for more than 80% of the market (Research and Markets, 2023). This means that these two RFLSPs have substantial market influence and presence within the industry. Overall, these data highlight the concentrated structure of the South African road freight services sector, with a few number of players controlling a sizable portion of the market.

Therefore, the large, exceptional businesses in Gauteng are probably going to have a big impact on the province's logistics market. They could potentially be more indicative of the region's logistics market. We can learn more about the trends and patterns influencing the market by analysing these businesses, which might be helpful for RFLSPs trying to stay on top of the game.

3.4.2. **Sampling design**

In a research endeavor, it is crucial to specify the unit of analysis at the outset of a study to make sure that the information gathered is pertinent to the research topic (Hennink, Hutter, & Bailey, 2020). The unit of analysis for the Gauteng province's road freight logistics sector will be a single RFLSPs. The study will use 3-5 large RFLSPs with at least 2-3 small-medium enterprise as part of the sampling supported by the above-mentioned information relating to the logistics competitive landscape.

For this study, a non-probability selection strategy called "purposive sampling" includes choosing participants based on criteria that are pertinent to the research subject (Braun & Clarke, 2020). Purposive sampling's goal is to make sure the sample is representative of the population at large and include people or organisations that can shed light on the research subject (Braun & Clarke, 2020).

Therefore, the study will be using an expert sample method, participants will be chosen based on their knowledge and competence in a certain topic (Creswell & Poth, 2021). When it comes to the road freight logistics sector in the province of Gauteng, expert sampling will entail choosing persons with prior work history in the sector, such as logistics senior managers, executives, or subject matter experts (Patton, 2020). The purpose of expert sampling is to make sure that the sample contains people who have a thorough understanding of and unique perspectives on the research subject (Hennink, Hutter, & Bailey, 2020). The research will entail collecting data from at least 2 executives (Digital Technology Executive and Logistics/Supply Chain Executive) with a face-to-face interview and a focus group discussion with 4-6 senior managers (subject-matter-experts) from different functions. The interview is expected to take approximately 1 hour and focus group discussion is also expected to run for 1 hour.

3.4.3. **Research instruments and data collection procedure**

Focus group discussions and in-depth interviews are two typical qualitative research techniques that may be utilised to collect rich and extensive data about the difficulties that Road Freight Logistics Service Providers (RFLSPs) face in achieving digital maturity in the province of Gauteng. The study will use a mix of face-to-face and online (video conferencing) interviews and focus groups including observations where is warranted as part of data gathering methods.

For this study, an in-depth interview with key decision-makers (e.g. senior managers, executives, etc.) in logistics companies will be conducted as part of the research on the issues encountered by road freight logistics service providers (RFLSPs) in reaching digital maturity in Gauteng (Creswell & Poth, 2021). These interviews may give a detailed discussion of the challenges faced by RFLSPs and provide vital insights into the province's journey toward digital maturity. The value of in-depth interviews and focus groups on this study may descend from their ability to collect comprehensive data on stakeholders' experiences and perspectives, shedding light on the factors that impede or promote the adoption of digital technologies in the logistics sector (Creswell & Poth, 2021).

The study will take note of the view that during an in-depth interview, developing a good connection with participants is critical because they are likely to give detailed information that could be missed in more organised or formal settings (Creswell & Poth, 2021). Furthermore, the study will this foster a secure environment in which participants can openly voice their thoughts and ideas, therefore contributing to the development of logistics sector and their organisations digital maturity aspects (Creswell & Poth, 2021).

Focus groups, on the other hand, may provide this study with mechanism to collect information from several senior managers and executives simultaneously, enabling the exploration of a greater range of viewpoints and experiences (Patton, 2020). New ideas and insights may arise as a result, which may not be the case with individual interviews (Patton, 2020). Focus groups, as opposed to individual interviews, can also be a more effective technique to quickly collect data from many people (Creswell & Poth, 2021).

Researchers can gain a deeper grasp of the problems at hand by conducting both in-depth interviews and focus groups on the study of difficulties RFLSPs have in becoming digitally

mature (Creswell & Poth, 2021). The advantages of each approach may be used to present a more complete and detailed view of the difficulties and possibilities presented by the digital transformation of the RFLSP industry (Hennink, Hutter, & Bailey, 2020).

Moreover, it is crucial for the study to employ semi-structured questions in focus groups and interviews because they enable the research process to strike a balance between structure and flexibility (Patton, 2020). On the other hand, giving participants some latitude in the questions' language and sequence encourages them to elaborate and contribute data that the researcher might not have anticipated at first (Hennink, Hutter, & Bailey, 2020). Participants will also be given the chance to express their ideas and experiences in their own words while answering semi-structured questions, which might help participants comprehend the topics under investigation better (Patton, 2020).

3.5. **Data Analysis**

This study is commiting to adhere to the data interpretation and analysis procedures to evaluate the data and produce a thematic analysis report (Hennink, Hutter, & Bailey, 2020). The major topics and groups that may be drawn from the data is likely to include things like the RFLSPs' difficulties on resources and capabilities, the chances for growth, and the methods for removing obstacles to digital maturity. The study is also expected to provide insightful information on this crucial subject by thoroughly examining the data and producing a comprehensive theme analysis report (Patton, 2020).

Coding and thematic analysis are crucial strategies in qualitative research for identifying patterns, themes, and insights throughout huge volumes of qualitative data (Hennink, Hutter, & Bailey, 2020). The use of coding and theme analysis may improve the study's capacity to make meaningful conclusions and offer practical solutions based on qualitative research findings. For example, the researcher may choose a segment of data in which an RFLSP mentions a specific issue they have experienced in implementing digital technology, such as implementation costs or staff experience. This part of data might be coded by the researcher as "implementation challenges" or "skills and knowledge gap."

For the study, a deductive technique, in which themes are produced based on past study or theory, are intended to be used by the researcher of this study (Creswell & Poth, 2021). To find

themes, the study is likely to employ a variety of strategies, such as grouping codes into groups (Creswell & Poth, 2021). Overall, the study can acquire a greater knowledge of the phenomena being investigated by examining these themes and developing recommendations or interventions to address the obstacles faced by RFLSPs in obtaining digital maturity in Gauteng province (Hennink, Hutter, & Bailey, 2020).

3.6. **Quality Assurance: validity and trustworthiness**

a) **Credibility**

The trustworthiness of the study will be enhanced by the use of different research techniques as data sources such as interview and focus group discussions intended for this study. The study will establish a researcher's authority by sharing his strong biographical information with the interviewee and the readers, such as skills, knowledge and experience in the field and attitude towards the research under study. This is intended to establish credibility of the study findings, especially with the use of qualitative method. The study will formulating the interview guide questions in a way such as asking the same question two-three times and phrasing it in a different way. This is more to check consistent responses from participants.

The researcher is fully aware that he can contact the participants via face-to-face, email, call, and so on to verify and confirm any doubtful or unclear information to provide clarity. Thus, it is about providing clarity before concluding the analysis or findings and to also to ensure accuracy of the information and reduces the researcher biasness or assumptions about the data. The study will also guard against the researcher prolong involvement in the study given his background in supply chain, particular logistics in order to enhance the validity and trustworthiness of the findings.

b) **Transferability**

Transferability is crucial in enhancing validity and trustworthiness of the study and its findings. The process is based on applicability of the findings to other people, organisations, and to other time periods. The key to this criterion is having a representative sample. Thus, the researcher of this study have an extensive experience in supply chain with enough knowledge of the population sample or industry in general. This will enhance the transferability of the findings

and enable other researchers to determine the relevance of the findings to their contexts or settings.

c) Dependability

Dependability is also crucial to qualitative research since it makes sure that the findings are dependable and consistent throughout time (Creswell & Poth, 2021). Thus, the study intends to enhance dependability by ensuring consistency of the research findings, followed by the researcher being consistent in the way he will be doing observations and analysing the data.

Moreover, the study will ensure unbiases and consistent data analysis process. For example, analysing the data today and let it sink for two days and without looking at the previous analysis and analyse it again; followed by comparing those analysis with the expectation to get the same analysis results by doing it the similar way as the first time. The study will also ensure to keep record of everything happen during the project including data modification. This will be regarded as being consistent and the study findings will be also seen as meeting the dependability criterion.

d) **Confirmability**

The study intends to avoid any biasness during the study, especially during data interpretation and analysis. The researcher commit to uphold neutrality based on his reality or values to avoid biasness. The study will enforce a records of everything throughout the research process to assure confirmability. The study will also enhance its validity and trustworthiness by reviewing any influence or distortion from the researcher.

3.7. Ethical consideration

This study highlights ethical issues by protecting the rights of participants. All respondents will be assured of their willingness to participate. The research information letter will clearly state the goal of the research and give information on the research instruments. Furthermore, the permission form will explain the nature of the research and how their participation will influence or benefit them.

To ensure compliance, permission will be sought from the university to conduct the study. The researchers will complete an ethics form and submit it to the Post-Graduate Committee (PGC)

for approval. The study will proceed only after obtaining approval from both the PGC and the road freight logistics service providers (RFLSPs) involved. This process ensures that all necessary ethical considerations are addressed and that the study is conducted with the required approvals and permissions in place.

The following considerations will be implemented during a study to ensure conformity with ethical standards:

1) **Informed Consent:** The study will obtain informed consent from participating RFLSPs by ensuring they understand the goal of the study and any potential dangers. For example, the study will explain to the RFLSPs and respondents that their participation may entail the exchange of operational data as well as potential interruptions to their business operations.

2) **Confidentiality and anonymity:** The study will protect the sensitive information of participating RFLSPs. To maintain anonymity, the study will utilise unique IDs rather than RFLSPs names in data analysis and reporting. The study will further guarantee the RFLSPs that their data will be stored securely and only authorised individuals would have access to it.

3) **Data Security:** The study will implement stringent data security precautions to safeguard the information gathered, as well as follow appropriate data protection rules, such as South Africa's Protection of Personal Information Act (POPIA).

4) **Disclosure of possible Conflicts of Interest:** the study will disclose any possible conflicts of interest to promote transparency and impartiality in the study's design and conclusions.

5) **Benefits and risks:** The study will communicate to RFLSPs the possible benefits and risk of engagement. For example, emphasise the advantages of developing digital maturity, such as enhanced efficiency and competitiveness, while recognising possible concerns, such as data breaches or increased dependency on technology.

6) **Fairness and impartiality:** the study will ensure that RFLSPs are fairly represented in the research to prevent prejudice and offer a broad picture of the industry's difficulties in Gauteng province.

7) **Transparency and Reporting:** The study will make sure that participants and stakeholders understand the study aims, methodology, and findings. It will also maintain credibility and integrity, and provide a transparent summary of the study, including limits and any biases.

8) **Collaboration and beneficence:** the study will encourage collaboration with RFLSPs to guarantee that research benefits the industry especially in the Gauteng province. This will involve industry stakeholders in the research design, elicit their feedback, and publish the study's findings and suggestions to help RFLSPs solve the problems they experience in their digital transformation initiatives.

In summary, this study will adhere to relevant ethical standards and obtain the necessary ethical approvals from the institution's ethics committee, specifically the WBS Ethics Committee. It will comply with any restrictions or guidelines established by the Research Ethics Committee of the institution conducting the research. By doing so, the study will demonstrate its commitment to upholding ethical considerations and respecting the rights and privacy of the participating Road Freight Logistics Service Providers (RFLSPs) and their respondents. Through this commitment, the study aims to contribute to the advancement of digital maturity in the road freight logistics industry in Gauteng province while maintaining ethical integrity.

CHAPRTER 4

4 Data Presentation and Analysis

4.1 Data presentation

(a) Introduction

This section of the study will meticulously present the qualitative analysis, interpretation and findings derived from the data collected. The primary focus is on the research topic, explicitly the "challenges encountered in reaching digital maturity by road freight logistics service providers in Gauteng province". The findings will identify themes or common challenges derived from the data collected outlining their impact to digital maturity. Critical variables such as digital infrastructure, skills and knowledge and technologies will be explored and provide an insightful overview of the state of digital maturity among the RFLSP in Gauteng province.

The presentation will begin by detailing the response rate from participating RFSLPs; followed by detail scrutiny of participants profiles; and the valuable insights participants contribute to the study. Finally the study will provide an in-depth view comprising of a clear understating of the challenges faced by RFSLPs in their journey to digital maturity in Gauteng province.

(b) Participants profiles

The study used an expert sample technique to carefully choose participants based on their in-depth knowledge and practical expertise in the logistics industry. Our main area of interest was Gauteng's road freight logistics sector, and participants included CEOs, Managing Director, executives, senior managers, and subject matter experts from small-medium and large companies among others with prominent responsibilities. Our study's depth was enhanced by the intentional expert sample that made sure to include people with deep knowledge and experience in the logistics industry. Herewith, detail professional background and experience of our participants in this study:

Participant	Title	Experience	Digital Technology Involvement
A – Male	Operations Manager	8 years in Logistics	Utilises WMS, HHC devices, Import & Export systems.
B – Male	CEO	35 years in Road Freight Logistics	ERP, WMS, route planning & tracking, and security systems.
C – Male	Managing Director	24 years in Cold Chain Logistics	Utilises WMS, route planning, vehicle tracking, time & attendance system,
D – Male	Customer Executive	20 years in Technology and Logistics	Pioneered E-POD and reusable transparent packaging. Utilise WMS, route planning and vehicle tracking system.
E – Male	Operations Executive	22 years in the logistics industry	Utilises WMS, route planning & vehicle tracking, time & attendance system, e-POD, etc.
F - Male	Finance Executive	20 years in the Logistics industry.	Utilises ERP, Sales force, WMS, Biometrics, etc.
G - Male	Operations Manager	15 years in the Logistics industry	Utilises WMS, HHC devices, Import & Export systems.
H- Male	Logistics Manager	20 years in the Logistics industry	Utilises WMS, route planning & vehicle tracking, time & attendance system, e-POD, etc.
I - Male	Infrastructure Manager (IT)	18 years in the Logistics industry	Utilises WMS, route planning & vehicle tracking, time & attendance system, e-POD, etc.
J - Male	Logistics Branch Manager	12 years in the Logistics industry	Utilises RFID Scanners and WMS, customised back-office system.

In the realm of logistics, Participant A from a small-sized organisation, holding the position of Operations Manager, brings an extensive 8 years of experience in the industry. His involvement in utilizing advanced technologies like WMS, HHC scan, and Parcel Perfect (import and export system) sheds light on the evolving digital landscape.

Participant B is the CEO of the small-sized organisation, boasts an impressive 35-year tenure in Road Freight Logistics. His role encompasses a myriad of digital technologies, including ERP system, WMS, route planning & vehicle tracking, and security systems.

A medium-sized organisation introduces a cadre of executives contributing to the study. Participant C, a Managing Director, carries 24 years of experience in Cold Chain Logistics. He had occupied a role of an Information Technology Director for a Logistics Company prior to joining his current organisation. His engagement with technologies like ERP systems, WMS, route planning, and vehicle tracking emphasises the company's commitment to digital integration.

Participant D, serving as Customer Executive at medium-sized organisation, brings a wealth of 20 years of experience in Technology and Logistics. Pioneering roll-outs of technologies like E-POD (Electronic-Proof of Delivery sign-on glass) and reusable transit packaging.

Participant E, Operations Executive brings an extensive 22 years of experience in the logistics industry. His involvement in utilising advanced technologies like WMS, route planning and vehicle tracking, e-POD and time and attendance system. Participant F brings an extensive experience of 20 years in both Ambient and Cold Chain Logistics. He is a Finance Executive who offers a unique perspective in the medium-sized business with strong background in finance and commercial areas contributing to the comprehensive understanding of challenges and opportunities within the logistics industry.

(c) Insider perspectives: elevating the study through participant expertise

The collective experiences of the participants mentioned above, contribute significantly to the richness and relevance of our study. Participant B role as the CEO brings strategic insights and a high-level perspective on industry trends and challenges. Participant A, as the Operations

Manager, provides a valuable operational viewpoint (challenges faced daily), having been immersed in logistics for eight years.

Moving on to participant C, position as the Managing Director offers a holistic understanding of organisational dynamics, strategic decision-making and the company's digital maturity. Participant D, the Customer Executive, contributes insights into the customer-facing aspects of the logistics business and understanding the challenges related to technology adoption from a customer perspective. Participant E, as the Operations Executive, offers expertise in optimising logistical processes with hands-on experience in overcoming operational challenges, while participant F, the Finance Executive, brings a financial lens to our study and offers insights essential for understanding the disparities in technology adoption based on business size.

In summary, the participants' diverse positions and expertise covers a range of aspects within the logistics industry, ranging from operational management and strategic planning to customer relations and financial concerns. This scope guarantees a thorough examination of the difficulties, prospects, and industry best practices related to road freight logistics. Their combined experience will be priceless in offering complex viewpoints that will deepen our investigation and increase its applicability and value to stakeholders in the sector.

(d) Table analysis, interview and focus group questions

The table presented below outlines the questions posed during the data collection process. These questions have been meticulously summarised and connected to overarching themes, offering a clear understanding of their implications for the research topic. This topic specifically addresses the challenges faced by Road Freight Logistics Service Providers (RFLSPs) in Gauteng province as they strive to achieve digital maturity. The synthesised information sheds light on the complex relationship between the interview questions, their summarised interpretations, and the primary themes, providing valuable insights into the challenges these organisations confront on their journey towards digital maturity.

Questions	Themes	Coding (Summarised version)
1. Can you please provide an overview of your professional background, including the number of years you have been working in the road freight logistics industry and your experience with the current company? 2. What is your current job title, and what is your management level within the organisation?	**Career Progression and Experience:**	1. Career paths. 2. Diverse roles (customer liaison, warehouse management, export/import, executive positions). 3. Training programs and skill enhancement.
3. Can you describe your experience with digital technologies in the logistics industry? 4. What digital technologies have you adopted in your business operations? 5. Can you describe any challenges you have encountered in adopting digital technologies?	**Digital Technology Adoption:**	4. Adoption of technologies (E-POD, WMS, route planning, vehicle tracking). 5. Challenges in convincing clients, especially in remote areas.

6. How would you describe your company's digital maturity?	**Digital Maturity and Challenges:**	6. Varied digital maturity levels. 7. Efforts to improve and progress. 8. Challenges (load shedding, private sector funding reliance, government tender struggles). 9. System integration and staff training challenges.
7. What challenges have you faced in terms of digital infrastructure, such as internet connectivity and access to hardware?	**Infrastructure and Connectivity:**	10. Impact of load shedding. 11. Backup systems (generators). 12. Connectivity challenges (real-time data transmission, monitoring).
8. Have you faced any challenges in terms of digital skills and knowledge among your staff?	**Digital Skills and Literacy:**	13. Varied digital literacy among staff. 14. Challenges in technology acceptance. 15. Resistance, particularly among less exposed or educated individuals.
9. How do you ensure that your staff has the necessary skills and knowledge to effectively use digital technologies?	**Training and Measurement:**	16. Continuous training. 17. Engagement sessions. 18. Measurement through KPIs. 19. Challenges in leveraging data for bottom-line impact.
10. Have you noticed any differences in the challenges faced	**Challenges Based on Business Size:**	20. Financial resource disparities

by RFLSPs based on the size of their business or the industry they operate in?		21. Impact on adoption of high-value technologies 22. Favouring larger businesses
11. Can you describe any challenges unique to RFLSPs in the Gauteng Province in reaching digital maturity?	**Gauteng-Specific Challenges:**	23. Generally good connectivity in Gauteng. 24. Challenges (technology upgrades, crime sophistication, privacy legislation).
12. How do you see the logistics industry in Gauteng province evolving in terms of digital maturity over the next few years?	**Future Outlook:**	25. Anticipated trends (increased cloud adoption, tech-savvy workforce, reliance on Generation AI). 26. Concerns about cybersecurity threats. 27. Green practices.
13. What do you think can be done to address the challenges faced by RFLSPs in reaching digital maturity in the logistics industry?	**Recommendations for Industry Improvement:**	28. Standardization of technology protocols 29. Simplification of technology Implementations 30. Addressing challenges in remote areas.

To provide perspective to the information above, the themes that emerged from the interviews highlight the complex dynamics of Gauteng's road freight transportation industry and throw light on important factors affecting digital maturity.

An encouraging image of the industry's will to overcome challenges in reaching digital maturity is painted by the interview with road freight service providers in the province of Gauteng. The

proactive approach to continuous staff development, with an emphasis on training initiatives, is one advantage. The industry's dedication to improving employee skills, particularly for the younger generation, shows that it understands the value of having a workforce that is tech savvy. By making this investment in human capital, the sector is better positioned to handle technology developments and guarantees that its workforce is prepared for the upcoming digital challenges.

The focus on empowerment in particular offers a promising direction for solutions for advancement. An innovative approach is suggested by the realisation of the critical role that educated people can play in advancing digital innovations. The sector hopes to use experience to overcome obstacles by empowering competent staff. This strategy fits in with a larger movement to develop knowledge and creativity among employees, which can help road freight service providers advance towards digital maturity.

Green practices and future trends offer an optimistic outlook for the sector. Expectations of more cloud use, better networks, and a workforce with greater technology awareness indicate a dedication to realising the potential of technology. Furthermore, the sector is aligned with sustainable practices since the implementation of green technology and paperless processes demonstrate an environmental conscience. These future trends reflect a readiness to adapt and exploit technology ethically for the benefit of the environment and general efficiency.

A major obstacle is client resistance, particularly the deeply rooted mindset and belief that supports traditional methods – in certain situations, it extends to a lack of customer trust. This reluctance highlights how hard it is to alter deeply held views inside the business, even in the midst of the COVID-19 pandemic. It is still difficult to persuade customers of the real advantages of digital systems, which could slow down the general adoption of cutting-edge technology.

Digital maturity is negatively impacted by resource disparities, which are brought to light by financial resource challenges. Due to budgetary limitations, smaller road freight service providers could find it difficult to keep up with larger businesses when it comes to technology expenditures. This financial barrier has the potential to exacerbate the digital gap by impeding the industry's overall growth and creating competitive gaps.

There are several obstacles in the form of infrastructure and connectivity issues, especially when it comes to load shedding and cybersecurity. Load Shedding Impact exposes a weakness in the digital infrastructure of the sector and has a direct impact on customer service and real-time data replication. Furthermore, dangers posed by the advanced nature of cyber-attacks necessitate strong security measures. These difficulties highlight the necessity of large-scale investments and careful planning to strengthen road freight service providers' digital infrastructure.

In conclusion, although the road freight service providers in the province of Gauteng demonstrate a commendable dedication to tackling difficulties, certain unfavourable elements including customer opposition, resource inequalities, and infrastructural problems provide significant challenges. The industry's ability to successfully navigate these obstacles and promote a comprehensive strategy to technology adoption will determine when it reaches digital maturity.

Together, these topics highlight the complexity of the road freight logistics industry's digital transformation process. A more complex understanding of the variables impacting digital maturity is made possible by the opportunities and difficulties found in the areas of infrastructure, technology adoption, career advancement, and skill competency. The conditions for a thorough investigation of the ways in which road freight logistics service providers manage these dynamics are created by the differences in digital maturity levels and the unique issues faced by Gauteng. By exploring the experiences of significant participants, the study seeks to understand how these themes relate to the main research issue, "Challenges Encountered to Reach Digital Maturity by Road Freight Logistics Service Providers in Gauteng Province."

4.2Data Analysis

The summarised findings below collectively form the framework for understanding the multifaceted challenges and opportunities that shape the digital transformation journey of road freight logistics service providers in Gauteng Province.

Within the complex network of road freight logistics service providers (RFLSPs) in Gauteng, the research reveals an engaging story of perseverance and challenges in reaching the goal of

digital maturity. Conversations with prominent figures in the field demonstrate a proactive dedication to ongoing employee development, which aligns with the ideas expressed by Aslanova & Kulichkina (2020). This thoughtful investment in human capital highlights the industry's appreciation of the value of having a workforce that is tech savvy and puts it in a good position to handle future technology developments. RFLSPs are supporting the journey towards digital maturity by promoting an atmosphere of continuous learning, which is in line with the larger trend supported by Dong et al. (2023) to advance knowledge and creativity among employees. The above notions align with the Resource-Based View (RBV) theory, emphasising the significance of digital capabilities for RFLSPs in the digital era. Thus, the RBV framework emphasise the industry's focus on internal resources, skills, and knowledge as essential components for establishing a competitive advantage.

However, amidst these progressions, a significant challenge arises in the form of resistance from customers or clients, originate from deeply rooted mindset and beliefs. Sumrit (2021) cautioned against this kind of skepticism, emphasising the industry's difficult task of convincing clients of the real advantages of digital technology. The study highlights the ongoing difficulties in adopting cutting-edge technology and highlights how difficult it is to change deeply held beliefs, even in the middle of the COVID-19 epidemic. This challenge is closely related to the RBV, as it reflects the industry's need to not only focus on internal capabilities but also navigate external factors, including client perceptions and preferences.

Challenges related to financial resources surface as a major obstacle, highlighting the differences that smaller RFLSPs encounter in comparison to their bigger counterparts. The results of the study support the cautions issued by Farquharson et al. (2021), highlighting the possibility that financial obstacles might exacerbate the digital gap in the sector, and this is aligning with the RBV's emphasis on the allocation and management of resources. The total expansion of the economy is threatened by this financial imbalance, creating competitive disparities based on technological capabilities.

Issues with infrastructure and connectivity, in particular cybersecurity and load shedding, show up as serious roadblocks that need to be addressed right away. These difficulties are consistent with the findings of Farquharson et al. (2021) and Rathore et al. (2022), which highlight the digital infrastructure of the industry's vulnerability and the need for strong security measures. Thus, it aligns with the RBV's consideration of internal vulnerabilities. The report demonstrates

the industry's dedication to tackling key issues as it moves towards digital maturity by emphasising the necessity of significant expenditures and careful planning to strengthen digital infrastructure.

To sum up, the RFLSPs in Gauteng demonstrate an impressive commitment to overcoming challenges, with an intentional focus on ongoing advancement and expertise acquisition. Nonetheless, the research emphasises that significant challenges include infrastructural challenges, client resistance, and financial concerns. As the industry continues to navigate its future, the ability to create a thorough plan for technology adoption will surely define the path and timeframe for achieving digital maturity. Through the lens of the RBV, we are able to comprehend the complex interactions between internal and external variables that impact the digital maturity of RFLSPs in Gauteng. The industry's strategy emphasis on using internal resources and skills while managing external challenges for sustainable growth and competitiveness is made clear by the RBV framework. A comprehensive understanding of the digital landscape of the industry is made possible by the Digital Maturity Model (DMM), which is also a useful tool for classifying enterprises according to their degree of digital maturity and offering insights into their digital capabilities.

CHAPRTER 5

5 Conclusion, Recommendations and Limitation

Conclusion

In the realm of Road Freight Logistics Service Providers (RFLSPs) in Gauteng, a captivating narrative of digital transformation unfolds, where progress, challenges, and strategic imperatives converge to shape the landscape of digital maturity. This conclusion serves as a summary of scholarly insights and industry observations, providing a holistic understanding of the sector's current trajectory and future prospects.

Career Progression and Experience

The logistics industry, renowned for its diverse career paths, emphasises the pivotal role of skilled professionals in propelling digital maturity within RFLSPs. Scholarly works by Farquharson, Mageto, & Makan (2021) illuminate the significance of workforce skills and experience, influencing an organisation's ability to adopt and leverage new technologies. Strategies such as investing in career development and continuous learning programs, as advocated by Westerman, Bonnet, & McAfee (2012), emerge as essential for fostering a digitally adept workforce.

Digital Technology Adoption

The adoption of digital technologies, a corner stone in the logistics sector's evolution, presents a tapestry of challenges and opportunities. The literature emphasises the need for strategic communication and subtle approaches to overcome client resistance, echoing the sentiments of Farquharson, Mageto, & Makan (2021). Meanwhile, the complexities surrounding technology adoption, illuminated by the same authors, emphasise the imperative for meticulous planning and clear value proposition communication.

Digital Maturity and Challenges

Amidst efforts for improvement, RFLSPs struggle with formidable challenges, from load shedding to funding constraints, as illuminated by Farquharson, Mageto, & Makan (2021). The pursuit of digital maturity demands a thoughtful balancing act, navigating financial constraints

while capitalising on long-term advantages. This echoes the sentiments of scholars advocating for a balanced approach to financial planning and investment in new technologies.

Infrastructure and Connectivity

The foundation of digital operations lies in robust infrastructure and reliable connectivity, as emphasised by Farquharson, Mageto, & Makan (2021). Addressing infrastructure gaps through collaboration and investment emerges as imperative, ensuring the seamless integration of digital solutions and real-time data management.

Digital Skills and Literacy

In navigating the landscape of digital transformation, the human element assumes paramount importance. The literature stresses the significance of ongoing staff development and training initiatives, empowering employees with the requisite skills and knowledge for digital adeptness.

Training and Measurement

Continuous training programs and effective measurement mechanisms are essential for evaluating the efficacy of skill development initiatives, as suggested by Dong, Akram, Andersson, Arnäs, & Stefansson (2021). Anticipating and embracing future trends are crucial for achieving digital maturity and staying competitive in the evolving landscape.

Challenges Based on Business Size

Disparities in technology adoption based on business size emphasise the need for strategic resource allocation and investment, as portrayed by Farquharson, Mageto, & Makan (2021). Careful consideration of costs and benefits is imperative, particularly for smaller businesses seeking to harness the transformative power of digital technologies.

Unique Gauteng Challenges

Regional intricacies in Gauteng, including technology upgrades and legislative considerations, add layers of complexity to the digital transformation journey. Strategic planning and investment in technology emerge as essentials for overcoming regional challenges and driving sustainable growth.

In essence, the digital transformation narrative of RFLSPs in Gauteng is a testament to resilience, innovation, and strategic foresight. By embracing the symbiotic interplay of progress, challenges, and strategic imperatives, the industry is poised to chart a course towards digital maturity and sustainable success in the dynamic landscape of logistics.

Recommendations

The study's practical and informative findings can help road freight logistics service providers (RFLSPs) in Gauteng make decisions that will help them navigate the transition to digital maturity. It is recommended that RFLSPs maintain their dedication to ongoing training and development in order to strengthen their workforce. According to Aslanova & Kulichkina's observations, this investment in human capital guarantees a tech-savvy workforce capable of skillfully navigating emerging technology.

Recognised as a significant obstacle, client resistance calls for a proactive strategy involving extensive education and communication techniques. The study emphasises the need of developing client insight in the face of deeply rooted traditional mindsets by highlighting the necessity to expose misconceptions and highlight the observable advantages of digital systems, as illuminated by Farquharson, Mageto, & Makan, 2021.

Recognising the difficulties in raising capital that smaller RFLSPs encounter, industry-wide strategies to provide financial support for these organisations are advised, echoing the same sentiments from Farquharson, Mageto, & Makan, 2021. This all-inclusive strategy promotes a fairer environment for technology adoption in line with the study's finding of financial challenges that may exacerbate the digital gap within the industry.

Government agencies and industry players must work together to address pressing infrastructure issues, as emphasised in the literature by Farquharson, Mageto, & Makan, 2021. The road freight logistics industry could accelerate infrastructure upgrades by tackling concerns like load shedding and cybersecurity by nurturing such partnerships. This culture of cooperation is consistent with the study's focus on the need for significant expenditures and careful planning in order to strengthen digital infrastructure.

RFLSPs are encouraged to proactively adopt sustainable practices and get ready for emerging trends as this resonates with the literature highlighting the importance of staying ahead of the curve in the digital age (Farquharson, Mageto, & Makan, 2021). Increasing the use of cloud computing, developing a workforce that is tech savvy, and utilising Generation AI's potential are all part of this. RFLSPs establish themselves as progressive leaders in the business by coordinating their processes with emerging trends.

Key suggestions include improving the ease of technology implementations and the standardisation of industry-wide technological standards is consistent with the literature emphasizing the importance of a comprehensive strategy to overcome challenges (Farquharson, Mageto, & Makan, 2021). Collaboration to create shared standards can help achieve connectivity, and more efficient digital environments can be fostered by lowering obstacles through simplified implementations. This is consistent with the study's focus on the importance of a comprehensive strategy to overcome challenges by utilising internal resources and competencies.

In addition, to deepen our understanding, future studies could delve into a comparative analysis across different provinces or regions within South Africa. Exploring how varying economic, infrastructural, and regulatory contexts influence the digital maturity journey of RFLSPs could provide an insightful perspective and uncover province or region-specific strategies for overcoming challenges. Additionally, focused research might evaluate the environmental impacts and effectiveness of eco-friendly technology used by RFLSPs. Studies that compare various RFLSPs enterprises sizes may offer significant insights into successful sustainability strategies and further the conversation around sustainable digital transformation in the logistics industry.

Furthermore, a longitudinal study tracking the evolution of digital maturity in the road freight logistics sector over an extended period would offer valuable insights into the industry's adaptive capacity. This longitudinal approach would enable researchers to observe how RFLSPs respond to changing technological landscapes, economic shifts, and external shocks, providing a dynamic understanding of their digital transformation journey. Furthermore, investigating the impact of specific interventions or industry-wide initiatives on digital maturity could contribute practical recommendations for policymakers and industry stakeholders aiming to foster a digitally resilient road freight logistics sector.

In summary, RFLSPs in Gauteng could lead a more targeted and efficient journey towards digital maturity by implementing these strategic ideas. The recommendations, that cover everything from collaborative infrastructure upgrades to workforce development, provide a road map for how the industry might flourish in the digital age.

Limitations

The research was subject to many constraints, primarily arising from difficulties in collecting data and involving participants in the road freight logistics service providers (RFLSPs) industry. This study's limitation is that it only uses a qualitative methodology. Although qualitative approaches yield valuable insights, a more thorough knowledge of the phenomenon being studied may be possible through the use of mixed methods. Therefore, investigating a mixed-method approach may improve the scope and depth of new studies. This study sourced data from two (2) small-medium sized logistics enterprises and one (1) large-sized logistics enterprises all operating in Gauteng province, with additional presence in various provinces across the country. This is against the proposed plan of 2-3 small-medium sized enterprises and 3-5 large sized enterprise. The data collection employed a combination of face-to-face and online interviews and focus group, utilising semi-structured questions. Data collection had limited time as it recommenced from November 2023 and continued until February 2024.

Another major obstacle was the need for more time to hold in-depth conversations with RFLSPs and obtain their consent to participate in the research. Due to the limited research time frame, persuading these organisations to participate needed extensive communication and frequently included going through their internal chain of command to gain approval, which aggravated the delays. It was also challenging to have the non-disclosure agreement (NDA) signed since both legal teams had to carefully go through the documents.

Additionally, several RFLSPs were reluctant to take part because they believed that their journey towards digital maturity offered them an advantage over their competitors, which made them reluctant to share their experiences. The challenge in contacting the right people within these organisations for providing approval to participate added to their hesitation; some purposefully disregarded attempts at communication—a practice that is especially common in larger businesses—while others rejected without providing a reason. Arranging focus groups

was difficult for those who did agree to participate; some preferred individual interviews, while others preferred group talks; this added complication to the data gathering process. These complex issues emphasised how difficult it is to involve RFLSPs in research projects and how important it is to prepare ahead and be persistent while facing problems.

Ultimately, to increase the chances of getting approvals from companies that are probably members of these associations, it is advised to form relationships or affiliations with accredited bodies in the supply chain industry, including SAPICS. By using this tactic, the response rate may rise. Furthermore, by collaborating with firms connected to the National Bargaining Council of the Road Freight Logistics Industry, joining this group may provide benefits for data collecting.

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Interview Guide:

The interviewer or researcher will ensure the following: What the interview is about; what will the interview be used for; who will have access to the interview; re-assuring the interviewee that there is no wrong or right answer; ask the interviewee that it is okay if the interview is recorded; inform the interviewee that he or she can stop the interview any time they like; and lastly, ask if he or she have any questions or comment before the interview begins.

The researcher will start asking broader questions (open-end) that are within the study context and steadily narrowing them down to get to specifics to get the respondents to relax and feel at ease. The intention is to allow the respondents to start remembering things as they happened, especially in past. There will be more probing or follow-up questions. The researcher will ask similar questions in different ways repeatedly from different perspective. The researcher will also ask lot of hypothetical questions to allow the respondents to detach from the situation and be willing to share their experience freely.

In conclusion: It is important to note that at the end of the interview ask the respondent if there is anything would like to add that the researcher has not thought about it relating to the study. Inform the respondents how they can contact the researcher if they have any questions or comment. Also ask the respondent if the researcher can contact them if there is any further questions or clarity. Lastly, thank them for the time and the willingness to share their experience.

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Proposed Interview guide questions:

1. Can you please provide an overview of your professional background, including the number of years you have been working in the road freight logistics industry and your experience with the current company?
2. What is your current job title, and what is your management level within the organisation?
3. Can you describe your experience with digital technologies in the logistics industry?
4. How would you describe your company's digital maturity?
5. What digital technologies have you adopted in your business operations?
6. Can you describe any challenges you have encountered in adopting digital technologies?
7. What challenges have you faced in terms of digital infrastructure, such as internet connectivity and access to hardware?
8. Have you faced any challenges in terms of digital skills and knowledge among your staff?
9. How do you ensure that your staff has the necessary skills and knowledge to effectively use digital technologies?
10. How do you measure the effectiveness of digital technologies in your business?
11. Have you noticed any differences in the challenges faced by RFLSPs based on the size of their business or the industry they operate in?
12. Can you describe any challenges unique to RFLSPs in the Gauteng Province in reaching digital maturity?
13. What do you think can be done to address the challenges faced by RFLSPs in reaching digital maturity in the logistics industry?
14. How do you see the logistics industry in Gauteng province evolving in terms of digital maturity over the next few years?
15. Are there any additional challenges or factors you believe are important to consider in relation to RFLSPs reaching digital maturity in Gauteng province?

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Mrs. Martha Mmakhale

Managing Director

Goitsemodimo logistics, GP Company

012 309 3392

Martha.mmakhale@ggplogistics.com

24 May 2023

Dear Martha,

Re: Permission to conduct research at Goitsemodimo Logistics, GP Company.

My name is Itumeleng Motshwari, a seasoned Logistics professional with an extensive track record of over 20 years in the Supply Chain field. Throughout my career, I have held key positions within various multinational companies specializing in FMCG and construction sectors.

I am studying a Master of Business Administration (MBA) with Wits Business School at the University of the Witwatersrand. I am seeking permission to do research at Goitsemodimo Logistics, GP Company.

The rapid advancement of technology in the road freight industry is compelling freight service providers to digitize in order to remain competitive and relevant. It is widely recognized within the industry that achieving both Digital Transformation and Digital Maturity empowers road freight logistics service providers (RFLSPs) to gain competitive advantages, including cost reduction, improved customer experiences, innovation, and increased efficiency. I am

conducting research on Road Freight Logistics Service Providers (RFLSPs) and their efforts to reaching digital maturity. The aim of the study is to assess the challenges encountered in reaching digital maturity by the road freight logistics service providers (RFLSPs) in Gauteng province; including the state of digital maturity amongst the RFLSPs in Gauteng province; the specific challenge relating to the digital infrastructure, digital skills and knowledge, and the use of digital technologies in Gauteng province. However, the findings will assist RFLSPs to fashion out an effective strategy to mitigate the challenges identified. The research aims to investigate in depth the following research questions: (a) What is the state of digital maturity among the RFLSPs in Gauteng? (b) What are the challenges encountered to reach digital maturity regarding digital infrastructure, digital skills and knowledge, and digital technologies in the province?

The research will entail collecting data from at least 2 executives (Digital Technology Executive and Logistics/Supply Chain Executive) with a face-to-face interview and a focus group discussion with 4-6 senior managers (subject-matter-experts) from different functions. The interview is expected to take approximately 1 hour, and focus group discussion is also expected to run for 1 hour. I will appreciate the participants to have a good knowledge and experience in their respective fields using digital technologies. To minimise disruption to participants' regular working hours, I kindly request to conduct the data collection on your premises. Audio recording will be used to facilitate accurate data collection.

Participants will be requested to provide written consent before the research commences. All responses will be treated with strict confidentiality, with participant identities (including names and organisations) replaced with pseudonyms during data collection and anonymised in the final report. Individual privacy will be fully protected in all published and written data resulting from the study.

The research outcomes will be communicated through my thesis report, forming part of my academic research article that will be reviewed and approved by Wits Business School.

The research participants will not be advantaged or disadvantaged in any way. They will be reassured that they can withdraw their permission at any time during this project without any penalty. There are no foreseeable risks in participating in this study. The participants will not be paid for this study.

The research data will be securely anonymised and preserved for potential future reuse by other researchers, ensuring the protection of participant confidentiality.

I therefore request permission in writing to conduct my research at your organisation. The permission letter should be on your organisation's headed paper, signed and dated by a specific person in your organisation with full contact details, and specifically referring to myself by name and the title of my study.

Please let me know if you require any additional information. I am eagerly looking forward to your prompt response.
Yours sincerely,

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UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Participant Consent Form

Title of project: Challenges encountered in reaching digital maturity by road freight logistics service providers (RFLSPs) in Gauteng province

Researcher: Itumeleng Motshwari

I, ……, agree to participate in this research project.
I agree to the following:

The research study was explained to me. I understand what this study is about.	YES	NO
I understand that I can volunteer to take part in the study.	YES	NO
I agree that I am authorised to share my experience for the purpose if this study.	YES.	NO
I agree that the interview may be audio recorded.	YES	NO
I agree that direct quotations from my interview may be used by the researcher in their research report.	YES	NO
I agree that my participation will remain anonymous in the research findings (my name or other identifying data will not be used by the researcher in their research report).	YES	NO
I agree that other researchers may use the information I provide in my interview (depending on their own ethics clearance being obtained) but my name and any personal information will not be used or passed on.	YES	NO

……(Signature)
…… (Name of the participant)
……(date)

……(Signature)
…… (Name of the researcher)
……(date)