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Information Communication Technology opportunities to promote effective remote working at Transnet within the Durban Container Terminal

by

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Declaration

I, **Gibson Nyarugwe**, student number **221013397**, declare that this research study,

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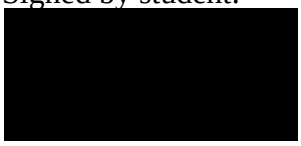

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Abstract

The study sought to investigate Information Technology Communication opportunities to promote effective remote working in Transnet Port Terminals at Durban Container Terminal. This concept is meant to support business continuity through remote working, minimise disruptions in times of crisis. This study also sought to determine whether the adoption of Information Technology Communication and digital solutions is influenced by the availability of resources. Other objectives were to determine the support system available for remote workers and examine digital innovative management solutions for supervising and monitoring employees working offsite. The research used a qualitative methodology and interviewed a sample of managerial and non-managerial personnel including the employee-collective bargaining unit members from Durban Container Terminal. Thematic analysis was employed wherein the researcher searched for patterns in the data to understand themes. Emphasis was placed in attempting to identify, analyze, and interpret data patterns. The results of the study revealed that Transnet employees have a culture of hardworking, accountability, honesty and can be trusted with the organisations' Information Technology Communication tools, computer equipment, and network in remote work and operational performance in the future, and in times of such pandemics, natural disasters and other events such as strikes service delivery protests, and industrial actions. The expected results was a positive change in the way the port operates by increasing collaboration amongst teams working remotely, utilising smart technology through automation and innovation. The research findings showed that funding and the availability of digital resources was a major challenge in the adoption of Information Technology Communication technological solutions. The research recommended alignment of organisational strategy and ICT policy, intensive automation of operations among other measures through Artificial Intelligence and Machine Learning to promote remote working. Increased adoption of Information Technology Communication enhances regional and global competitiveness as port operating organisations sought to survive in the marine sector. Limitation of the research, include Covid-19 restrictions, protests, industrial strike action, and low employee morale due to protracted wage negotiations. Direction of future studies should focus on quantitative research to include a larger population sample and wider geographical area including other ports under Transnet Port Terminals and review of port operational performance and funding model.

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Key words/terms:

Container port performance index, Computer-Mediated Communication, delta variant, Durban Container Terminal, Remote Working, State Owned Company, and Working from Home.

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Acronyms/Abbreviations

4IR	Fourth Industrial Revolution
5G	5th Generation Mobile Network
ACTs	Advanced Communication Technologies
AI	Artificial Intelligence
APN	Access Point Name
AR	Augmented Reality
BI	Business Intelligence
BW	Business Warehouse
CA	Cluster Analysis
CIA	Confidentiality, Integrity, Availability
CLMS	College of Law, and Management Studies
CMC	Computer-Mediated Communication
CMMS	Computer Maintenance Management System
COGTA	Cooperative Governance &Traditional Affairs
COVID19	Coronavirus Disease Of 2019
CPPI	Container Port Performance Index
CPS	Cyber-Physical Systems
DCT	Durban Container Terminal
DIC	Drivers in Charge
DL	Deep Learning
DMS	Document Management Systems
DOI	Diffusion of Innovation
DPE	Department of Public Enterprises
DRC	Democratic Republic of Congo
EAP	Employee Assistance Program
ERP	Enterprise Resource Planning
EU	European Union
FTF	Face-To Face
FWA	Flexible Working Arrangement
FWSs	Flexible Working Spaces
GCOS	General Cargo Operational System
GDP	Gross Domestic Product
GUI	Graphical User Interface
IA	Intelligence Automation
ICT	Information Communication Technology
ICTs	Information & Communication Technologies
IDR	Issuer Default Ratings
KPI	Key Performance Indicators
KZN	Kwazulu-Natal
LAN	Local Area Network
ML	Machine Learning
NLP	Natural Language Processing
NPD	New Product Development
NWSs	New Working Spaces
PdM	Predictive Maintenance
PEOU	Perceived Ease of Use
PMI	Project Management
POPIA	Protection of Personal Information Act
PPP	Public-Private Partnership
PU	Perceived Usefulness
ROI	Return of Investments
RR	Rest And Recuperation
RTO	Return To Office
SA	South African
SADC	Southern African Community Development
SAP	Systems Application Programmes
SCM	Supply Chain Management
SDGs	Sustainable Development Goals
SHEQ	Safety Health, Environment & Quality
SME	Subject Matter Expects
SOC	State Owned Company
SOEs	State-Owned Enterprises
SS	Social Support
TAM	Technology Acceptance Model
TCA	Thematic Content Analysis
TNPA	Transnet National Ports Authority
TPT	Transnet Port Terminals
UCC	Unified Communications & Collaboration
UNTU	United National Transport Union
USA	United States of America
V2I	Vehicle To Infrastructure
V2P	Vehicle To Pedestrian
V2V	Vehicle To Vehicle
VPN	Virtual Private Networks

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ILO	International Labour Organisation
IoMT	Internet of Mobile Things
IoT	Internet of Things
IP	Internet Protocol
IS	Information Systems
ISS	Institute For Security Studies
IT	Information Technology
JD-R	Job Demands–Resources
VSP	Voluntary Service Packages
WAN	Wide Area Network
WFH	Work From Home
WfMSs	Workflow Management Systems
WFO	Working From the Office
WHO	World Health Organisation
WLB	Work-Life Balance
WREA	Work Related Extended Availability

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DEFINITION OF KEY TERMS

Artificial intelligence (AI): The ability of machines, such as computers, to simulate human intelligence, (Harpur (2020).

ChatGPT: is a natural language processing (NLP) model that combines GPT-2, a transformer-based language model developed by Open AI, with supervised and reinforcement learning techniques to fine-tune it (an approach to transfer learning) on the GPT-3 group of large language patterns developed by Open AI. The model enables users to interact naturally with an AI system through text-based conversations, (George 2023).

Container Port Performance Index (CPPI): The elapsed time between a ship's arrival in port to its departure from the berth having completed its cargo exchange (Markit, 2021)

Covid-19: A pandemic caused by the new strain of coronavirus (Hatipoğlu, 2020)

Delta Variant: Also known as B.1.617.2, is the strain that has mutations on the spike protein that make it easier for it to infect human cells. (Abdelnabi, Mora, Eshak & Nugent, 2021).

Diffusion of Innovations: A theory that seeks to explain how, why, and at what rate new ideas and technology spread (Rogers, 1962).

Flexible Working Arrangement (FWA): A situation where the organisation enters into an agreement with the employees to choose either to work from the office, home or remotely for some specific period of time (De Klerk et al., 2021).

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Fourth Industrial Revolution (4IR): Nicholas (2016) claimed that the 4IR can be described as the advent of 'cyber-physical systems' involving entirely new capabilities for people and machines.

Graphical User Interface (GUI): Mishra (2007) described GUI as a type of user interface through which people interact with electronic devices via visual indicator representations.

Gross Domestic Product (GDP): Church (2016) defines it as a measurement that seeks to capture a country's economic output, while Coscieme et al. (2020) state that it is one of the United Nation's sustainable development goals (SDGs) for decent work, economic growth, and a measure of the broad wellbeing.

Hybrid Working System: It is a flexible work model that supports a blend of in-office, remote and on-the-go-workers, which allows the autonomy of the workers to choose to work from wherever, as long as they are productive (Webex, 2022). This has allowed companies to remain productive and sustain relevancy during the height of Covid-19 by delivering value via digital tools, (McKinsey & Company, 2020)

Omicron: It is popularly known as a Covid-19 variant which was reported to WHO from South Africa for the first time on the 24 November 2021 (Samsunder et al., 2022).

Information and **Communication Technologies** (**ICTs**): Salman et al. (2013) pointed out that this is a broader term for Information Technology (IT), which refers to all communication technologies, including the internet, wireless networks, cell phones, computers, software, middleware, videoconferencing, social networking, and other media applications and services.

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Machine learning (ML): Algorithms and statistical models that are programmed to learn from data, therefore recognizing and inferring patterns within them. This enables computers to perform specific tasks without explicit instructions from a human operator, Harpur (2020).

Remote Work: Remote work (also known as work-from-home) or telecommuting is a type of flexible working arrangement that allows an employee to work from remote locations outside of corporate offices (Gartner Information Technology Glossary, 2021).

State Owned Enterprises (SOEs): Ray (2011) indicates that State-owned enterprises (or public entities) are independent bodies partially or wholly owned by Government. They perform specific functions and operate in accordance with a particular Act.

Transnet Port Terminal (TPT): It is a division of Transnet SOC Limited; South Africa's state-owned freight transport company which owns and operates 16 terminal operations situated across seven South African Ports. (Transnet Port Terminals, 2021)

Working from Home (WFH):
This is a concept where employees do not commute to an office environment but perform their duties from home through the use of information and telecommunications technology that allows instant communication anywhere and at any time (Heery & Noon, 2017).

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CHAPTER 1: ORIENTATION TO THE STUDY

1.1 INTRODUCTION

This chapter provided the background, research context regarding the adoption of ICT digital solutions in order to support and promote Remote Working in Transnet Port Terminals at Durban Container Terminal (DCT). The chapter provides an overview of the study, its focus, the problem statement, the purpose of the study, aim and objectives, research questions and justification for the study.

1.2 BACKGROUND

In order to change the course and mitigate the effects of the Covid-19 pandemic, a number of measures were put in place worldwide. It became imperative to contain and supress the pandemic. Vuscan et al., (2022) noted that the world over, various governments-imposed lockdowns and restrictions to curb the spread of the Covid-19 pandemic, workers were forced to work from home, a practice now commonly called 'Remote Work'. As of May 23, 2020, according to WHO, there were 213 countries, areas or territories with COVID-19 positive cases, (Rohith & Devika, 2020). The effects of the pandemic were, and still are far-reaching, and South African State-Owned Enterprises (SOEs) were not spared in the process, such as the Durban Container Terminals (DCT) a port within Transnet Port Terminals (TPT) in Durban. In this regard, it became imperative to seek solutions on how DCT could effectively leverage on Information Communication Technology (ICT) applications and tools to support Remote Working during and after the Covid-19 pandemic.

The World Health Organisation (WHO) on 11 March 2020 declared the novel coronavirus (Covid-19) outbreak as a global pandemic, (Cucinotta & Vanelli, 2020). As of 18th April 2020, 10:00 am CEST; Africa CDC reported, 19,895 confirmed cases, including 1,017 deaths and 4,642 recoveries, from 52 African countries, while two countries (Comoros and Lesotho) were still virus-free (Africa CDC.,2020). Interestingly, most of the identified cases of COVID-19 in Africa have

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been imported from Europe and the United States, rather than from the original COVID-19 epicentre China, (Maclean, 2020).

According to the TPT Corporate Affairs, Covid 19 update, Transnet Port Terminals (TPT) as of mid-April of 2023 had suffered 46 Covid 19 related deaths, 2 047 total Covid 19 cases,1 995 total recoveries and zero hospitalisation as of the 13th April 2023.

TPT-COVID-19 UPDATE

Covid-19 Dashboard for TPT as at 13.04.2023			
Total Positive cases Recorded	Total Death	Total Recoveries	Total Hospitalisation Cases
2,047	46	1,995	-

Figure 1.1: COVID-19 UPDATE., (TPT Corporate Affairs, 2023)

Figure 1.1 above shows that that TPT was not spared from the devasting effects of the Covid-19 pandemic losing nearing 50 members of staff whose families' survival were depending on them.

Health crises such as communicable and non-communicable diseases can cause wide-ranging socioeconomic disruptions, losses to human lives and livelihoods, and to avoid the international spread of the disease, the identification of the biological threats and strengthening of health systems were found to be critical (Ahmad et al., 2020). Economic actors and different industries had to respond expeditiously by implementing survival strategies in the face of the rampant crisis, not only for global airlines but also port businesses in order to prevent financial collapse, loss of jobs, or serious retrenchments through cost cutting innovations, (Albers & Rundshagen, 2020).

Significant proactive measures to prevent the serious contagious transmission of the virus had to be ensured, (Shah et al., 2020). Emerging from this crisis, lessons from Covid-19 taught the world that workers can perform effectively working from anywhere, (Nolan et al., 2021). Various organisations, private businesses, public institutions and Government departments had to hastily send employees home without a clear strategy and understanding of the future of working at home.

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In addition to the intricacies of remote working, the dilemma was exacerbated by not knowing when and how the pandemic will end, (Mukaigawara et al., 2022)

Furthermore, rather than face the risk of contracting the Covid-19 virus, employees and organisations preferred the flexible ‘non-contact’ working arrangements called the ‘new norm’ to continue even after the abatement of the pandemic (De Klerk et al., 2021). More so, De Klerk et al., (2021) claimed that this was in line with fundamental organisational benefits, improved employee engagement and organisational performance, reduced absenteeism, improved financial returns, and enhanced overall organisational effectiveness. However, this was difficult as no one knew when the pandemic would end mainly due to mutations, and several waves of the viruses, also with the emerging of new viruses, among other novel health issues (Ioannidis, 2022). Hutson (2021: p10) predicted that “the global economy was expected to remain subdued, with the impact of the Covid-19 pandemic resulting in slowing demand”. Considering this, it was important to understand how Transnet Port Terminals in the Durban Container Terminals, South Africa, the Africa Region and the rest of the world was going to respond to the pandemic.

Transnet as a whole suffered profitability, and incurred some loses. Burroughs (2020) reveals that Transnet, South Africa SOC, reported a 34.9% decrease in net profit of Rand 3.9 billion ($US 241.7m) for the 2019-20 financial year ended March 31, despite a 1.3% increase in revenue of Rand 75.1 billion. In the report for its half-year performance, Transnet SOC Ltd emphasised that it was negatively impacted by the phased lockdowns necessitated by the Covid-19 pandemic, but the outlook remains cautiously optimistic (Transnet, 2021). In February 2021, Fitch Ratings downgraded South Africa-based Transnet SOC Ltd's Long-Term Foreign- and Local-Currency Issuer Default Ratings (IDR) to BB- from BB following the weakening of the South African currency (Fitch Ratings, 2021). The President Mr. Ramaphosa warned that South Africa needed to revamp the ailing port system following his visit to the Durban port after serious customer complaints and port traffic congestion due to ICT systems delays (Ramaphosa, 2021)

There are number of factors that made it difficult for workers to commute to work and caused business disruptions in that the Durban. This includes political unrest, protests, looting, burning of property and violence that occurred in the Province of KwaZulu-Natal (KZN) in South Africa in

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July 2021, (Masuku et al., 2023). There is this undeniable fact that the developments resulted in colossal socio-economic damage countrywide wreaking havoc on people's lives and livelihoods, but also the valuable lessons for business continuity strategies, sustainable future prevention, in South Africa, (Mongale, 2022).

The need to continue work and avoid business disruptions was further compounded by the 2022 floods that hit much of the KwaZulu Natal Region, destroying business, displacing families and villagers. This has been one of the most catastrophic natural disaster yet recorded in KwaZulu-Natal (KZN) in collective terms of lives and revenue lost, homes, equipment and infrastructure damaged and economic impact, and workers were unable to come out of their houses to report at the work sites, (Grab & Nash, 2023).

There have been sporadic service delivery protests characterised with vandalistic protests and violent attacks on persons, distraction of property, infrastructure and buildings making it further difficulty for workers to commute to work, making it imperative to seek alternative work arrangements (Chiwarawara, 2023). It has been estimated that there were 122 service delivery protests in the first half of 2023 alone, (Opinion, 2023).

1.3 FOCUS OF THE STUDY

The Covid-19 pandemic triggered emergency of other cultures and forced new habits in society such as wearing of masks, elbow greetings, social distancing, restricted room and indoor capacities, new ways of greetings, and more importantly new approaches to engaging in office spaces such as Remote Working. The corona virus brought about a turning point in the history of mankind, with the 'introduction of new categories for social groups based on such criteria as health, profession, or attitude to the pandemic and socially responsible behaviour' (Alyeksyeyeva et al., 2020; pp.202-212). Covid-19 generated full-time Remote Working environments especially in many information technologies sectors globally (Yang et al., 2021). Hence, the pandemic had a major unintended effect for companies transitioning to Remote Working. This sudden shift to Remote Working from home produced transformational changes that produced long-term implications (Mark et al., 2022). This then meant organisations had to become more proactive to develop and implement strategies to transition workers swiftly from the office to home spaces.

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Experts such as Phillips (2021), also predicted that the Covid-19 pandemic may become endemic, and may not be the last crisis; hence, people and organisations must adjust their lives to circumvent such phenomena.

This study explores the efficacy of Digital Technology Solutions and ICT tools such as collaborative office 360, Microsoft Teams, Zoom, Access Point Name (APN), Azure Virtual Private Networks (VPN), Cloud Technology, Smart Technology, Internet of Things (IOT), amongst others, to promote the adoption of ICT to facilitate operations, performance, measuring, monitoring and accessing the efficacy of employees working from home at the Durban Container Terminal (DCT). Specifically, the study sought to explore how Transnet Port Terminals (TPT), Durban Containers Terminals can sustainably continue to operate and maintain operations without closing down or shutting down operations, avoiding retrenchments, maintaining production, retaining and at the same time improving customer satisfaction, and providing effective service delivery via ICT and digital platforms for both internal and external parties to collaborate and share information and knowledge during and post pandemic crises.

1.4 STATEMENT OF THE PROBLEM

The objective of a problem statement is for the researcher to think beyond his/her own interest and at the same time covering the concerns of a broader audience, (Pecher, Chu & Byrd, 2020). Covid-19, severely disrupted the lives of people who turned for urgent assistance from by their various Governments. Governments has the moral obligation to protect the nation and livelihood of the communities, through various strategic measures, (Hamza & Jarboui, 2022). Regulations which were stipulated by legislation equally affected livelihoods and workplaces since businesses had to create safe and health-conscious workplaces, protect workers from mental and physical harm, and generally maintain the well-being of the workforce. People were losing life and survivors could no longer go out to fend for their families. Since employees are considered the lifeblood and most valuable assets of the organisation, Villanueva (2020), it is crucial to protect them to ensure business continuity, sustainability, and profitability. However, organisations have a legal obligation to respond to Covid-19 health protocols as per Government legislation, and thus need

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to work within the parameters that balance work productivity and health restrictions (George & George, 2020).

Reporting on the 2020 half-year performance report, Transnet SOC Ltd revealed how the organisation was heavily impacted due to the phased lockdowns necessitated by the Covid-19 protocols stating that:

> Lower demand in rail, container, and petroleum volumes, on the back of limited economic activity, saw a decrease in Transnet revenue for the year ended 30 September 2020. For the period under review, the company reported R32,0 billion in revenue, down 17,3% when compared to the same period in the previous year (Ayanda, 2020:1).

Several other studies were conducted on port operations in South Africa (Durban and Richards Bay) and Mozambique (Maputo) over the past years by researchers such as Karuga (2016)), in his research he focused on sustainable enterprises assisting in creating decent and productive jobs, the effectiveness of management strategies, availability and use of resources, and the impact of absenteeism. Other studies examined the impact of governance on the performance of the Durban Port (Mokone, 2016). Recently Moszyk, K. and Deja, M., (2023) examined the reduction of exceeding the guaranteed service time for external trucks at the DCT, they also attempted to identify constraints which limit the annual container throughput, and to provide solutions to increase the annual container throughput capacity for the DCT using a Lean six-sigma framework. Patel as cited by Misra (2021) in his studies entitled addressing the innovation lag of port congestion in Durban, South Africa, investigated in opportunities for private sector involvement in the container market industry in the Port of Durban which covered the public-vs-private interface in the South African port system, the role that Transnet plays in the freight logistics system of South Africa, and the importance of private operators currently in the Port of Durban with respect to containerised logistics.

While Cele (2018) investigated customer perceptions of service delivery at Transnet Port Terminal, Pier 2, this study focused on the adoption of ICT technology in the face of the challenges precipitated by the Covid-19 pandemic and possible other crises. In recent times, there were alleged cyber-attacks, rail derailments, strikes, and other unforeseen circumstances that forced

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Transnet to declare a drop in revenue and earnings (News24Wire, 2021). In such a crisis there is an urgency for organisation to reinvent and invest in ICT cyber-security (Claassen, 2021). Denys (2021) of the Institute for Security Studies (ISS) reports that cyber-attacks exposed the vulnerability of South Africa's ports. Since the beginning of the pandemic which resulted in the work-from-home practice, the number of cyber-attacks has been increasing worldwide; and South Africa as a country was not spared in incurring enormous financial losses across the logistics, manufacturing, banking, and energy sectors. Denys (2021) alludes to the fact that attacks on critical infrastructure, including ports, are likely to increase in severity and number. This calls for increased ICT usage, and the awareness of vulnerabilities in the present system.

These challenges and the devastating effects of the Covid-19 pandemic clearly indicate that there is a gap in research with regards to adopting fully functional Information Communication Technology (ICT) digital solution systems to foster and facilitate Remote Working. This research investigated the approach in which DCT adopted ICT to enable achieve smooth transition to Remote Work during and after the pandemic. This research included some of the difficulties faced by the organisation, strategies for dealing with such hurdles, and suggested recommendations. Current developments in ICT engenders a positive impact on the productivity of employees working remotely by improving and sustaining performance to enhance employee motivation. The study examined the adoption of such collaborative and communication digital technology tools including Cloud applications, Ms Teams, groupware, instant messaging, and web-based conferencing (Martin et al., 2022) at Durban container terminals.

1.5 PURPOSE OF THE STUDY

Globally, ports compare their productivity with each other's, which results in pressure, inter-port competition, market commonality, and the desire to perform effectively; and due to rivalry, ports tend to enter each other's market segments (Kola, and Abbas., 2020). Ports have been susceptible to natural disasters; hence, such occurrences should encourage port adaptation (Verschuur et al., 2022). Globally, recent studies including China and Chile indicate that the marine industry is transforming towards international cooperation, that speak to the impact of performance evaluation, opportunities, and the risks that ports experience (Zarzuelo et al., 2020). Since all South

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African ports were affected by these international developments which were exacerbated by the devastating effects of the pandemic, it became imperative for the Durban Container Terminal to collaboratively craft and implement sustainable strategies to compete regionally and internationally to deliver cutting-edge service.

South Africa, as a member of the Southern African Community Development (SADC), has a duty to contribute to peace, security, and economic development. One of the objectives of SADC is the development of a regional freight transport network system, particularly the Short Sea Shipping in the African context (Konstantinus et al., 2019). Moreover, South Africa is geared towards boosting economic development through the "Blue Economy" specifically investment attraction, stimulating growth, and expanded the development of the marine and coastal areas popularly known as Operation Phakisa (Rogerson & Rogerson, 2019). While there were Covid-19 variants such as the Omicron, Durban Container Terminal (DCT) had to further strategise to evolve towards familiarising their workers to work effectively from home (Callaway & Ledford, 2021).

As stated earlier, the purpose of this study was to investigate the adoption and sustained use of Information Communication Technology (ICT) solutions to support Remote Work during and post-Covid-19 pandemic periods at Durban Container Terminals. Further, the study assessed variables that support quality employee contribution to the performance of the organisation, as well as to strengthen management supervisory capacity to implement ICT strategies on collaborative digital platforms.

1.6 AIM AND OBJECTIVES

The **aim** of this study was to investigate the adoption of Information Communication Technology at the Durban Container Terminal to facilitate effective Remote Working.

The research **objectives** included:

- To investigate the adoption of Information Communication Technology (ICT) to enable remote work at DCT;
- To determine to what extent the utilisation of ICT tools is influenced by the availability of resources;

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- To identify available support systems for remote workers that promote the use of ICT tools; and
- To assess digital innovative management solutions for monitoring employees working off-site.

1.7 RESEARCH QUESTIONS

1.7.1 Main Research Question

- How can the Durban Container Terminal (DCT) promote the adoption of Information Communication Technology (ICT) for effective Remote Work?

1.7.2 Subsidiary Questions

- How does the availability of resources influence the adoption of ICT tools at DCT?
- What support systems are available for remote workers to use ICT tools effectively?
- What digital innovative management solutions are available to monitor employees working off-site?

1.8 RATIONALE FOR THE STUDY

The suddenness, rapidness and the concomitant spread of the COVID-19 virus found many organisations in a state of unpreparedness, Vaccaro et al., (2020) South Africa and the Durban Container Terminal were not spared. There was need to find ways of dealing and responding to the pandemic. Although there were earlier studies on Transnet in general concerning opportunities for private sector involvement in the container market industry in the Port of Durban (Patel 2015), including the addressing the innovation lag of port congestion in Durban (Misra, 2021) and customer perceptions of service delivery at Transnet Port Terminal, Pier 2 (Cele 2018), these were not conducted in a health crisis such as the Covid-19. Before the pandemic, Mukomana (2015), conducted a study on the implementation of *Intelliport* at DCT, did not specifically focus on the opportunities in ICT digital solutions, and the merits of remote work at Durban Container Terminals in a natural disaster situation. This study attempted to fill the gap in scholarly research in the field of ICT and its promotion and enhancement of Remote Work during the Covid-19 pandemic and the post-pandemic period.

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According to the New Global Container Port Performance Index (CPPI) launched by the World Bank and IHS Markit (Kapoor, 2021), the pandemic enlightened all role-players on the critical role that ports play in the global economy. This report was based on different methodological approaches; in terms of the administrative approach which considered the knowledge of experts, Durban Container Terminal (DCT) ranked the lowest at number 351, Marseille at 350, Ngqura at 349, Gqerberha at 348, and Cape Town at 347, (CPPI, 2021). Although there is no consensus on the CPPI report, this is a worrying development which warrants research of this nature to be conducted at an academic level. The new knowledge derived from the findings of this study is expected to boost the performance of DCT, especially in times of crisis when remote workers are at the centre stage.

1.9 DELIMITATION OF THE STUDY

Although Transnet Port Terminals' operations stretches from the North ports of Richards Bay to the East and Western Cape Coasts, popularly known as the Cape Channel, this study was confined to the Durban Container Terminal (DCT), specifically at Pier 1 and Pier 2. Theofanidis and Fountouki (2018) recognised the fact that every research carries some inherent delimitations regarding underlying theories, study design, replication potential, shortcomings in data collection, interview or questionnaire design, insufficient subgroups, narrow time-span for data collection, restrictions regarding data access, seasonal differences, causal relationships, population or sample error, data analysis, and errors in analysis.

The research data was collected from participants within Durban Container Terminals. The customers' perceptions captured in the study were incidental to the development of sub-themes within the data collection space. Due to the nature and fast-paced development of ICT, this research also relied on recent literature. Information Communication Technology (ICT) keeps involving which in itself was considered in the study, at the conclusion of this research new applications such as ChatGPT, were playing some critical roles in public health and other areas. Similarly further limitation of Mainframe Computers with Interactive Users is no more a hinderance, these have been replaced with portable personal computers and laptops which utilise

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Graphical User Interface [GUI], O'Regan, (2021), and use of Cloud Computing, Fu, Liu, Chao, Bhargava & Zhang, (2018) was considered in this study as an opportunity in this study.

Since this study was conducted during the pandemic to investigate adoption of ICT solutions in Remote Work, the challenges at the various levels of lockdown made it difficult regarding freedom of movement for both the researcher and the respondents, thereby prolonging the period of the study under a constant changing environment. Other researchers are encouraged to conduct in-depth studies involving large numbers and covering many locations to enable generalisability of results. Much of the work on this study was conducted in a period of restrictions and limitations that may have affected the validity and reliability of the results.

1.10 LIMITATIONS OF THE STUDY

The study faced several limitations. First, the organisation was facing a massive workers' strike due to unresolved wage negotiations with Transnet. The Bargaining Unit Employees and Transnet reached a deadlock at the time the researcher was conducting research interviews, thus most workers were reluctant to be interviewed. Secondly, the pandemic itself hindered access and free movement of people in and around the port. Thirdly, this study was conducted in a limited area (Durban), whilst Transnet operates along the coastline from Richards Bay to the Cape Channel. Lastly, ports compete regionally and globally, thus they tap into each other's market segments, which makes generalisation among ports difficult.

1.11 LAYOUT OF CHAPTERS

Chapter One provided the research background, aim and objectives, significance of the study, and the limitations and delimitations of the study. Definitions of terms are also explained here for the readers to gain an understanding of their meanings as used in the study.

Chapter Two presented the review of theoretical literature regarding digital opportunities of Communication and Technology (ICT) on facilitating Remote Work at Transnet Port Terminals in Durban. The review of literature on each of the research objectives and research questions

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explored the variables of relevant models, the theoretical frameworks, and unpacks the proposed conceptual framework for the study.

Chapter Three dealt with the methodology employed in the study, the research design, population, sampling, data collection instruments, the interview schedule, validity and reliability of the study, and ethical considerations. This chapter also mentioned the piloting of the interview protocol that was used in the research and data collection since piloting assisted in refining the schedule of possible questions.

Chapter Four discussed the results and the findings of the study. Data collected was presented in different forms such as tables, graphics, and descriptive formats to the readers. It presented the results of the study as evidenced by the responses that were elicited from the respondents during the interviews. The results were discussed according to the objectives and questions as per the coded emerging themes. Responses were coded and inserted in different relevant tables per objective. Individual perspectives and experiences were discussed in detail in line with the literature review.

Chapter Five discussed the analysis and interpretation of the results. The chapter explained the answers to the research questions. Conclusions and recommendations were outlined based on each objective.

Chapter Six concluded the study by providing conclusions, recommendations, and the implications of the study. It also outlines the direction and suggestions for further studies. The objective of this chapter was to present a summary of the findings of this study. This chapter also presented the contributions of the study in both theory and practice to the body of knowledge.

1.12 CHAPTER SUMMARY

This chapter presented the introduction to the subject of the adoption of ICT solutions to enable remote work at DCT in Durban. It outlined the background, purpose of the study, research aim and objectives, and the research questions. Justification for the study, and delimitations and the limitations of the study were presented in this chapter. The chapter concluded with an explanation of the terms used in the research as well as a chapter layout. The next chapter (2) dealt with the literature review.

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CHAPTER 2:

REMOTE WORKING INFORMATION COMMUNICATION TECHNOLOGIES

2.1 INTRODUCTION

This chapter presents the theoretical and conceptual framework, review of theoretical literature regarding digital opportunities of Communication and Technology (ICT) on facilitating Remote Work at Transnet Port Terminals in Durban. The review of literature on each of the research objectives and research questions explored the variables of relevant models, the theoretical frameworks, and unpacks the proposed conceptual framework for the study. Literature relevant for the purpose and objectives of this study was reviewed to support data in this research, to determine the gaps in the body of knowledge that the research intended to fill, and identify areas for further research. The researcher focused on theories underpinning the study, and literature that seek to provide answers to research questions. The review of literature was aligned to the objectives of the study; this literature is matched to each objective of the study as indicated hereunder:

2.2 REVIEW OF LITERATURE

One of the consequences of the global Covid-19 pandemic has been a trichotomising of the workforce in Europe, (Countouris, 2023). During the middle of 2022, proponents of Return to Office (RTO) policies such as Tesla Incorporated, Chief Executive Officer (CEO) Elon Musk, the world's richest man was already demanding at least 40 hours a week in office. However, employees at numerous companies, used to working from home or hybrid policies, have revolted against "RTO" policies and long commutes. It has been reported that thousands of Tesla staff in Shanghai have been effectively locked in for months, working 12-hour shifts, six days a week. Until recently, many were sleeping on the factory floor as part of a closed-loop system meant to keep Covid out and cars rolling off the production line, (Nicholas & Hull, 2022). This effectively calls for enablers for Remote Work during and after the pandemic such as ICT tools and other

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digital applications. It is not yet known whether the Covid-19 pandemic was or could be the last pandemic, organisation need to be well prepared and have contingencies in place should such a pandemic re-occur.

Insights from the European Union (EU) and abroad suggests that people decided to keep working remotely even after the Covid-19 restrictions were cancelled, studies continued to explore the remote working phenomenon as described in European countries and the United States of America (USA), and its effects on workers' wellbeing, workplaces, cities, periphery and rural areas, most of these studies shows that remote working affects coworking and hybrid spaces' future, (Akhavan et al.,2023). In the face of the pandemic digitalisation of work has enabled flexible working, leading to a broader shift from full-time office hours to part-time, casual working, bringing spatial and temporal boundaries between the living and working spaces are blurred in the context of digital work, flexible working spaces (FWSs), that is new working spaces (NWSs) most popular being the coworking model, (Hölzel et al., 2023). Marcus, J.S. (2023), noted that the COVID-19 has accelerated the shift to remote work, enabling knowledge workers to do their jobs from home or elsewhere bringing the benefits by increasing labour participation, avoiding unproductive commuting time (thus reducing the carbon footprint), and the post-pandemic new normal is sure to differ both from the pre-pandemic normal and from current arrangements, everybody needs to adapt to the new normal.

In some other studies conducted in Asia by researchers such as Qu & Yan, (2022), coupled with some evidence from China it was revealed that working from home (WFH) enhances job performance in terms of job quality than working from the office (WFO). The study further found out that WFH provides some level of job control items, such as talking right and work rate, and job demand items, such as a long time of intense concentration and hecticness of the job, are vital factors that contribute to how these differences exert influence on employees' performance in the context of the pandemic, (Qu & Yan, 2022). Evidence from Japan with regards to Work-from-home productivity during the COVID-19 pandemic, shows that the mean WFH productivity relative to working at the usual workplace was about 60%–70%, and it was lower for employees and firms that started WFH practice only after the spread of the COVID-19 pandemic, (Morikawa, 2021). It is important to note that, the observation from the same study shows that highly educated

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and high-wage employees tended to exhibit a small reduction in WFH productivity as opposed to WFO.

There were calls to avoid chaos in the midst of a pandemic in favour of future sustainability in the context of the Covid-19 in Suh Saharan Africa, (Cawthorn et al., 2020). The Covid-19 hit Africa much later than most parts of the world. In Africa most of the systems are considered fragile with low levels of digitalisation, lessons from Tanzania can inform adaptation of digital resources in an unbalanced ecosystem, further different countries involuntarily sought immediate measures for digital platforms and technological systems, (Upor.,2023).

The South African government responded to the pandemic in a decisive manner. Staunton et al. (2020) indicated that in drafting the South Africa (SA) Government's response mechanism to the virus, President Ramaphosa and his cabinet had the opportunity to learn from the experiences of the rest of the World such as Asia, and Europe that focused on social distancing, self-isolation, quarantine, testing, contact tracing and lockdowns. Agarwal and Reed (2021) asserted that the world needed to sufficiently achieve worldwide herd immunity under the baseline with fewer mutations to conclude that the pandemic was over. Presently, the pandemic is generally under control, although it is believed that China's unplanned exit strategy from its Zero Covid-19 policy was a recipe for causing mass hospitalisations and deaths that were preventable (Yang, 2022).

The onset of Covid 19 saw Transnet implementing some of the following measures including the establishment of a Command Centre to serve as a central focus and provide direction on all coronavirus-related matters, placing an embargo on both domestic and international work-related travel, issued various staff communiques to raise the level of awareness and ensure proper education of employees through the Transnet Health and Wellness team, reviewed and updated, Business Continuity Plans (Desk, 2020). Further, under no circumstances TPT were to work on commercial vessel without clearance issued by the Port Health and health clearance granted by Port Health and Transnet National Ports Authority (TNPA).

Since ports are an accelerator of high-quality development, the business continuity of ports is vital for the modern world economy and trade, the COVID-19 outbreak that hit the world, the frequency

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and severity of port congestion caused by various factors are increasing, challenging the stability of international supply chains, and logistics especially within the ports, (Gui et al., 2022). The coronavirus disease of 2019 (COVID-19) pandemic directly affected the shipping industry globally, regionally and at the same time South Africa experienced decreased cargo volumes and increased freight rates, (Grater and Chasomeris 2022).

Due to the chaotic management of the Covid-19 pandemic, organisations and businesses took time to set up sustainable and more stable work arrangement and digitalisation is becoming more formidable, the COVID-19 pandemic brought a wave for an increased need for a hybrid workplace, (Iqbal et al., 2021). Hybridity is, especially in a workspace, combines the presents of physical work arrangement model and the remote work system (Cook et al., 2020). Andrea Alexander, Aaron De Smet, and Mihir Mysore, (2020), noted that many companies due to the Covid-19 pandemic did plan for a new combination of remote and on-site working, a hybrid virtual model in which some employees are on premises, while others work from home. The new model promises greater access to talent, increased productivity for individuals and small teams, lower costs, more individual flexibility, and improved employee experiences.

2.2.1 The adoption of ICT to enable remote work at DCT.

Information and Communication Technologies (ICT) has become an enabler for remote work in business to "provide economic value" (Laudon & Laundon, 2012: 56). This section elaborated on the importance of adopting ICT-based solutions and how Covid-19 showed the world that work can be effectively conducted remotely.

In this study it was imperative to explore the challenges that can be paused due to working in remote sites and geographical dispersed areas especially in terms of human resource management, command of control, supervision and communication. Most of these challenges can be resolved through the use of ICT and digital technologies. Fuchs & Reichel, (2023), noted that due to the increasing numbers of employees working remotely, Advanced Communication Technologies (ACTs) are crucial for enabling the communication necessary for relational coordination. This was observed especially with users whose jobs are characterized with high levels of task variety,

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autonomy, creative problem solving, and interdependence across teams. Lack of effective digital technologies for communication, limits interactions in a remote work setting, resulting in a lower likelihood of effective performance and communication, Wang et al., (2020), thereby affecting coordination among teams and productivity.

A lack of effective ICT can make remote work impossible. Innovations in information and computer-mediated communication (CMC) technologies support remote work and make it possible, resulting in more companies adhere to ICT, (Popovici and Popovici, 2020). Further Popovici observed this as a true revolution in the way people work and its practicalities, stemming from the assumption that remote work can guarantee a win-win situation for employers and employees. Popovici and Popovici, (2020) further examined the ingredients necessary for a successful implementation of remote work system and the psychological impact of remote work on employees. They also proffered strategies to mitigate its proven risks, challenges and enhance the benefits it can still foster within organizations.

Recent research noted that Information and communication technologies (ICT) may increase people's freedom to decide when, where, and how they wish to work and travel. Tropea and De Rango (2020) provided insights on the importance of migrating to new ways of learning, working, and living based on ICT technologies. In another study, Wairiuko and Ndiritu (2021) supports the notion that human and financial resource availability influences the adoption of ICT in service delivery. Dash and Ansari, (2022) assert that most businesses are influenced by ICT, and continue in using ICT as their operating tool. Additionally, as stated by Hamzah et al., (2022) internet and broadband access are becoming commonplace. Information and Communication Technologies (ICTs) thus represent the fastest, broadest, and deepest technical change experienced in international development. As such, ICT provides promising solutions for managing and operating facilities (Sulaiman et al., 2021)

There has been a lot of research and studies conducted on ICT utilisation. Vergara at el., (2022) conducted an examination of the relationships between ICT adoption factors (technology utilisation, management support, and ICT training) by looking at the size of the firm, the level of which ICT tools can be measured by the availability of internet, intranet, and extranet access in

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the company, and their findings supports the view that resource availability influences the adoption of ICT in an organisation. Furthermore, Signé, (2023), states that the Fourth Industrial Revolution (4IR) is a concept widely discussed within business leadership thereby accelerating the requirement for workforce reskilling, and the adoption of ICT in Remote Work in several organisations.

The world is revolving around digital technology. Cetindamar Kozanoglu & Abedin, (2020) noted that there is need to explore how digital transformation is reshaping existing conceptions of technology adoption in the workplace, adding that "improving on changes in the workplace in attitude and culture, promoting digital literacy, and the establishment of new programmes to facilitate adoption of technology" will accelerate better quality of working from home which requires that employees need to be well conversant with ICT technology to remain in touch with the rest of the team members and line management through applications such as MSW Teams, Zoom and other teleconferencing facilities. Since ICT supports 'Smart Work', it has been described as the mode of work that allows employees the freedom to perform their duties anytime and anywhere (Ko et al., 2018).

The Fourth Industry Revolution has been gaining momentum. Klaus (2018) highlights that the 4IR is much more than just a description of technologically driven change; it must be implemented to drive ICT benefits. Ewan (2019) contends that the ICT within the 4IR context requires corporations to start rethinking strategies and auto cannibalisation of business models. Vagnani (2019:28-31), summarises the adoption and impact of information technology and change on the various types of industries:

> The 4th Industrial Revolution [4IR] refers to dramatic social and economic changes because of an array of technological breakthrough inventions impacting on all industries. It includes technologies such as the Internet of Things (IoT), Robotics, Artificial Intelligence (IA), Augmented Reality and Big Data. It can be described as the revolution of digitisation and cyber-physical systems (CPS) [a mechanism that is controlled or monitored by computer-based algorithms].

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Digital technologies have been implemented in organisation through managerial preferences. Vagnani et al. (2019:6) introduced "a conceptual framework in which the attributes of innovation-adoption decision linkages in organisations are mediated by both the behavioural preferences of managers and organisations' resource availability". Tallon et al. (2019) note that organisations are increasingly turning to information technology (IT) to help them respond to unanticipated environmental threats and opportunities. The advent of Covid-19 pandemic is a serious operation disruption that requires organisations to avail ICT resources to mitigate its effects.

In addition, Robelski and Sommer's (2020) paper entitled *ICT-Enabled Mobile Work* described how ICT enabled mobile work considering institutional and regulative, as well as company-related requirements. In this digital age, ports face stiff competition in terms of global supply chains. Smart high-performing ports utilise ICT to provide a wide range of smart applications, resulting in vastly improved vessels and container management (among others), which subsequently improve the competitiveness and sustainability of the national economy (Yau et al., 2020).

Although Mhlanga and Moloi (2020) sought to assess the influence of the Covid-19 pandemic in motivating digital transformation in education, their conclusions did not fill the gap regarding this research topic which explored the adoption of ICT Solutions in the port operating environment. Ko, Kim and Kim, (2021) add that before the Covid-19 pandemic, Smart Work was considered as one of the options companies had to choose voluntarily to run their business more effectively and efficiently. Aided by advanced information technology infrastructure resources, smart devices became increasingly mobile, portable, and accessible, which allowed more work to be done from anywhere, at any time (Corso et al., 2011; Kim et al., 2018; Mazmanian et al., 2005; Sorensen et al., 2005).

Covid-19 engendered the need to adapt and innovate. Cetindamar Kozanoglu & Abedin, (2020) contend that the digital transformation in the workplace is for everybody, and demands the reshaping of existing conceptions of technology, adding that individuals in the workplace should embrace a learning mentality to proactively identify, adopt, utilise technology, and evolve. Similarly, Friedman, (2020) claims that once the pace of change accelerates, the only way to get lifelong working capacity is to engage in lifelong learning. Tim (2021), in his study *Transitioning*

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to Remote Work in Times of Crisis, emphasised the achieving of results under extraordinary pandemics. The Information Resources Management Association (2021: 22 found that:

> [The] application of remote work has recently skyrocketed, digital transformation within the workplace has gone under a microscope, and it has become abundantly clear that the incorporation of new technologies in the workplace is the future of business. These technologies keep businesses up- to-date with their capabilities to perform remote work and make processes more efficient and effective than ever before.

The Covid-19 pandemic saw the intensified worldwide implementation of working from home practice (Prodanova & Kocarev, 2021). The Durban Container Terminal was not spared and had to be forced to implement the *Work from Home* policy in some of its core functions.

The Covid-19 pandemic produced fluctuations in global trends as port terminals leveraged on technologies such as digitisation, enabling regional volumes to rebound at the end of 2020 due to crane and gate automation, and the digital twin (Zhou et al., 2022). Another phenomenon that caught the attention of the world internationally was the adoption of Smart Ports. A Smart Port is one that utilises automation and innovative technologies such Artificial Intelligence (AI), Big Data, Internet of Things and Blockchain to improve its performance (Donnelly, 2021). Ports are evolving to embrace ICT (De la Peña Zarzuelo et al., 2020) anchoring on Autonomous Robots and Systems, IoT, Cybersecurity, Cloud Computing, Augmented Reality (AR), and the Big Data. The need for digital transformation is more urgent as ships are bigger and goods are moving faster. The industry acknowledged that the uptake of digital technology accelerated after Covid-19. The marine industry is seeking higher efficiencies, better resource management, and transforming the industry through the Industry 4.0 and the Digital Twin, which represents the physical system, data, production, and other systems (Jorgen-Berre et al., 2019). The Port of Antwerp and Esberg are already leveraging on Digital Twin data visualisation platforms to identify, monitor and analyse emission.

This study examined possibilities, options, and prospects that organisations could embrace to adopt ICT to support Remote Work in response to the Covid-19 pandemic.

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2.2.2 Adoption of ICT tools and the availability of resources

In recent decades, ICT implementations and migrations are often marked by huge costs which is a challenge for developing economies in the era of digital transformation, (Çakır et al., 2022). This section explains the influence of the availability of resources on ICT adoption in terms of capital outlay requirements, maintenance, and the return of investments (ROI) on ICT implementations. The resource input variables are categorised into factors for success (drivers and enablers of ICT) and factors for failure (barriers and inhibitors). Some of the typical limitations for ICT adoption were identified as the availability of technology and infrastructure (Thashmee et al., 2018).

The lack of resources and the impact for Information Communication technology opportunities needs a deep dive understanding remote work phenomena that has spread across the globe. Using on the job demands–resources (JD-R) model, De Carlo et al., (2022), looked at whether smart working affects the longitudinal association between perceived work characteristics, such as workload and social support (SS), workers' health and well-being, in terms of exhaustion. They came to a conclusion that organisations need to promote sustainable work, through interventions aimed at assisting remote workers to manage their workload effectively, as well as reducing professional stress and social isolation.

Persistent public protests and COVID-19 pandemic has been seen as ''catalyst for the adoption and increasing use of digitalization in work organization and the office, alongside presenting foreseen and unforeseen opportunities, challenges, and costs. Covid-19 actually accelerated and fast-tracked global trend towards embracing modern emerging technologies ushering in transformations in lifestyle, work patterns, and business strategies''. (Amankwah-Amoah et al., 2021, pp. 602–611). Odongo, J., Sang, P. (2023) in their research concluded that Information and Communication Technology (ICT) projects and their relevance are spreading rapidly in government-owned institutions globally

Contrastingly, Shouki (2018) claims that the availability of resources was not among the influential factors inhibiting ICT adoption, instead he found that management or other organisational factors such as the lack of planning, resistance to change, misunderstanding user requirements,

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government regulations, poor business process reengineering, and lack of training were key indicators that influenced ICT project failures. Kniffin et al. (2020) provided an integrative approach for considering the implications of Covid-19 for remote work and organisations while also identifying resource availability issues for future research and insights to inform ICT solutions. Accordingly, the adoption of ICT for Remote Work accelerates the usage of ICT and enhances performance (Bae & Chang, 2020). Despite all these advantages, the lack of resources can affect the adoption of ICT (Munje & Jita, 2020).

Lack of or the availability of resource might affect changes in an organisation, Faraji et al. (2022) and Crawford (2021) note that resources are components that are necessary for successful project implementation. Group resources include human capital, assets or equipment, money, time (scope), and knowledge. A resource is anything that is needed to execute a task or project; this can be the skill sets of employees in utilising ICT software. A lack of resources is therefore a serious constraint on the successful implementation and completion of the ICT projects.

In the project management domain, PMI (2021:186) describes:

> [R]esource management as a part of project management that is all about doing more with less. Nobody likes waste, especially in business. Resource management is centred [on] optimisation and efficiency. When you know what you need to make a project successful, you can effectively understand how to plan resources in an efficient way.

Careful allocation and management of resources is need in an organisation, Hansen (2022: 3) states that “optimum efficiency is so important that organisations hire a solely devoted resource management person, also known as a Resource Manager, responsible for creating and assigning tasks to get the project done, and accountable for allocating the resources needed to make the project a success”.

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Some of the advantages of resource management are listed below (Hansen, 2022: 4)

- **Avoids unforeseen hiccups**

By understanding the required resources upfront, and planning how to use them, one can troubleshoot gaps or problems before they happen.

- **Prevents burnout**

Effective resource management allows management to avoid ‘over-allocation’ or ‘dependency’ of resources by gaining insight into the team’s workload.

- **Provides a safety net**

Sometimes a project fails due to the lack of resources. Resource planning and leadership establish that management did everything it could with what it had.

- **Builds transparency**

Other teams can gain visibility into the other team’s bandwidth, and thus plan accordingly if the team is at maximum capacity or available to take on new projects.

- **Measures efficiency**

With a high-level understanding of what’s needed to manage and execute an upcoming project, one can effectively plan and measure ROI and utilisation vs efficiency.

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There is need to become innovative and implement sustainable project management in organisation change. (Masyhuri, 2022:6) presented "empirical evidence from research on how companies' developing products reconfigure their resources (reference to human resources) as changes continuously occur to their new product development (NPD) portfolios''. There is need for increamental resource planning, see figure 2.1 below:

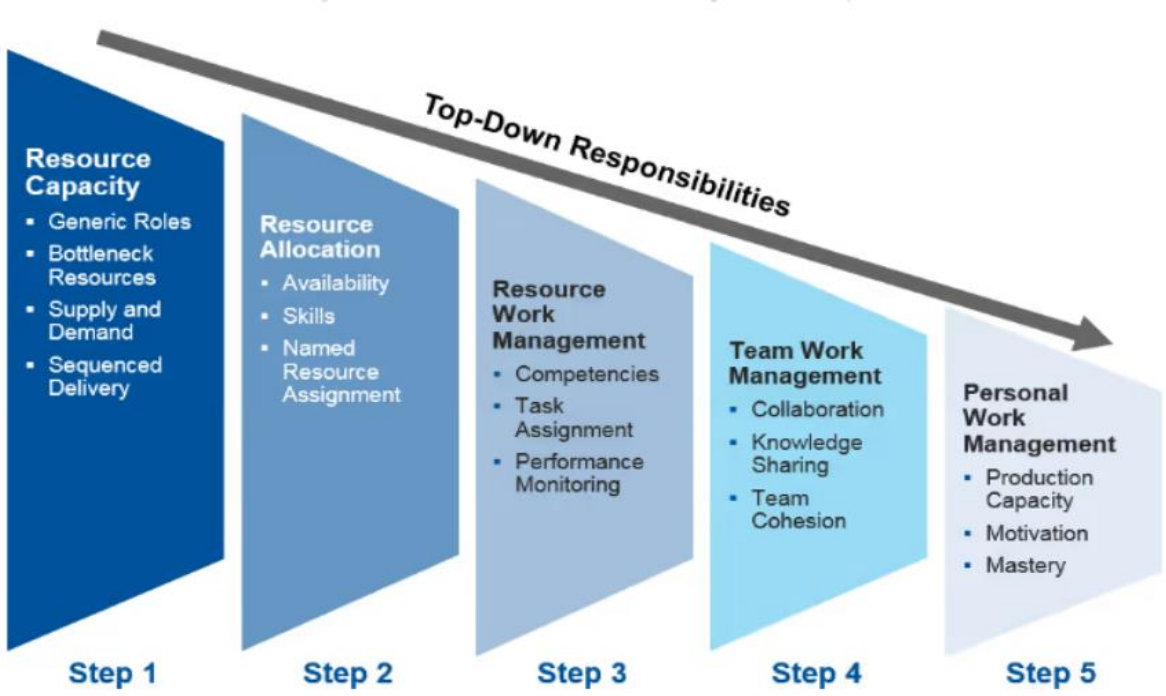

Figure 2. 1:Resource Planning Responsibilities (Gartner Consulting Group, 2020)

There is need to become innovative and implement sustainable project management in organisation change. (Masyhuri, 2022:6) presented "empirical evidence from research on how companies' developing products reconfigure their resources (reference to human resources) as changes continuously occur to their new product development (NPD) portfolios''. Abrantes and Figueiredo (2015) focused on an innovative trend, a new paradigm, and sustainable project management to drive sustainability within project management processes, but this trend is developing at different rates. To understand the influence of resources on maintaining sustainable ICT implementation and adoption, we need a structured framework. Armenia et al. (2019) identified five dimensions: corporate policies and practices, resource management, life-cycle

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orientation, stakeholders' engagement, and organisational learning as depicted in Figure 2.2 below:

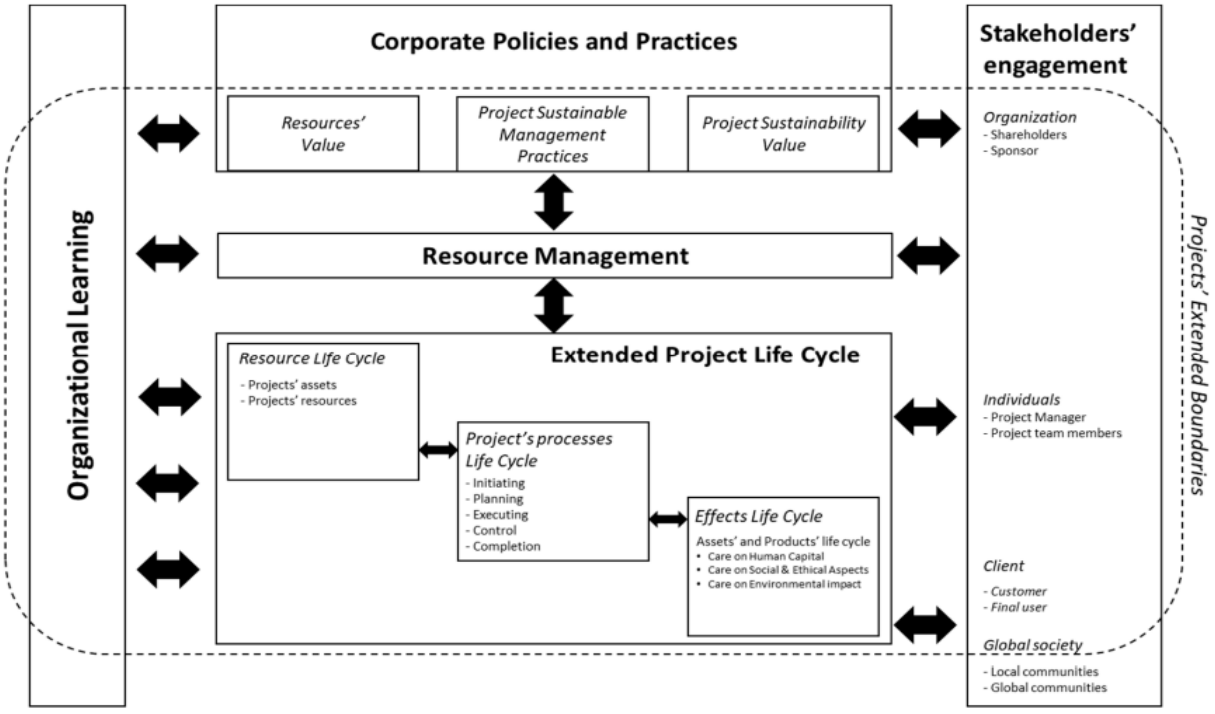

Figure 2. 2: Dimensions of Resource Management (Armenia et al., 2019)

The organisation needs to have a culture of change, and freeze the change to be part of it, Moshood et al. (2020) submitted that the ICT adoption process is considered as an interaction between technology, task, and an individual; and users should be able to embrace the technology in the long term. Sun (2021: pp13,27) observes that ICT is evolving and impacting on business models, thus transforming the working environment, adding that:

> As information and communications technology (ICT) continues to evolve by changing the incumbent business models and industry ecosystems, the digital economy is transforming the way we live and work. [These include] the remote control of heavy machinery in the industrial field as ICT infrastructure is required for digital transformation.

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Fast paced digital developments are considered as some of the main influencing factors of employee health and work stress (Burman and Goswami, 2018). Employees' health or lack of it can be a cost to the organization, and might affect performance, ineffective management of chronic work stress might cause burnout (WHO, 2019). Digital Technologies and ICTs have become even more important, as many employees were required to work from home with the onset of the COVID-19 pandemic, Wang et al., (2021), Carnevale and Hatak, (2020), through technology. People and workers were forced into a virtual sphere, and it was through the use of ICTs that employees and firms to stay connected (Kniffin et al., 2021). It's important to consider advancement of scientific insight into ICT demands and resources as well as employee burnout and the effects of ICT in stress-creating and stress-reducing mechanisms, (Ninaus et al., 2021).

The International Labour Organisation (ILO) (2021) estimates that nearly 18% of workers have occupations suitable for home-based work- and also live-in countries that have the infrastructure to enable home-based work. The spread of the Covid19 pandemic, Sokolic, D. (2022), forced organisations to rethink eliminating physical spaces leading to the creation of virtual organizations. Decision makers are beginning to consider and implement hybrid work models.

The usefulness of Information and Communication Technology also came to a spotlight in the recruitment and selection of employees amid the COVID-19 pandemic. Information and Communication Technology is shaping online recruitment beyond the pandemic, (Jalagat & Aquino, 2022). Despite widespread shifts to remote and hybrid work during the COVID-19 lockdown, there are glaring changing job conditions to the extent that there is need for consensus that remote and hybrid work are a disrupter or accentuator of existing practice, norms and inequalities, (Fan & Moen, 2023).

2.2.3 The support available for remote workers to use ICT efficiently.

Research reveals that "organizations have a duty to help their workforce cope with and adjust to their newly altered work environment (Carnevale & Hatak, 2020). Supervisors must play a role to

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perform the important function of linking the strategic vision of top management to the workforce, (Spagnoli, Manuti, Buono & Ghislieri, 2021). The pandemic forced most workers to be 'locked' at home, unable to commute. Carroll and Conboy (2020:86) claim that the pandemic had massive implications for the nature of work and the role technology plays in the workplace. Accordingly, organisations have been forced into the rapid 'big bang' introduction of technology and 'tech-driven' practices in an unprecedented and time-pressured manner. In many cases, there was little training on how to utilise ICT to adapt to the new workplace context.

Working from home during covid-19 need to be viewed from the point of view of family life. Galanti et al., (2021: p3) observed in their study that 'employees' family-work conflict and social isolation were negatively related, while self-leadership and autonomy were positively related, to WFH productivity and WFH engagement and that family-work conflict and social isolation were negatively related to WFH stress, which was not affected by autonomy and self-leadership'.

With regards to the challenges faced by the Remote Worker, Wang, Liu, Qian and Parker, (2020) conducted investigations on the challenges experienced by Remote Workers in the context of extraordinary pandemics and found that Remote Workers face interference, ineffective communication, procrastination, and loneliness, exacerbated by issues of the lack of social support, job-autonomy, monitoring, and burdensome workloads. However, "there has been little work in examining the challenges faced by virtual teams and their use of technology to mitigate Remote Work issues" (Morrison-Smith & Ruiz, 2020:2). Workers working individually are isolated in their Remote Work environment, hence there is need to support them both physically and emotionally. It is important to provide guidance, upskilling, and training in the use of ICT tools so that they become effective, and thus improve on productivity and performance. However, Remote Workers face isolation and social delineation. A study to gain a deeper understanding of the association between remote e-working among workers and the five dimensions of well-being at work (affective, cognitive, social, professional, and psychosomatic) was conducted which found that "social and professional isolation, and perceived threats in professional advancement" were evident (Charalampous et al., 2019: 51-73).

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Further, Rudnicka, Newbold, Cook, Cecchinato, Gould and Cox (2020) conducted their research on policy implications for supporting neophyte Remote Workers when managing digital self-control, productivity, and work-life balance during and beyond the Covid-19 pandemic, and found that there was need for awareness of paradigm shifts to enable both individuals and organisations to proactively adapt to a rapidly changing business environment (Howe, Chauhan, Soderberg & Buckley, 2021). Job losses was one negative impact and a cause of concern for Remote Workers that would require emotional support. Unskilled women have borne the brunt of the impact concerning retrenchment (Jacks, 2021). There are also positive aspects of Remote Work associated with technology use – its implementation, utilisation, and integration have increased dramatically since the onset of the pandemic due to business demands for higher agility and flexibility (Elragal, Haddara & Hustad, 2020).

Additionally, Remote Workers were impacted by recent ICT developments such as Artificial Intelligence (AI), Deep Learning (DL), Machine Learning (ML), Industry 4.0 and cyber-attacks which required a support mechanism to minimise the short- and long-term negative effects. Krishnamoorthy & Rajeev, (2018) provide a comprehensive presentation of artificial intelligence (AI) methodologies and tools valuable for solving a wide spectrum of problems.

The speed of the Internet in promoting remote work need to be mentioned here, Vagnani, Gatti and Proietti, (2019) in their primary empirical studies introduced conceptual frameworks in which the attributes of innovation-adoption decision linkages in organizations are mediated by both the behavioural preferences of managers and organizations' resources and moderated by the innovation life-cycle. The Internet of Things (IoT) illustrates that there be a network of devices capable of acquiring and sharing the information. The Internet of Mobile Things (IoMT) is used to communicate by using inbuilt mobile sensors (Srinivasan et al., 2019). Often, these network devices use internet protocol (IP) to communicate with one another.

Although Munje and Jita, (2020: 263-279) looked at the impact of the lack of ICT resources on teaching and learning, generally "the lack of resources can affect the adoption of ICT in any sector of the economy". Sudden changes in the working environment affected many workers which would require a sustainable support organisational system. Since remote working can affect both

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social interactions and job satisfaction, Bulinska-Stangrecka and Bagienska (2021:) observe that the support leaders can provide their employees with protecting and replenishing their work-related resources to cope with critical work demands, is crucial; these include digitalisation such as working in virtual teams, mobile working, expectations of being constantly available, and the need for support in adapting and learning new digital tools

Companies must simplify the transition to the home office by providing sound job management processes and tools to ensure uninterrupted and productive working output (Prodanova & Kocarev, 2021). Thinyane and Gallo (2021:34) emphasise that organisations should seek to capitalise on the transformative potential of ICTs to facilitate remote monitoring where possible adding that "Digital tools can further support larger and more integrated datasets, empower workers through greater levels of engagement, and help to evaluate outcomes meant to improve working conditions".

Another aspect that could be brought about through the use of ICT is that employers have the opportunity to recruit from anywhere in the world, in search of skilled worker. Sarker, (2020) investigated the potential for ICT-supported working from home arrangements to reshape employment opportunities and highlighted that what needed to be ascertained was will this temporary transition to enable workers to work from home become more permanent, and how will this shape the spatial distribution of employment opportunities. Lessons learned from the impact of Covid-19 showed that there was positive impact on Remote Work in terms of overhead cost reduction, creation of remote working environments, focus on health and safety, improved productivity, and sustainability (Ogunnusi et al., 2021).

However, there is still need to provide a framework to support workers post-pandemic. Agarwal, Mathiyazhagan, Malhotra and Saikouk (2021) sought to align human resource practices and policies with Industry 4.0 in the face of Remote Work environments during and after the advent of the Covid-19 pandemic. Previous studies acknowledged the importance of resilience in enabling individuals to cope and bounce back from crises and unexpected situations like the pandemic. While it is important to build resilience, Ojo, Fawehinmi and Yusliza (2021) applied the Conservation of Resources theory by investigating the job, social, and personal resources in

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stimulating job-engagement amid the Covid-19 pandemic and found that management could strengthen their employees' resilience by providing them with the flexibility to spend quality time with their loved ones while providing adequate support to promote better working conditions.

Additionally, Savolainen et al. (2021:1) found that "Perceived loneliness, psychological distress, technostress, and neuroticism were identified as robust psychological predictors of Covid-19 anxiety". Hence, employees working remotely require organisational support. Also, it was found that remote e-working has a significant and positive effect on flow levels or active engagement of employees who care for the survival of their companies. However, technostress and loneliness limit this relationship between remote e-working and flow, but technostress experienced by employees can be decreased with flexible remote working arrangements provided by companies (Taser et al., 2022).

There is also need to consider the social aspects of employees, Limburg and Jackson, (2022) explored links between the management of remote workers and dispersed teams, and the use of information systems (IS) which led to developing a framework to evaluate IS potential to support remote control through workflow management systems (WfMSs) for Remote Workers to be productive and efficient. Moreover, Vyas (2022:2) speaks to the "New Normal" at work in a post-Covid-19 world including work-life balance after noting that the Covid-19 pandemic triggered a series of flexible work arrangements. These inculcated new dimensions of employer-employee relations to achieve a Work-life Balance (WLB).

Additionally, Newman and Ford (2021:2) formulated five steps for leaders to follow on how to maximise the effectiveness of a remote workplace which required "taking specific actions and ensuring the organisation has a culture to support their virtual workforce so that leaders could improve the performance output and engagement of their teams". The five steps are:

- first, establish and explain the new reality;
- second, establish and maintain a culture of trust;
- third, upgrade leadership communication tools and techniques to better inform virtual employees;
- fourth, encourage shared leadership among team members; and

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- fifth, to create and periodically perform alignment audits to ensure virtual employees are aligned with the organisation's cultural values including its commitment to mission' (Newman & Ford, 2021:9).

Lastly, the organisation requires access to financial resources to acquire and implement new ICT resources including the internet, data, laptops and other mobile devices to promote the adoption of ICT within Durban Container Terminals.

The Covid-19 pandemic the whole world dependant on ICT. Cakula & Pratt, (2021) indicated that the world in getting dependent on information communication Technology (ICT) and digital technologies in the performance of work duties, the delivery and receipt of services and mutual communication. Different business entities developed techniques to deliver and bring services to the customer's doorstep. It became imperative to find effective communication in digital workplace model that includes factors for effective communication in forced distancing conditions, (Rahim et al., 2021). They also stated that "companies are working to develop individual smart assistants (so-called digital twins) that can open up unprecedented business and collaboration opportunities'' Cakula & Pratt, 2021: p2).

Models of remote work calls for a look at the human resources, the job design and specifications of the job including, job demands and the anatomy of the job, and use technology for work. In return, technology shapes work and people. It's important to understand that information communication technology (ICT) is becoming ever more embedded in today's increasingly digital organizations, the nature of our jobs and employees' work experiences are strongly affected by ICT use, (Wang et al., 2020).

Daily commuting to and from the office result in time wastage and fatigue, skipping a commute has the impact of letting one customize the workday and work longer hours due to the reduced stress levels (Lin & Bao, 2019). Traditionally and even to this day, many individuals and companies have a perception and a belief that office spaces are more productive because the collective energy of having other people around who are working towards the same goal promotes innovation, collaboration, and collision, (Ilag, 2021). Working remotely encourages one design

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own workplace such that they are effective throughout the day without the noise and commotion, interruptions from other workers dropping into one's office space, seeking for impromptu meetings, and gossip sessions (Haapakangas et al., 2018). Ilag, (2021), observed that employees are advocating for working remotely, and many organizations are working towards the policy of remote work, at the same time organization has an opportunity to recruit top talent from other geographical locations without limiting workers who can physically make it to the office

Remote work has been challenged in some circles as workers get stress and depressed due to physical isolation at home, and managers believe face-to face (FTF) is a good approach to motivation, (Van Zoonen & Sivunen, 2021). Digital communication help to overcome some of the challenges remote workers experience, Nurmi & Hinds, (2020) as these technologies can prove to be valuable resources for employees. At the same time existing knowledge on remote work can be questioned in an extraordinary pandemic context (Wang et al., 2021). The use and importance of ICT to communicate with co-workers can be seen as a resource, at the same time mediated communication can be functional in achieving work goals and reduce job demands, (Van Zoonen & Sivunen, 2021).

At the onset of the Covid-19 Executive Management have been sceptical at the effectiveness of remote work. Wang et al., (2020) identified four key remote work challenges which included among others work-home interference, ineffective communication, procrastination, and loneliness. They also pointed out virtual work challenges such as social support, job autonomy, monitoring, and workload and the importance of self-discipline. These challenges require a deeper understanding and resolution for effective remote work. Franken et al., (2021) identified similar challenges associated with working remotely, as well as important resources for wellbeing and productivity of remote workers

The world has witnessed continued rise in trends for remote and hybrid work arrangements since the beginning of Covid-19 and are unlikely to taper off soon, it imperative companies deal with the impact of remote work and reconsider future working arrangements, (de Klerk et al., 2021). In their study De Klerk et al., (2021) observed employees could work effectively with improved

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employee engagement and experience, and that the benefits of working from home created expectations that this practice would continue in future, along with some office work

2.2.4 Digital innovative management solutions for monitoring employees off-site

In today's world ransomware and computer security is key. Kaster and Sen (2017) note that there is need for managing the organisations' digital systems regarding supervising employees working remotely which requires protection against cybersecurity attacks, and monitoring aspects of confidentiality, integrity, availability (CIA), costing, and constant identification of adversaries, threats, vulnerabilities, consequences, and risks.

Digital transformation is moving at an astonishing pace. Adib and Stage (2018) elaborate on how organisations and utilities are proactively focusing on how to implement and manage the adoption of a rapidly changing technological infrastructure while utilising existing systems. During the past few years there has been an explosion in the use of smart workplace technologies as interest in exploiting digital workplaces and smart offices is increasing, and deployments are gaining momentum (Attaran et al., 2019). Savic (2020), who studied the unprecedented impact of the pandemic on the sudden demand for work from home, and the subsequent push for the digital transformation of the workforce, found that digital workplaces became the order of the day.

Communication is key in maintaining leadership and coherence in an organisation, Romanovs et al. (2021) claim that there is an urgent need to explore approaches used for communication between managers, supervisors and subordinates to control the quality of work in general. It is important to analyse the current situation in the world and review main tele-management integration problems that prevent employees from performing all necessary tasks remotely. Since Covid-19 impacted organisational coherence, leadership, and social exchanges, Chen and Sriphon (2021) noted that leaders need sound communication skills to share authentic information with empathy and optimism, in addition to being effective and efficient to handle change ethically in uncertain times.

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Organizations are implementing collaboration technology and Microsoft Teams to reduce productivity gaps and inconsistencies. Unified Communications and Collaboration (UCC) Technology, is a software that enables enterprise communication in real-time and asynchronous cooperation proficiency, Ilag, (2021) that is being used in futuristic organisations. Sustainable remote work can in the long term be promoted through a culture of trust through open communication and collaboration, intrapersonal communication, and problem-solving in the organization

In sum, the use of existing ICT equipment and technology remotely demands more accountability on the part of the employees, supervisors, and management to increase the levels of communication and awareness. The use of technology outside the organisational premises poses further risks that requires flexible but sound management styles and leadership approaches. Management needs to ensure that company digital technology entrusted to workers is being utilised for business use and that workers' time and energies are channelled towards the business of Transnet.

2.3 CONCEPTUAL FRAMEWORK

Considering the objectives of the study, the conceptual framework emerged as a product of combining the variables of the two theoretical models; that is, that of Rogers (1995) and Davis (1989). The conceptual framework provided an 'integrated' approach of studying the research problem that concerned the enabling of organisations to become more ICT and data-driven (Smit et al., 2022).

In order to explain the aim of the study and the research objectives, the conceptual framework diagrammatically (Figure 2.6) represented the variables to clarify the relations between theoretical and conceptual frameworks, (Varpio et al., 2019).

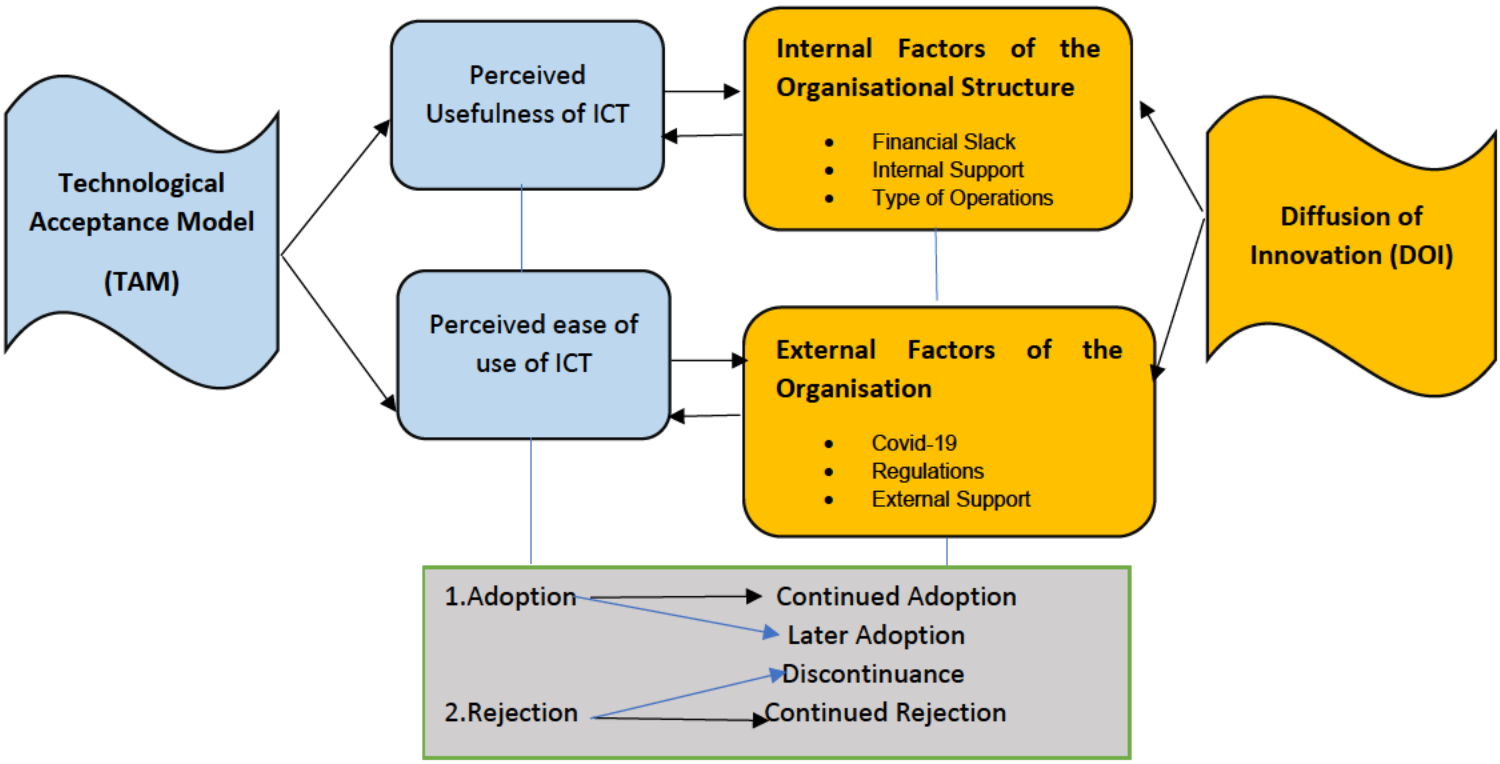

Figure 2. 3: Conceptual Framework of the study (Varpio et al., 2019)

The researcher adopted (and adapted) the above framework (Figure 2.3) for this study to gain insights into the variables influencing ICT adoption during the Covid-19 period. Some variables included the continued use or rejection of technology, discontinuation of using an innovation as a product of internal and external factors. Internal factors of the organisational structure included the availability of resources, lack of funding, and the ability of the organisation to become self-sustainable. State-owned organisations rely on government funding, and top-quality executives are appointed to provide internal support structures and expertise to drive port operations within the organisation. The type of operations is also important as ports face both internal and regional competition, as customers have a choice to decide where they will receive their goods in the most flexible manner. In this study, external factors that compromised organisational fluency included the effects of the disruptive nature of the Covid-19 pandemic, the loss of expertise due to illness

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of staff members, and Government regulations in terms of the hard and soft lockdown rules. The Ministry of Cooperative Governance and Traditional Affairs (COGTA) was mandated to deal with the Covid-19 protocols which were lifted in April 2022. During the lockdowns the organisations relied on external support from its shareholders, the Department of Public Enterprises (DPE), investors, private public partnerships, and equity partners.

Table 2. 1: Other studies on ICT adoption for Remote Work

Objective	*Prior Research*	*Methodology*	*Contribution to Knowledge*
1	a) Donnelly, 2021: Digital adoption of ICT in the Marine Industry b) Murdoch and Fichter (2021); Transition of Remote Work, and digital transformation c) Berre et al., (2019), Ports of Antwerp and Esberg leveraging digital Twin data visualisation platforms to identify and monitor equipment. internet of things (IOT), Artificial Intelligence (AI),	Qualitative Research	Investigate the adoption of Information Communication Technology to enable Remote Work at DCT.
2	a) Limburg and Jackson (2022): Links between the management of remote workers and the dispersed team. b) Newman and Ford (2021): leadership and management effectiveness of a remote workplace.	Qualitative Research	Determine if the adoption of ICT tools is influenced by the availability of resources.
3	a) Ojo, Fawehinmi and Yusliza (2021): Building resilience for Remote Workers. b) Zara and Monteiro (2021): Home confinement having serious consequences on the mental health of workers.	Qualitative Research	Analyse support available to workers using ICT tools in Remote Work.
4	a) Kester and Sen (2017): Managing the organisations' digital systems and employees working remotely to be protect them against	Qualitative Research	Examine existing digital solutions for managing employees working off-site. Subordinates require constant

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	various forms attacks, including cybersecurity attacks. b) Chen and Sriphon (2021): Leadership and good communication skills to share true information with empathy and optimism, and leaders need to be thoughtful and capable to handle change in uncertain situations ethically.		supervision otherwise they misdirect their effort elsewhere.

2.4 THEORETICAL FRAMEWORK

The purpose for conducting the literature review was to understand what is already known about the subject, and what should be still discovered on the subject under investigation (Granic & Marangunic, 2019). The literature review also assists to assess and position the research by choosing the appropriate methods in building on what other researchers had explored. The researcher compared academic sources about the topic such as academic books, journals, and periodicals and by accessing using google scholar and other online platforms. Literature related to ICT adoption, innovation, Remote Work, and Covid-19 was considered as relevant to this study. Literature of 5 years and older was excluded from the study. The researcher explored opportunities for learnings using backward and forward citation chasing, a technique that uses preliminary reading to understand the origin and development of an article quoted and citied by other authors (Haddawaywa et al., 2022). In sum, the aim of literature review is to make comparisons with previous studies, draw conclusions, justify the methods, methodology and the techniques the researcher used in his/her investigation. This chapter concluded by clearly delineating the literature review in line with stated objectives to address each objective. Also, the theoretical and conceptual frameworks, and evaluation of the models were illustrated.

This research is based on the implementation, adoption and acceptance of Information Technology and Communication in an extra ordinary environment, a crisis caused by the natural phenomenon such as the Covid-19 pandemic. This study is grounded on variables of two theories that have been used in several studies to understand the adoption process: the Diffusion of Innovation (DOI)

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theory of Rodgers (1995), and the Technology Acceptance Model (TAM) developed by Davis (1989). These two theories have the necessary building blocks that explain the variables that support an organisation in the adoption of ICT including innovation processes for new, emerging, and changing technologies, and the implications on performance outcomes thereof.

2.4.1 Technology Acceptance Model (TAM)

This theory looks at perceived usefulness and perceived ease of use for new innovations. ‘’Perceived usefulness is defined as subjective beliefs that the use of ICT will improve work productivity, performance, and motivate people, while perceived ease of ICT use refers to the extent to which users believe that the use of technology is effortless’’ (Kabir et al., 2022:27).

Several researchers in the past thirty years have looked at the adoption of new technology within different organisations. Subsequently, the Technology Acceptance Model (Ko et al., 2021). Guner (2020) applied this theory in his studies and found that “both elderly and younger adults [regard] the technology acceptance model (TAM) in a similar way in accessing technology in the Information Society”. According to Ko, Kim and Kim (2021), the original TAM framework has been refined and extended by the inclusion of such variables of the organisation that considers research subjects and objectives. Other researchers who have used the TAM model after its initial introduction such as Bahlol et al. (2018) who reviewed published research on health information systems’ development and implementation concerning its application in health areas by using the model’s framework.

Shin et al. (2022) used the TAM model to explain the limitation to users who were finding it difficult to adopt the modular construction technology by citing perceived usefulness (PU) and perceived ease of use (PEOU) as the mediating variables. (Scherer et al., (2019:13) also used the Technology Acceptance Model (TAM) to “understand the extent to which teachers adopt technology in their teaching practice, and [found that] overall, in this instant, the TAM model explained technology acceptance well”. Additionally, Sahil and Ali (2018) used the TAM model in their study concerning driverless car technology and “found significant, positive relationships

between perceived usefulness of driverless car technology, perceived ease of use of driverless car technology, and the intention to continue using driverless cars.

Taherdoost (2018), who evaluated the TAM, claims that several models and frameworks have been developed to explain user adoption of new technologies. Considering the rate at which new technology is being developed, "the Technology Acceptance Model will continue to remain the flashpoint of different studies as new technologies are evolving'' (Morris, 2007). "Over [time], TAM has been found to be an effective model in information systems theoretical frameworks" (Lai, 2017:21). The variables of the model according to Davis and Venkatesh (1996) consist of external and internal factors which are regarded as perceived usefulness of ICT and perceived ease of use of technology – these are integrated with behavioural intention and the actual application of the research model as indicated below in figure 2.4:

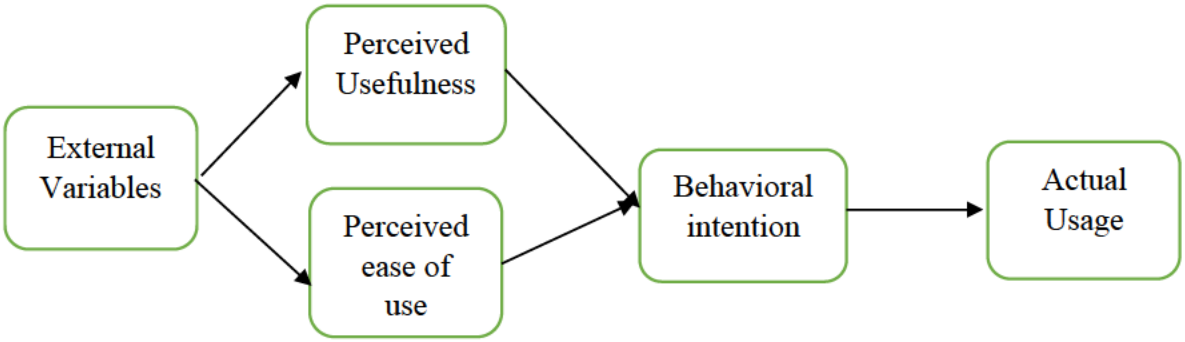

Figure 2. 4: TAM model (Adapted: Davis & Venkatesh, 1996:20)

An external variable, referred to as a stimulus in the study, could be any happening that can be a trigger off a process - could be a natural phenomenon, a pandemic, a disaster, government policies which may include convenience and integration with available technologies for economic use. These will in turn trigger cognitive response coupled with the intention to use. Perceived usefulness and perceived ease of use are based on individual briefs that are affected by external variables which in turn affects the attitude towards using and behavioural intentional use (Hong & Yu, 2018). The user of technology will regard *Perceived Usefulness* of the technology as helping him/her to perform the tasks which produces the desired results and improves performance quality.

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If the technology is regarded as *ease to use* without difficulty, complications, or need for some rigorous training, then the user will perceive it as easy to use and therefore will be willing to use the technology and possibly continue utilising the technology. Quality, free of errors, and speed of execution of the system also contribute to *ease of use.* On the other hand, if the user finds the technology difficult to use, then he/she may not want to continue using the technology.

2.4.2 Diffusion of Innovation (DOI)

Diffusion of Innovations (DOI) is a theory that seeks to explain how, why, and at what rate new ideas and technology spread. Rogers (1962), who theorised on the adoption of innovations among individuals and organisations, was also instrumental in advancing the notion of opinion leaders and opinion followers (Booth & Oudshoorn, 2014). The existing knowledge of the variables of the DOI are known to affect the adoption of ICT technologies in a positive way by accelerating innovation in the organisation (Akca & Ozer, 2014). Rogers (2003:17,55) noted that ‘’the adoption process is the way communication channels are used to pass the message depending on the rate and degree to which the news is being spread’’ such that the initial model of DOI proposed that the rate of adoption of an innovation follows an S-shaped curve with a normal distribution to get the full benefits of this theory.

The adoption of Roger’s (1962) DOI theory considers innovation, communication channels, the system in which the innovation is situated, and the length of time since the innovation was introduced. Factors that affect the diffusion of innovation include the characteristics of ‘adopter’, opinion leaders’ reactions, social and political influences, and the timing of the innovation’s introduction (Dearing & Cox, 2018). According to Kim et al. (2021), ICT is the integration of telecommunications, computers, software, hardware, and audio-visual systems that enable users to access, store, transmit and manipulate information to communicate in a digital form. Theories of ICT implementation and adoption were considered and evaluated to form a research model. In other words, the ICT adoption process is considered as an interaction between technology, task, and users (Moshood et al., 2020).

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2.4.2.1 Innovation

According to Rogers (2003), an innovation is an idea, practice, or project that is perceived as new by an individual or other unit of adoption. It does not necessarily mean that the idea must be novel if the users perceive the idea as new - the individual must have knowledge of the idea, persuaded to utilise it, and decide to use it. Rogers (2003) elaborates that there are desirable or undesirable consequences referred to as 'functional or dysfunctional' or 'anticipated or unanticipated'.

2.4.2.2 Communication channels

Rogers (2003) noted that communication is "a process in which participants create and share information with one another in order to reach a mutual understanding", and it happens through different communication channels. Communication channels require two components: the sender and the receiver. New technology is spread mostly through interpersonal communication or mass media communication channels such as the television, radio, twitter, Facebook, and TikTok, among others (Vázquez-Herrero et al., 2021).

2.4.2.3 Time

In some behavioural studies, the time variable is not considered as being in line with that of Rogers (2003). The effluxion of time presents either opportunities or barriers to the rate and speed of innovation diffusion. The time dimension can be difficult to deal with especially where the events are so spontaneous such as a disaster. Covid-19 is ongoing in terms of research; hence, only a few studies were conducted (Shapoval et al., 2021). The theory of Diffusion of Innovation (DOI) assisted in unpacking the process of ICT adoption in times of the pandemic.

2.4.2.4 Social system

Rogers (2003: 24 defines the social system as "a set of interrelated units engaged in joint problem-solving to accomplish a common goal". Individuals and organisations do not exist in a vacuum, therefore society has a major role to play in the DOI processes. Rodgers, cited by Kaminski (2011), identified five categories of innovation: innovators, early adopters, early majority, late majority,

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and laggards (at times there is the other group of non-adopters). The characteristics of each category is outlined below:

(i) Innovators

Kaminski (2011) describes persons in this category as those who are willing to take uncalculated risks: they are adventurous, and want to the first in all endeavours. People in this category do not need effort to be persuaded to try out an innovation.

(ii) Early Adopters

This set of the population consists of society opinion leaders. They are easy when it involves embracing changes. The most important consideration is to make them understand the importance and how to handle the innovation. They may be driven by other factors and motives which may change as other users display interest in the technology (Palm, 2020). These are individuals who are highly integrated into the social systems and are likely to be consulted by innovators.

(iii) Early Majority

There are two groups of majorities: the early and late majority. The early majority simply needs to understand that hard evidence for innovation works, and that it is not a waste of time. Story-telling plays a major role in convincing this group of people to execute the innovation. They rely on information, and usually taking longer to adopt innovations, (Sartipi, 2020).

(iv) Late Majority

Most of the people in this group are risk-averse, not wanting to sacrifice anything until they see everyone using the innovation. This category of people is sceptical and very cautious.

(v) Laggards

These are hard to convince people who are entrenched in their own beliefs. Laggards sometime act out of fear of being left out, and take much convincing to execute an innovation. Sartipi (2020) referred to this group of people as having a strong inertia. According to Rogers (2003), as cited in Ismail (2006) and Lee (2021), the innovation-decision process involves five steps: knowledge, persuasion, decision, implementation, and confirmation. These stages typically follow each other in a chronological order.

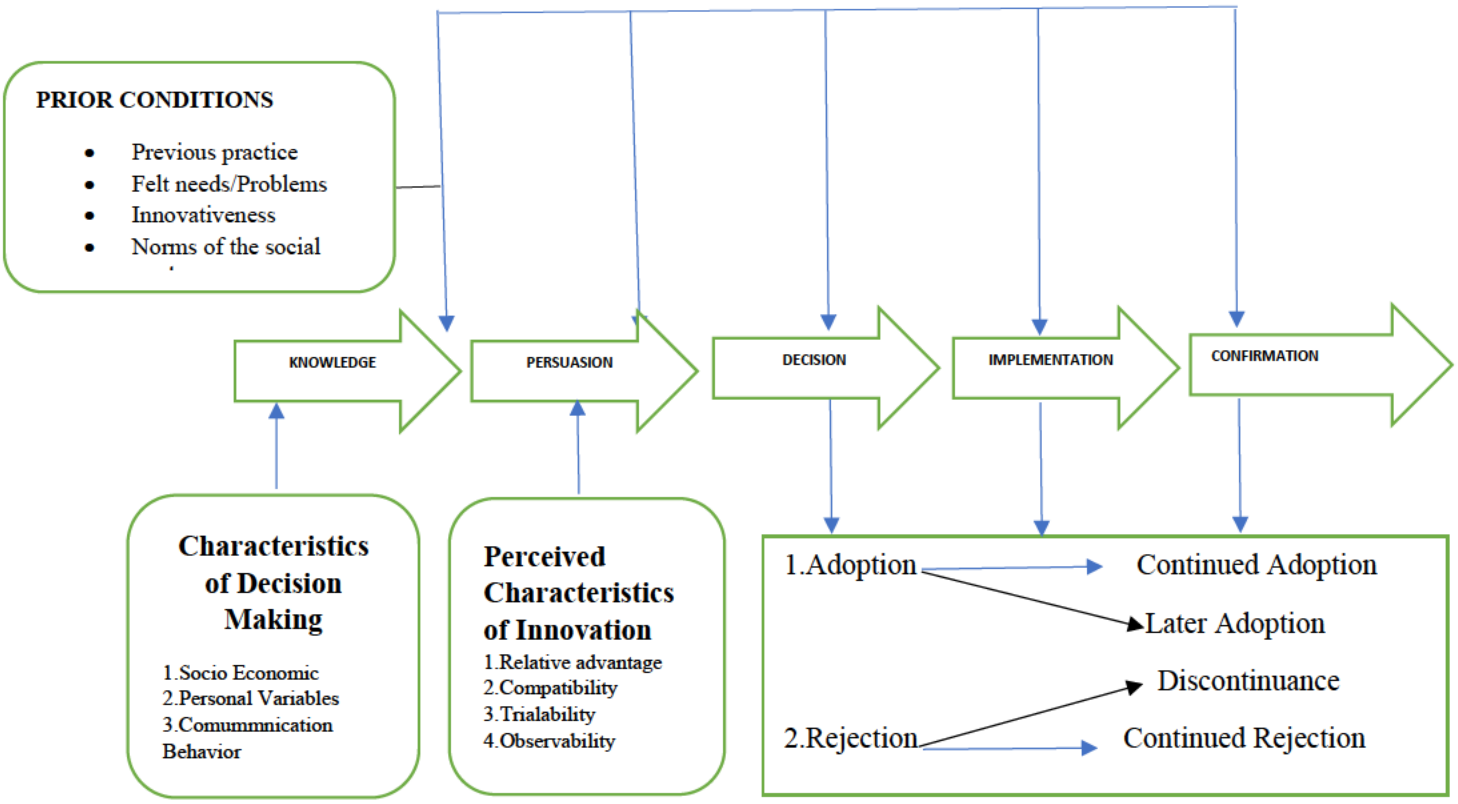

Figure 2. 5: Communication Channels (Rogers, 2003)

Rogers (2003), who referred to the DOI process as "an uncertainty reduction process", categorised the characteristics of innovations into five groups: relative advantage, compatibility, complexity, trialability, and observability.

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Accordingly, the theory considers organisational innovation as being related to independent variables such as the individual leader, the internal organisation's structure, and external factors of the organisation (Taylor, 2015) as seen in Figure 2.6 below:

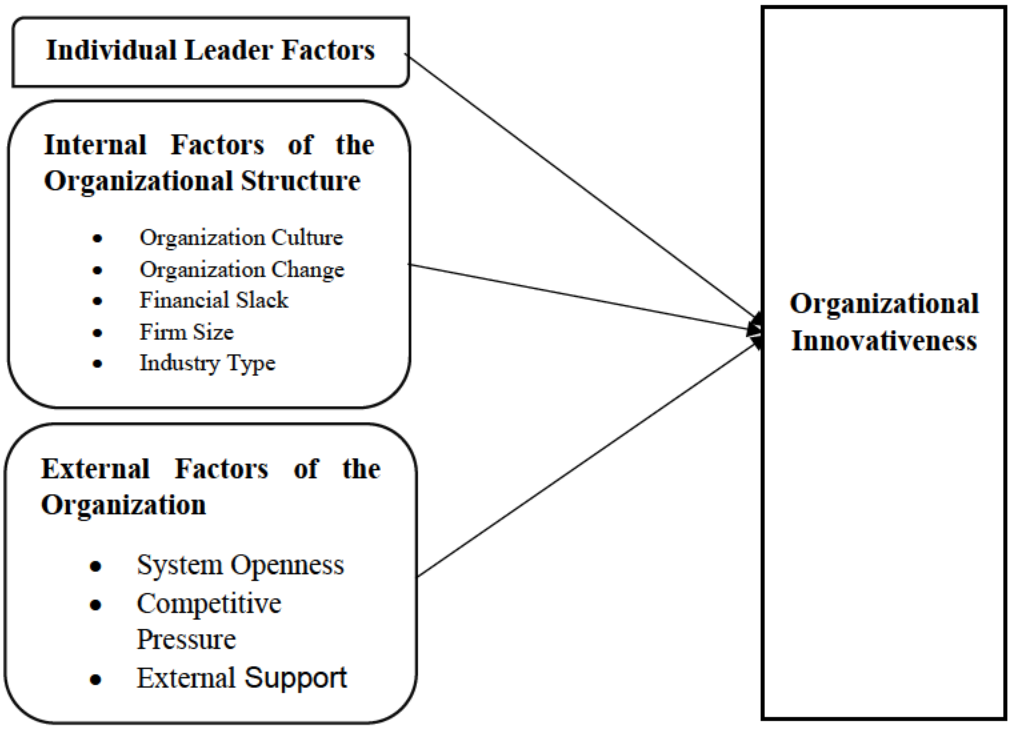

Figure 2. 6:DOI internal and external factors (Rogers, 1995)

An evaluation of the DOI theory indicates that it provides an overarching framework for the study of ICT adoption by different organisations as it encompasses innovation, adoption decision-making processes, and interpersonal context in which ICT operates (Taylor, 2015)). However, the theory does not provide and or consider forced adoption due to natural phenomena of immense proportions such as the Covid-19 pandemic. In this research, the stages of the adoption process are: Knowledge and Awareness, Persuasion, Decision, Implementation, Confirmation, and Continuation (Rogers,1962). The researcher applied these variables in this study to gain an understanding of the impact of ICT on Remote Work at Transnet Port Terminals in Durban until such time the full benefits are realised.

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Diffusion of Innovations is a theory that seeks to explain how, why, and at what rate new ideas and technology spread (Rogers, 1962). Hua (2017), as cited by Moshood et al. (2020), proposed an information technology implementation model that contains six steps: investment, organisational adoption, reutilisation, acceptance and adoption, adaptation, and distillation. The outcomes of each stage is outline below:

- **Initiation**

An ICT solution is found to match the specific demands of the organization.

- **Adoption**

The investment decisions are made by the organisation to accommodate the implementation effort.

- **Adaptation**

The ICT application becomes accessible to end-users in the organisation, and is adapted to the organisational context.

- **Acceptance**

The implementation of the technology is employed in the professional activities of the organisation.

- **Reutilisation**

The organisation's governance systems are accustomed to accounting for the ICT application, and thus would not treat it as something out of the routine any longer.

- **Infusion**

The ICT application could realise its full potential within the organisation.

2.5 SUMMARY OF THE LITERATURE REVIEW

This chapter discussed literature relevant to the theoretical framework and the major theories applied in this study. An analysis of previous literature revealed that there were areas that other researchers made significant inroads into - the areas of ICT adoption. The conceptual framework of this study was derived from Rogers (1995) and Davis' (1998) theories of TAM and DOI respectively. Also, other topics aligned to the aim and objectives of the study included the adoption of technology, the influence of the availability of resources, support systems provided to employees, and digital technology available for monitoring employees off-site.

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The major contributions were made in the areas of port operations, and the adoption of ICT technology. The gaps identified by the researcher included scenarios where the usage and adoption of ICT have been forced into an organisational set-up due to the unanticipated crisis. Another area was mental health issues and the possibility of job losses due to Remote Work because of Covid-19. The other area which affected the adoption process was the aspect of time with its sudden occurrences that took the world by surprise. This study examined the adoption of ICT in times of crisis, where no organisational unit had prepared for an emergency of such a magnitude of a highly disruptive phenomenon.

2.6 CHAPTER SUMMARY

This chapter explored the literature review in line with the purpose of the study. The review was categorised in terms of the research objectives. This section also examined the theoretical foundations and developed the research framework according to the variables related to the study. The next chapter (3) focused on the methodology applied in this study.

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CHAPTER 3: RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter provided the research methodology, data collection techniques, and the qualitative approach applied in this research. The justification for the research methodology, recruitment of participants, and management of the interview-protocol are also covered. The methodology presented details for data acquisition via data collection techniques. The determination of the population and sample size were also outlined. Attention was given to the piloting and pre-testing processes to confirm the effectiveness of the interview question schedule. Issues of secondary data collection, validity and reliability, and ethical considerations were also addressed.

3.2 RESEARCH DESIGN

The research design applied in this research is qualitative in nature (Creswell, 2017). This qualitative exploratory research design was the plan on how the researcher intended "to answer the research questions" (Asenahabi, 2019: 76). Decisions must be made in line with the most appropriate data collection methodology and data analysis approach. Although there are similarities between qualitative and quantitative research methodologies, both have fundamental ontological and epistemological perspectives that are unique to their respective research designs (Mary 2019). According to Abutabenjeh and Jaradat (2018), researchers must select the appropriate method of analysis and design for their study. This study pursued the qualitative research approach.

3.3 QUALITATIVE RESEARCH APPROACH

Qualitative research can be described as a sequence of interpretative techniques that describes, decodes, and translates concepts and phenomena rather than recording the frequency of a certain phenomenon in society (Nikolaos & Yannis, 2018). Philipsen and Vernooij-Dassen (2007) cited in Busetto et al. (2020) define qualitative methodology as the study of the nature of a phenomenon,

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its quality, its different manifestations in the context in which they appear, the perspectives in which they can be interpreted, while at the same time excluding their range, frequency and place in an objectively determined chain of cause and effect. Additionally, qualitative research seeks to analyse behaviours and relationships without mathematical, statistical or numerical data (Bloomfield & Fisher, 2019). In other words, qualitative data is about words and language, rather than numbers and measurements, and it informs the researcher about people's opinions, emotions, experiences, attitudes, what they think and why.

Qualitative research provides an understanding of the participants' behaviours which assist in formulating a hypothesis. During the last few decades, the use of qualitative research has been increasing in many institutions as it can be used to explore several areas of human behaviour for the development of organisations' operating models (Haradhan, Kumar & Mohajan, 2017; Silverman, 2021). Qualitative research investigates people's experiences by providing an understanding of what is important to them (Success Research Application, cited by Silverman et al., 2021). Simply put, qualitative research is about seeking people's rich real-life experiences.

The general principles underpinning qualitative approaches inform the type of data collected which needs to be naturalistic: meaning that data must not be coded, summarised, categorised or reduced at the point of collection (Linneberg & Korsgaard, 2019). Linneberg and Korsgaard (2019) add that qualitative research tends to work with smaller numbers. Qualitative investigators attempt to get closer to the actor's perspective through detailed interviewing and observation, with a view to capturing the subjects' perspectives (Leipold et al., 2019). The researcher acknowledged the importance of research validity; internal validity is automatically established in qualitative research because the group of interviewees has its own point of reference (Eldh, Arestedt & Bertero, 2020). As such, validity for qualitative research is best described as rigorous, credible, and trustworthy (Rose & Johnson, 2020).

3.4 JUSTIFICATION FOR ADOPTING THE QUALITATIVE APPROACH

The importance of selecting a research method in a study cannot be over-emphasised. Molina-Azorin (2018:104) advocates that "the choice between quantitative and qualitative research

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methods should be determined by the research question, not by the preference of the researcher". The problem statement, research questions and research objectives call for a specific research design (Saunders et al., 2009: Chen, et al., 2023). The research design should address important issues relating to a research project such as the aim of the study, location of study, type of investigation, extent of researcher interference, time horizon, and the unit of analysis (Sirisena & Iddagoda, 2022). Literature indicates that qualitative research is significantly facilitative especially in new areas (Nikolaos & Yannis 2018). Accordingly, the Covid-19 pandemic is a novel research phenomenon. Qualitative research might be suitable for such research studies where there is uncertainty about concepts, factors, or phases under consideration, and where there is the need to understand the nature and complexity of the phenomenon.

Moreover, not all research questions are answered through quantitative approaches; there are times when qualitative methodologies are needed to discover reasons for observed patterns, especially the invisible ones. Others contend that the research design and methodology should be chosen to fit the research questions at hand (Busetto et al., 2020). Importantly, qualitative research is often used to analyse and evaluate technology solution implementation (Oussous, et al., 2023). The choice of qualitative research is based on the complexity of the methodological framework, the need to test methodological framework based on qualitative research in a real environment, and the need to explore parameters and correlations (Nikolaos & Yannis, 2018). This study adopted a qualitative analysis approach to take advantage of its assessment and testing nature, such as the eliciting for incisive insights and exploring behaviours, perceptions, feelings, and understanding of participants.

Some of the advantages and justification for using the qualitative method, Hangel, and ChoGlueck., (2023) is that it captures and interprets participants' feelings, opinions, experiences, and actions, by facilitating an understanding of people's voices, meanings, and events. In this regard, the researcher interacted with participants through physical observations, contact interviews, telephonically, and via face-to-face interactions. The interactive nature of interviews allowed the flexibility of probing by asking follow-up questions for elaboration and clarity which led to restructuring the interview schedule. This was important as part of the research protocol in a qualitative study by continuously looking for adaptations and refinements based on lessons learned from the earlier steps in the research process (Busetto et al., 2020).

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3.5 STUDY AREA

This research study was conducted at Durban Container Terminals, located in Durban, within the Transnet Port Terminals (TPT) a division of Transnet Group. The DCT consists of Pier 1, also known as the New Pier, and Pier 2. Durban Container Terminals (DCT) is a port-operating concern, situated in the KwaZulu-Natal province and is operated by the Transnet State Owned Company (SOC) which falls under the eThekwini Metropolitan Municipality.

3.6 TARGET POPULATION

In interviewing the participants, the researcher also attempted to gain insight into Transnet Port Terminals' customer-perspectives. The researcher initially intended to select 5 participants from Durban Container Terminal Pier Two, and 3 members of staff from Pier One. Eventually, the researcher selected a total of 10 participants, two more than was anticipated. Saunders (2018) notes that qualitative researchers recognise that some participants are 'richer' than others, and that these research elements are more likely to provide greater insights and understanding for the researcher. The target population included Transnet Port Terminal members of staff who are in different departments such as the operations, engineering, maintenance, ICT, Shared Services including Finance, Supply chain, logistics human resources, and senior management staff. It must be noted that the whole support ICT team is not based at the terminal; however, it provides remote support whist based at either Head Office or working from home.

3.7 SAMPLING

The purpose of sampling is to allow all variants of the objects under study that are deemed to be relevant to be present in the sample to dissect and make-sense of the subject under investigation from as many perspectives as possible (Busetto et al., 2020). Three broad sampling techniques are identified in literature: convenience, judgemental (purposeful), and probability or non-probability sampling. Although convenience sampling incurs the least cost, the data maybe of sub-standard quality and may lack intellectual credibility, since no one-size-fits-all (Grossfield, 2018). Kassiani

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(2022:1) referred to purposive sampling as “a group of non-probability sampling techniques in which units are selected because they have [relevant] characteristics required in a study, and units are selected ‘on purpose’ in purposive sampling”. This involves identifying and selecting individuals or groups of individuals that are especially knowledgeable about or experienced with a phenomenon of interest (Creswell, 2017).

Since this research was qualitative in nature, the study adopted non-probability sampling techniques to ensure generalisability of the study’s results in terms of the target population (Karim et al., 2019). Some of the advantages of adhering to purposive sampling is that it enables drawing results that can be used to investigate the phenomenon further. This study was based on a purposive sampling design grounded on the judgement approach to promote the choice of respondents who were most likely to provide the best information to successfully achieve the objectives study. The research focused on elements of the population with professional expertise with a background in ICT who had experience in port operations and who were willing to share their opinions with the researcher. The respondents were informed that the research was purely academic and voluntary - there was no form of compensation for participation.

3.7.1 Population and the Sample Size

In research the population and sample size are important attributes. Schreier (2018) viewed the total pool of components or individuals in the range being studied as a population. Vasileiou et al., (2018) claims that there is no straightforward answer to the question of how many and that sample size is contingent on several factors relating to epistemological, methodological, and practical issues. Sakshi (2022) notes that several factors must be considered before accepting an arbitrary number by considering quality over quantity, selecting an appropriate study design, and understanding of the principle of saturation is important. Saturation refers to a situation in which is when “adding more participants to the study does not result in obtaining additional insights’, (Daher., 2023, p.98).

Sample sizes in qualitative research tend to be small to support the depth of case-oriented analysis that is fundamental to this mode of inquiry (Vasileiou, Barnett, Thorpe & Young, 2018). Lakens

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(2022) observes that researchers find it difficult to justify sample sizes used in qualitative research; they are more concerned about selecting the appropriate sample size, and sometimes apply the rule of thumb (Saunders et al., 2018).

Concerning the relevant statistics, there were over 2 519 members of staff across Durban Container Terminals at the time of the research, of which Pier 2 alone has a staff compliment of 1 781 employees and Pier 1 has 738. Within Transnet Port Terminals (TPT), there were 15 departments referred to as departments of Organisational Units, and these included:

- Operations
- Engineering
- Corporate Affairs
- Facilities
- Finance and Accounting,
- Risk, Compliance and Sustainability,
- Supply Chain Management (SCM), including Procurement and Contracts,
- Warehousing
- Projects and Planning
- Safety and Health
- Human Resources and Administration
- Logistics
- Civil Engineering
- Maintenance
- Information Communication and Technology (ICT)

The job categorisation or classifications at Transnet Port Terminals (TPT) regarding Durban Container Terminals (DCT) consists of:

- The Chief Executive
- Chief Engineer
- General Managers in Engineering, Operations, Corporate Services, People Management, and Strategic Projects

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- Managers responsible for Human Resources, Operations, Technical, EAP (Employee Assistance Programmes), Fleet, Regional and Terminal Managers
- Other job positions: Administrators, Trade hands, Technicians, Millwrights, SHEQ Officers, Electricians, Welders, Logistics Specialists, ICT Specialists, Business Analysts, Planners, Technical Supervisors, Quality Controllers and Assurers, Cargo Handlers, Drivers in Charge (DIC) and other officers.

- Five employee-grade-level categories exist at Durban Container Terminals (DCTs): Executive Management, that is grade (A-B), of which the Chief Executive is grade A, and the rest of the executives are in grade B
- Senior Managers are in grades C to D
- The rest of the managers are grades E to D.
- The Bargaining Employees consist of the bulk of the employees, and they are grade G and below
- A further category of workers called Unclassified, mostly temporary, non-permanent Casual Workers and Port Workers

The sample was carefully selected to provide incisive insight and understanding of the phenomenon under study (Chun, Birks & Francis, 2019). There was an element of convenient sampling with some form of a judgemental approach to ensure the generalisation of results. Initially the study intended to engage 40 participants, but eventually the number was reduced in line with qualitative research principles. The researcher then selected 2 Engineering Managers, 2 Technical Managers, 1 Logistics Specialist, 2 Technical Managers, 2 Operations Managers, 2 Maintenance Planners, 2 Engineering Technicians 6 System Users (Assistant Management Accountant, Cost Engineer, Contract Administrator, Document Controller, Engineering Technician, Planner and a Financial Accountant), and 2 Union Representative Members. In total, this study identified a sample population of 21 participants from both Pier 1 and Pier 2. The main criteria for selecting subjects were their positions, nature of work, and they should have worked at Durban Container Terminals for at least one full year before the onset of the pandemic. Out of the 21 only 10 participants volunteered to co-research in this study. Each department was fully represented out of these 10 participants.

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3.7.2 Recruitment of Participants

In order to improve the quality of participation in qualitative research, the researcher should implement a recruitment strategy for identifying and enrolling people to participate in a research study (Bonisteel et al., 2021). Participant-recruitment is vital to the reliability and success of a research study, hence researchers must recruit a sufficient number of participants (Daly, Hannon & Brady, 2019). Researchers always experience challenges when recruiting participants for their project, hence it is advisable to engage close workmates, family members, friends, and members of professional circles. Researchers should ensure that the desired sample was recruited to guarantee the authenticity of the research results (Watson et al., 2018). In this regard, consideration was given to the impact of relevant and sufficient recruitment in designing and appraising this qualitative research study.

In recruiting, the researcher physically contacted each of the possible participants and others through emails, telephonic follow-ups, and individual visits. All participants in this research were recruited from the existing pool of managers and professionals working at DCT Pier One and Two, and they are all Transnet employees who had more than one year of service since the onset of the pandemic.

3.7.3 Inclusion and Exclusion Selection Criteria

In this study, the researcher only selected from the pool of managers and specialists in all the different departments according to their responsibilities, their professional roles impacting on decision-making processes within the organisation, and their bank of knowledge and experience accumulated over the year(s). They have been with Durban Container Terminals, Pier One or Pier Two before December 2019 and are currently at DCT. This was considered to elicit in-depth insights from their real-life experiences and knowledge, so that they can be verified against the culture and practice obtaining before, during and after Covid-19.

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Those who were employed post-Covid-19, and the category of Unclassified Workers were excluded from the research as they did not have any decision-making experience and does not relate to the culture of the organisation.

3.8 SECONDARY DATA

Secondary data in research is based on information from secondary resources that already exist (Holloway et al., 2021). Secondary data is collected by other researchers or entities for other purposes, in contrast to primary data which the researcher collects through interviews for the purpose of a particular study. Largan and Morris (2019) encourage researchers to understand and consider the potential for using secondary data, both as their primary research method, and as a useful strategy.

Further, secondary data increases the validity of the study, but primary data will suffice where there is no secondary data. Although to a lesser extent the researcher consulted available sources of data such as the company's intranet, the internet, and journals, access to collect primary data was granted through a gatekeeper's consent letter from the organisation in addition to an ethical clearance certificate from the university (UKZN). At the time of data collection government had not fully or completely relaxed the Covid-19 regulations, such legislation was also considered as part of secondary data.

3.9 RESEARCH INSTRUMENTS

In qualitative research, one can choose a variety of research instruments such as observation guide, focus group discussion guide, interview guide, and others. Collins (2021) referred to a research instrument as any tool that is used by a researcher to obtain, measure, and analyse data. Interviews were used for data collection as a research instrument in this study. There is a variety of data collections methods at the disposal of a researcher - these include but not limited to interviews, mail or online surveys, email, web surveys and questionnaires (Nayak & Narayan, 2019). Questionnaires can be designed in a variety of ways of greater or lesser complexity, linking to the objective of the design, (Oosterveld et al., 2019). Moreover, the most important consideration was to focus on the transparency of the research methods, including the instruments implemented for

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eliciting data, and why, how and by whom they were implemented in any specific study setting to foster discussion on whether they may have influenced data collection, analysis, or interpretation (Busetto et al., 2020).

As stated earlier, this research used interview as a research instrument. Dadzie (2018) states that an interview is a common tool for data gathering in qualitative research, which may involve structured, semi-structured, or the unstructured type of interview. Semi-structured interviews are characterised by open-ended questions and the use of an interview guide (Busetto et al., 2018). Although the semi-structured approach includes pre-planned or structured questions, they are flexible as the interviewer has the freedom to probe during the interview which promotes probing and posing clarifying questions for elaboration. An existing pre-constructed interview protocol was agreed upon prior to the study's commencement of data collection (Eriksson & Arpine, 2020) but was modified to suit the study's research aim and objectives to guarantee the garnering of quality data. The interview refinement protocol framework included the alignment between interview questions, research aim and objectives, research questions, construction of an inquiry-based discourse, and feedback on piloting the provisional interview questions (Yeong et al., 2018).

Additionally, interview questions were grouped into different categories according to the specific objectives of the study, thus providing the flexibility of skipping some questions where the interviewee could not answer them. Busetto et al. (2018) state that qualitative interviews basically focus on the interactive approach rather than the written format to allow free-flow of conversation and the emergence of unanticipated views for the researcher to consider for the study.

The importance of a good interview schedule cannot be overlooked in a research project. Lagevik and Essinger (2022) maintain that the design of interview schedule is crucial for the accuracy, clarity and relevance of the data to be collected for appropriate analysis. Questions should firmly be reviewed to garner answers related to the chosen variables of a study's topic. Lagevik and Essinger add that there are three types of interviews: structured, unstructured, and quasi-structured (a mix of both structured and unstructured interviews). Interview schedule can either be closed or open-ended. Open-ended questions allow the interviewee the flexibility to answer by using his/her own words. The answering of such questions requires that the researcher should access facts

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relating to the interviewee's knowledge and experience or the opinion of the interviewee regarding the subject matter. This also assists to overcome researcher-centred bias. Interviews can be audio- or video-recorded (with consent), but written notes are equally important which was considered in this research.

The advent of in-depth email interviews by some qualitative researchers have already been utilised in data collection. Fritz and Vandermause (2017) cited in Creswell (2007), Wertz et al. (2011) and Hunter (2012) maintain that this method is regarded to be an effective and reliable method of data collection, adding that quality email interviews will improve the interviewing experience for both the participant and the researcher by enhancing data quality and research results.

The data collection processes were divided into two catergories: one involved workers or bargaining unit employees, another for management personnel. After the South African President announced the total Lockdown on 26 March 2020, Transnet negotiated with the workers and entered into agreements with individual employees. Those employees who had the tools, equipment, means and ability should work from home; the rest were issued with permits to travel to-and-from work since Transnet was declared to be an essential service by the Minister of Corporative Government during the hard lockdown period. However, it was discovered that some staff members, instead of embarking on Remote Work opted for rotation, while some chose to remain on shift-work.

Hence, the conducting interviews required rethinking and innovation; the researcher used a variety of approaches including physical contact, ICT tools such as face-to-face interviews, Microsoft Teams, and Zoom. Archibald et al. (2019) state that Zoom is a collaborative, cloud-based video-conferencing service offering features including online meetings, group-messaging service, and secure recording of sessions. Technology has provided researchers the flexibility to conduct interviews from anywhere. Lobe et al. (2020) and Teti et al. (2020) highlight that qualitative researcher is facing unique opportunities and challenges because of the disruptions caused by the onset of the Covid-19 pandemic which included wearing masks, sanitising, social distancing, face-to-face restrictions, and the need to explore alternatives such as the utilisation of ICT when conducting interviews. In support, Gray et al. (2020:292), in their article, highlighted some of the

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positive experiences and the strength of the approach stating that Zoom provides convenience and ease of use, enhances personnel interface through end-to-end encryption, is accessible, and is time- and cost-saving as there is no need to travel.

It has been noted that qualitative online interviews provide both the researcher and the participant flexibility as it does not require one to have an account - it can be easily downloaded using the link provided by the organiser of the meeting. Zoom also has abilities to share screens between the participant and the interviewer, and display documents as well. By using this facility the researcher can attach the gatekeepers' consent letter as well as the ethical clearance document. The participants were informed about the purpose of the study, all finer details of the research processes, voluntary informed (signed) consent, and all precautions to safeguard the confidentiality of personal identities and information.

3.10 PRE-TESTING

Its important to consider a pilot exercise. Archana (2020) suggests that a pilot study should be used to measure the willingness of the respondents to participate in the research, in addition to test the appropriateness of the questions (among others). In this study, the researcher initially discussed the interview schedule with 2 participants to gauge their opinions, understanding, and interpretation of the interview questions, in addition to testing the appropriateness of language usage in the construction of the questions or the interview schedule. Piloting also assisted the researcher to understand the responses to questions in line with what was intended to collect. Since participants have been working at DCT since 2019, they were in a position to add their own suggestions such that the interview schedule was subsequently amended to heed a range of views. The result of the piloting was gaining an insight into the willingness of the respondents to participate in the study, the researcher then adjusted the interview schedule, and embarked on the next step of recruiting a suitable and relevant number of participants.

3.11 DATA COLLECTION TECHNIQUES, AND THE INTERVIEW SCHEDULE

Data collection in qualitative research may involve several back and forth moves between data collection and data analysis processes as new insights and experiences can lead to elaborations,

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adaptations and changes in the original plan that may necessitate a revision of the design. In this study, the researcher conducted in-depth structured interviews in a logical, cordial, ethical, simple, and transparent manner, (Ancillo at el., 2021).

Data was primarily collected from both bargaining unit employees and management employees by posing interview questions in line with the interview schedule. There was one set of interview questions for managers, and another for workers. There was a combination of open-ended, short-notes, and multiple-choice questions. A few participants indicated that they could not find time to sit down face-to-face with the interviewer; hence, telephonic, Zoom and MSW Team sessions were arranged at a convenient time. The interview duration was between 25 to 30 minutes.

3.12 DATA ANALYSIS

Qualitative data analysis which may exhibit recurring trends, requires text summaries, categorising, and data coding. The researcher adhered to the notion that data analysis describes how the model comparison approach and uniform framework can be applied to include predictors to observations that are non-independent, while providing guidance to the treatment of problem areas (Charles et al., 2017). In qualitative studies, the data must be analysed by using words and text rather than numbers, after which hypotheses are developed (Mohajan, 2018). Qualitative analysis transforms data into findings (Aspers & Corte, 2019), but there is no specific formula for this process and approach. Methods for analysing qualitative data include discourse analysis, content analysis, narrative analysis, thematic analysis, and grounded theory. Friese et al. (2018) recommend the grounded theory approach since it utilises the computer-aided thematic content analysis method. The thematic analysis approach was applied in this study to dissect and organise information collected from the interviews. Thematic content analysis (TCA) entails the use of a development topic and subtopics, normally referred to as theme analysis as it familiarises the researcher with the data who then searches for (and reviews) themes to create a coherent pattern. Accordingly, thematic analysis provides clear steps to elicit results from summarised data in a structured manner. According to Friese et al. (2018), thematic analysis has of six steps:

- Familiarisation through getting to know the data
- Identifying initial codes in the data

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- Generating themes through combining codes
- Reviewing themes by checking themes against the data
- Defining and naming themes through sense-making
- Writing up results, conclusions, and quality assessments

The responses from the participants were categorised into sub-themes which were further analysed and grouped to make interpretation of the data clearer. In the process of analysing qualitative data, the research analyst needs to follow a few basic guidelines as suggested by Friese et al. (2018):

- Understand your inner self, your biases, and preconceptions;
- Understand your question, and seek creative abundance;
- Consult others, and continue looking for alternative interpretations;
- Exhaust the data, and account for all the data in the texts, then publicly acknowledge the unexplained, and remember the next principle;
- Be flexible, and celebrate anomalies as they are the windows to insight;
- Get critical feedback as the solo analyst is a great danger to his/her self and others; and
- Be explicit and share the details with oneself, team members, and the audiences.

In the next chapter the researcher made use of Monkey Learn version 12, using the word cloud technique to present the results of the study. The researcher also integrated Cluster Analysis (CA) within qualitative inquiry as cited in (Prevett et al., 2020). The Monkey Learn software is a powerful computer-assisted tool that is used to analyse qualitative data using coding and themes (Mortelmans, 2019). Additionally, Monkey Learn is an open-source licensed computer software that applies an algorithm layout to position words without overlaps, allowing the reader to select relevant words and develop themes (Gao at el., 2020).

3.13 LIMITATIONS

Through the duration of data collection processes, Transnet was experiencing wage negotiation protest action with its workforce and their trade unions. Most of the possible participants were initially hesitant to participate in the study. The workers eventually went on a unprotected labour strike on 6 October 2022. Transnet immediately declared force majeure. Most of the bargaining unit employees belonged to unions; however, there were 4 non-managerial staff members, and 6 members from management personnel who responded to the call to participate in the interviews.

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The limited number of participants, as well as the protest action at Transnet, restricted the findings from being generalised to other port terminals in the country.

3.14 VALIDITY AND RELIABILITY

Reliability is the ability of different or separate researchers to reach similar conclusions using the same experimental design or participants in a study to consistently produce the same measurement. Validity speaks to the trustworthy of the study's results. Siedlecki (2020) claims that validity is the ability of an instrument to measure what it is supposed to measure and generalise the result beyond the sample. Internal validity refers to the veracity of the study, how well it was constructed and run, accuracy of definitions and theories employed, accurate measurement of variables, the researcher's degree of confidence that the change in the dependent variable as was affected by the independent variable, and how validity can be improved (Quintão et al., 2020)

External validity is a study's ability to generalise the results to the population, and elimination of extraneous variables as causative factors increases external validity (Hancock et al., 2019). Caution was applied in this investigation to achieve better data quality by controlling and executing quality sampling processes. Hence, quality control measures ensured information credibility and dependability by asking appropriate research questions, in addition to explaining the purpose of the study and all its finer details to all participants.

Nevertheless, multiple factors can create risks to the validity and reliability of the findings of research (Harahan, 2018). In order to mitigate such risks, the interview protocol was reviewed and aligned according to the aim, objectives, and research questions of the study. Since this is a qualitative study the researcher touched on issues of organisational culture, trustworthiness of employees, accountability, credibility, authenticity, transferability of skills and behaviours with the organisation

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3.15 ETHICAL CONSIDEREATIONS

The researcher made sure that the identity of the respondents remained anonymous, provided a comfortable interviewing atmosphere in which respondents were free to respond without free of victimisation. Saunders et al, (2019:208) state that the ability of a "researcher to collect his/her own primary data, or obtain secondary data will depend on gaining access to an appropriate source(s)". Emphasises is required for researchers to guarantee the anonymity of interviewees, in addition to recommending strategies to adopt for ensuring privacy to all research processes including the management of distress and risks during the interview (Arifin, 2018). In this study the researcher was guided by UKZN's Research Ethics Committee's stipulations regarding culture, conduct, integrity, and procedures concerning the area of research. Further ethical fundamental considerations by Fleming (2018) are outlined below:

- *Ethical expectations*

  Society has broadened and increased the demand for accountability for the actions of researchers' conduct, both at personal and professional levels.
- *Informed consent*

  This is referred to as the cornerstone of ethical research. Consent should be provided freely by the potential participant. The researcher should ensure that participants are fully informed about the research procedures, the intention, and data to be collected such that and give their consent voluntarily to participate in the research prior to data collection processes.
- *No deception*

  Deceiving participants should be avoided altogether. The only justification for deception is when there is no other way to answer the research question, and the potential benefit of the research far exceeds any risk to the participants.
- *Right to withdraw*

  The researcher should ensure that participants feel free to withdraw from participation in the study without fear of being penalised. Consideration of the potential harm to the participants and to the institutions is paramount.
- *Conflict of interest and debriefing*

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The revelation of prior relations and activities of the researcher can provoke conflict which may stifle transparent reporting. Ideally, participants should also have access to any publications emerging from the study.

- *Confidentiality and anonymity*

  The researcher should maintain complete anonymity and confidentiality regarding the identity and information the participants provided before and after the research process. This study ensured that the identities of the participants were protected via anonymity, such that each participant was referred to as respondent number 1, 2 and so forth. Consideration was also given to the Compliance to the Protection of Personal Information Act (POPIA), also known as the POPI Act, which is mandatory for most organisations in South Africa.

3.16 CHAPTER SUMMARY

This chapter (3) presented the methodology for the research which included data collection techniques, the qualitative research method, the research design, sampling techniques, validity and reliability, and ethical considerations of the study. A semi-structured interview schedule was implemented. Ten (10) participants were involved in the study. Interviews were conducted through face-to-face interaction, telephonically, and via social-media platforms. The next chapter (4) provided the results of the study.

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CHAPTER 4: ANALYSIS AND FINDINGS

4.0 INTRODUCTION

This chapter presented the findings of the study and analysis of the results. Data collected was presented in different forms such as tables, figures, graphics, and descriptive formats to the reader. The chapter also discussed the data analysis approach, meta data and the demographics of the respondents. The results were discussed according to the objectives of the study. Individual questions were coded as per the emerging themes. Responses were coded and interleaved in different relevant tables per objective. Individual perspectives and experiences were discussed in detail in line with the literature review. The chapter focused on the sense-making of the perspectives of both the managers and the workers in the bargaining units. The chapter used annotations in written notes to ensure that no pieces of collected data are omitted during analysis and the presentation of the results. In order to provide clarity when describing the results, the research objectives were delineated as topics.

4.1 DATA ANALYSIS APPROACH

The purpose of the data analysis is to provide only relevant (and summarised) information gathered from raw data and align it to the research objectives. In this regard, the researcher described and interpreted the participants' comments, information, and the emergence of subsequent themes for data analysis. The presentation of results adhered to common qualitative analysis principles by immersing oneself in the data collected to gain rich insight into the respondents' understanding and experiences of the subject of ICT and its adoption at DCT during and after the Covid-19 pandemic. The study elicited an array of participants' perceptions on the adoption of ICT at Durban Container Terminals. This data was coded and linked to the different units relevant to the main research question. Interview transcripts were subjected to technical analysis and thereafter categorised into different themes according to the study's subtopics. Data relevant to the research objectives was dissected to answer the research questions. The researcher also considered negative data to understand its nuances and to identify gaps to provide suggestions regarding topics for

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further studies. The results of this qualitative research were further analysed using the Monkey Learn computer software to assist in unpacking response connotations. As stated earlier, the researcher used Monkey Learn program to highlight relevant themes from the results which were also presented in figures.

Qualitative tests which were applied included coding and categorisation of data from the interviewees' comments and views. These included transcripts from one-on-one in-depth recorded interviews and Zoom sessions (video-recorded), in addition to the researcher's written notes from probes and follow-up questions. Lastly, key codes were developed using the participant's own words.

4.2 META-DATA AND DEMOGRAPHICS

The respondents were drawn from DCT Pier 1 and Pier 2, management and Bargaining Unit workers. The respondents were purposely selected from Operations, Engineering, Maintenance, ICT, and Support Services such as Capital Projects and Finance Departments. The researcher successfully conducted interviews with 10 respondents. There was a total of 6 managers who participated in the study, representing 60% of the sample, with 40% non-managerial staff representing the bargaining unit employees.

4.2.1 Respondents' departments

As state earlier, the study targeted two Engineering Managers, and One Logistics Specialist who were Subject Matter Experts (SME), two Technical Managers and two Operations Managers who were Terminal Executives managing the operations, two Maintenance Planners and two Engineering Technicians using ICT tools as their Computer Maintenance Management System (CMMS), One ICT manager and an Application Support Analyst supporting the Terminal, six System Users who were Assistant Management Accountant, Cost Engineer, Contract Administrator, Document Controller, Engineering Technician, Planner and a Financial Accountant, and two Union Representative Members.

These positions represent the various careers and employee levels at Transnet Durban Container Terminals (DCTs) at the time when the headcount was conducted. The employees in these departments were affected by the Covid-19 pandemic which precipitated the Transnet work-from-

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home policy. Most of the port and casual workers were excluded from the sample (as per exclusion criterion) but they could possibly belong to any of the departments in operations and engineering.

The participants represented all the departments from Durban Container Terminals as depicted below in figure 4.1. Engineering and Operations represented about 40% of the sample as they form the core of the Durban Container Terminal Business. The Information and Communication Technology (ICT) department is an extension recommended by the Head Office of DCT and other terminals and is responsible for the implementation and supports of all ICT-related projects.

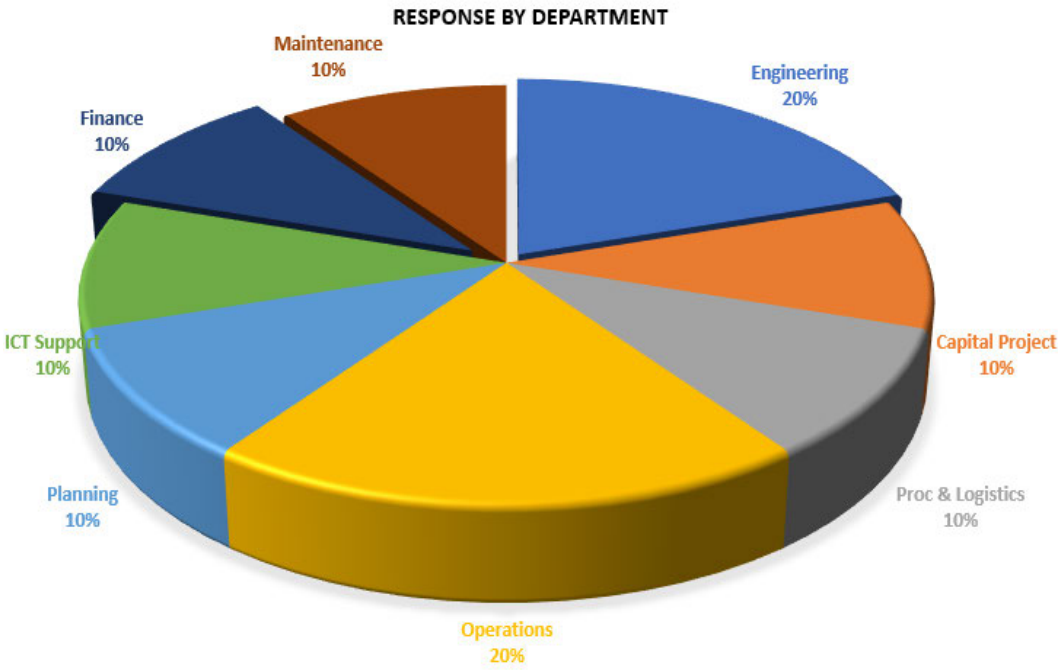

Figure 4. 1 Respondents' Departments

Operations, Engineering and Maintenance departments accounted for half the number of the participants, and their departments represent the core of the Durban Container Terminal (DCT) business; the others such as Procurement and Logistics, Finance, Capital Projects, Planning, and ICT Support service the core departments. The rest of the departments are evenly distributed and make up the other half. The Operations Department and Engineering Department each contributed

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about 40% of the respondents as they were the two major departments from both Pier One and Pier Two.

4.2.2 Respondents' Experiences

Over 60% of the participants have been at DCT for more than 5 years, and 40% were at DCT for more than a year but less than 5 years. It is important to note that no participant was at DCT had less than one year's experience at DCT as shown in figure 4.2 below. The research results reveal that most of the respondents were at Durban Container Terminal for more than five years, and some were well over ten years, indicating that they had sound knowledge of past and current situations at the workplace. As such, they had sufficient experience to relate to the environment to understand how it was affected by the pandemic.

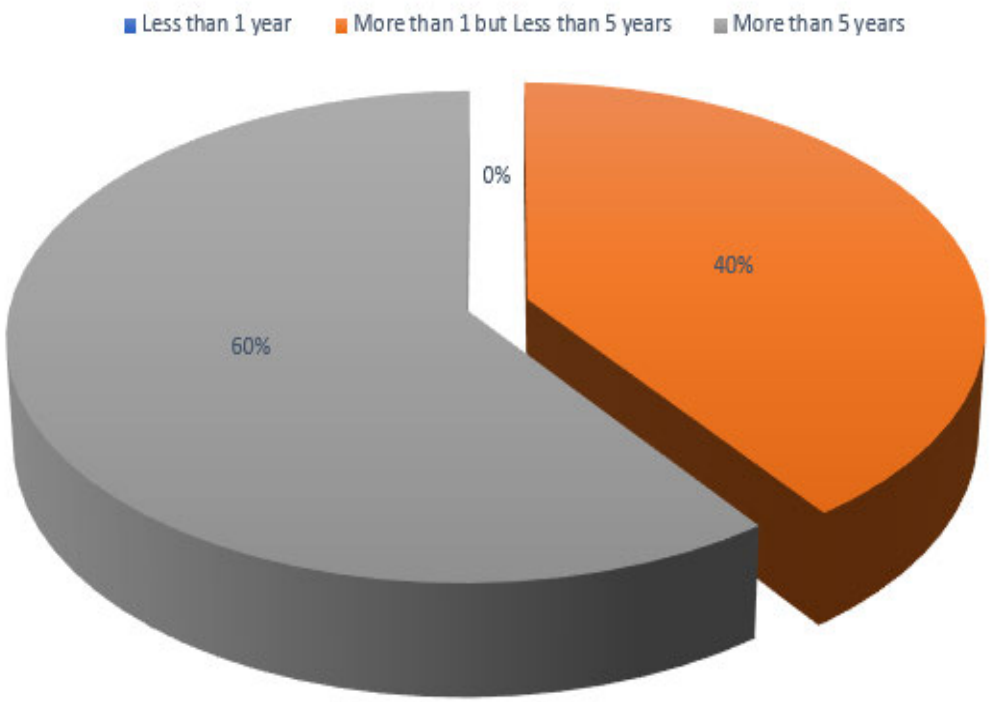

Figure 4.2: Respondents' experience, (Monkey Learn Online, 2023)

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4.3 MONKEY LEARN RESULTS AND OUTPUT

In order to gain an incisive understanding of the participants' perspectives and experiences, relationships and/or meanings emerging from the data via the use of Monkey Learn, generated key words that helped drive themes which created a clear picture of the results that emanated. Key words such as Remote Work, Use of Microsoft, Smart Technologies, Employee Support, Shared Resources, Productivity, and Task-relatedness emerged more prominently as depicted in the Cluster of words (figure 4.3). These key words helped to drive themes through cluster analysis which were connected to the objectives of the study were unpacked according to their relevance.

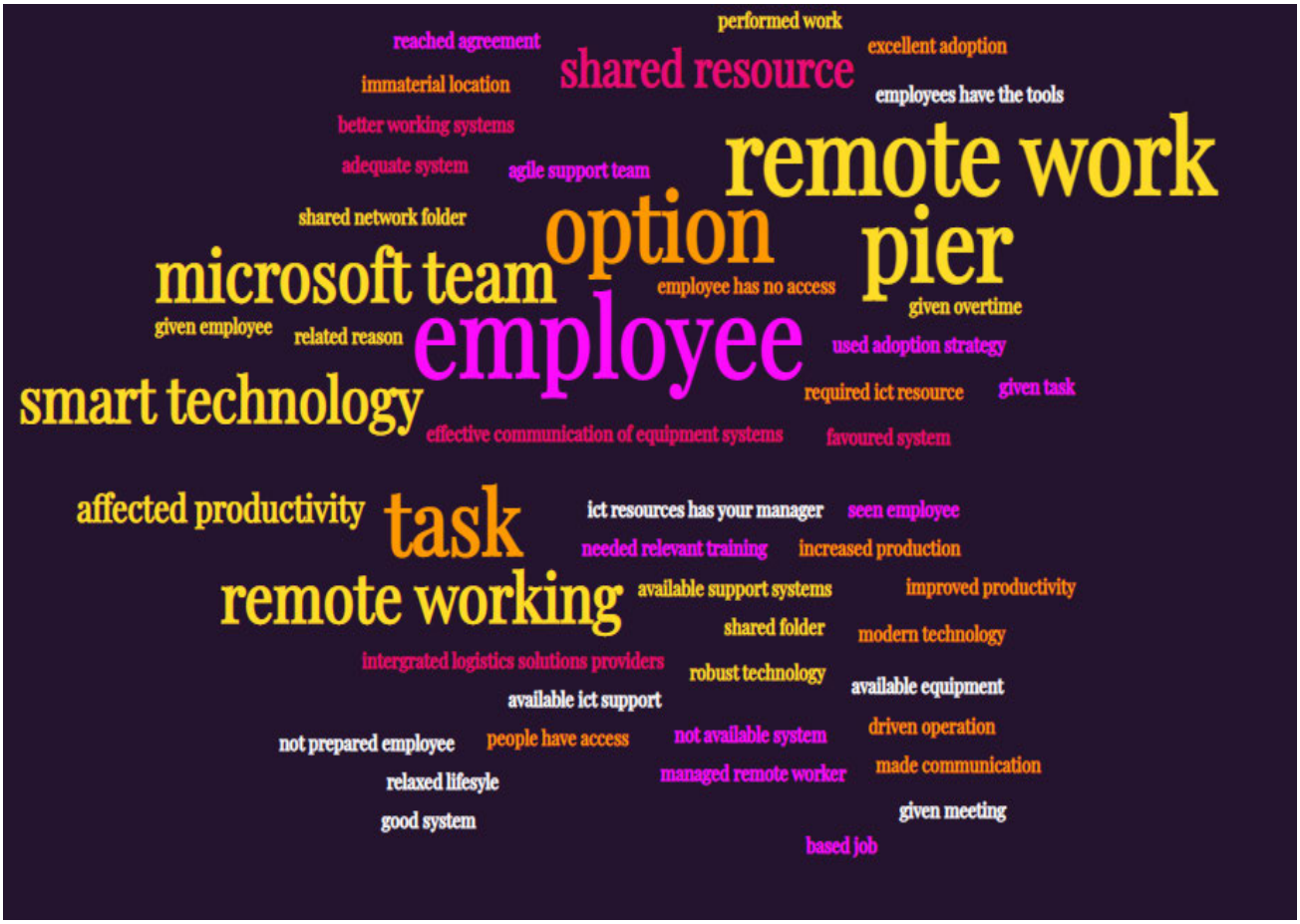

Figure 4. 3 Cluster Generator (Monkey Learn, 2023)

According to the Word Cloud process relevance output, the following themes and sub-themes emerged as being relevant to the objectives of the study, as shown in table 4.1 below. Sub-themes

were allocated a percentage in terms of their relevance to the objectives and purpose of the research.

Table 4. 1 Theme Relevancy

Objective	Theme	No.	Sub-theme	%
Influence of resources on the adoption of ICT applications	Shared Resources	156	Shared network-folder availability	56%
			Shared ICT resources	100%
	Remote Working	141	Remote working	85%
			Managing remote workers	56%
	Task-relatedness	131	Productivity and Task-relatedness	75%
			Used adoption strategy	56%
Adoption of ICT for effective Remote Work	Availability of ICT resources	242	Available ICT to improve working systems	56%
			Employee access to ICT	65%
			Management of ICT resources	65%
			Required ICT resource	56%
	Uptime and System support	112	Available ICT support	56%
			Agile support team	56%
Support Mechanisms for workers in Remote Work	Management Communication	130	Effective communication of systems	65%
			Employees having the required ICT tools	65%
	Change Management	56	Employees being prepared for change	56%
	Relevant training	56	Relevant training to plug the gaps	56%
	Support for employees	56	Available support systems	56%
Digital solutions for management of employees Working Remotely	Open-door policy	106	Employees having access to Management	56%
	Emerging Technology	49	Smart technology to run the port effectively	49%

4.3.1 Influence of resources on the adoption of ICT Applications

Three main themes emerged under the objective on the influence of resources, which were Shared Resources, Remote working and Task Relatedness. Respondents are of the opinion that remote work can be effective if resources are shared among departments across DCT such as working on Shared network folders where files can be edited, viewed or commented by several users simultaneously. One User can create the file on a shared folder, the supervisor can review it, make

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corrections and obtain approvals online. Shared ICT resources was another aspect where the same can be used across rather than replicating the same at each and every department.

4.3.2 Adoption of ICT for effective Remote Work

Respondents were of the view that the availability of ICT Resources in general affect effective Remote Work in a wider range of aspects with regards to available ICT to better working systems that are always available when required, are reliable and effective. It also came up that even though systems are working well, employee might not be having the access to those ICT resources such as portable, iPad, mobile apps and laptops as opposed to desktops, at the same time respondents felt the management of ICT resources is critical to ensure equitable allocation within departments and individuals of the required ICT resources

An important aspect that came out strongly is the Uptime and System support of the system. Systems affected by either loss of power such as continued load shedding affecting the network infrastructure causing long periods of system downtime. This has a huge negative impact on productivity, System support both from a technically point of view where the specialist personnel from ICT should be available to support on a three-shift basis as DCT operations are around the clock and from and infrastructure point where once the network is down, affecting moving of trucks and cargo in and out of the terminal causing serious congestion affecting Transnet clients along the entire supply chain and logistics

4.3.3 Support Mechanism for workers in Remote Work

Four major themes came out of this objective which are, Management Communication, Change Management, Relevant training and Support for Employees. Management communication according to the respondents is key as this helps in change management and to remove or clear entirety and fear of the next move the employer is going to take as people were not sure if Remote Work is going to continue or employee services will not be required for long. The same goes for employee support and providing relevant end user training for all new implementations as a result of new ICT solutions

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4.3.4 Digital solutions for management of Employees Working Remotely

Open door policy and trusty were another major aspect linked also to management communication, allowing the employees access to superiors when they need to seek clarification in their areas. It is important to note that most of the employees interviewed were of the opinion that Durban Container Terminal management made it possible and allowed unlimited access to even top executive Management

Respondents were of the perception that DCT should leverage on automation, and Emerging Technology such as IoT, to manage online monitoring of equipment, remote smart sensors especially where physical opening of gates for cleared vehicles and driverless machines. This aspect is closely linked to task relatedness where some tasks require digitalization to be performed by machines. This can reduce the practice of rostering employees. They further noted that Smart technology can assist effectively run the port

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Research Objective Ranking

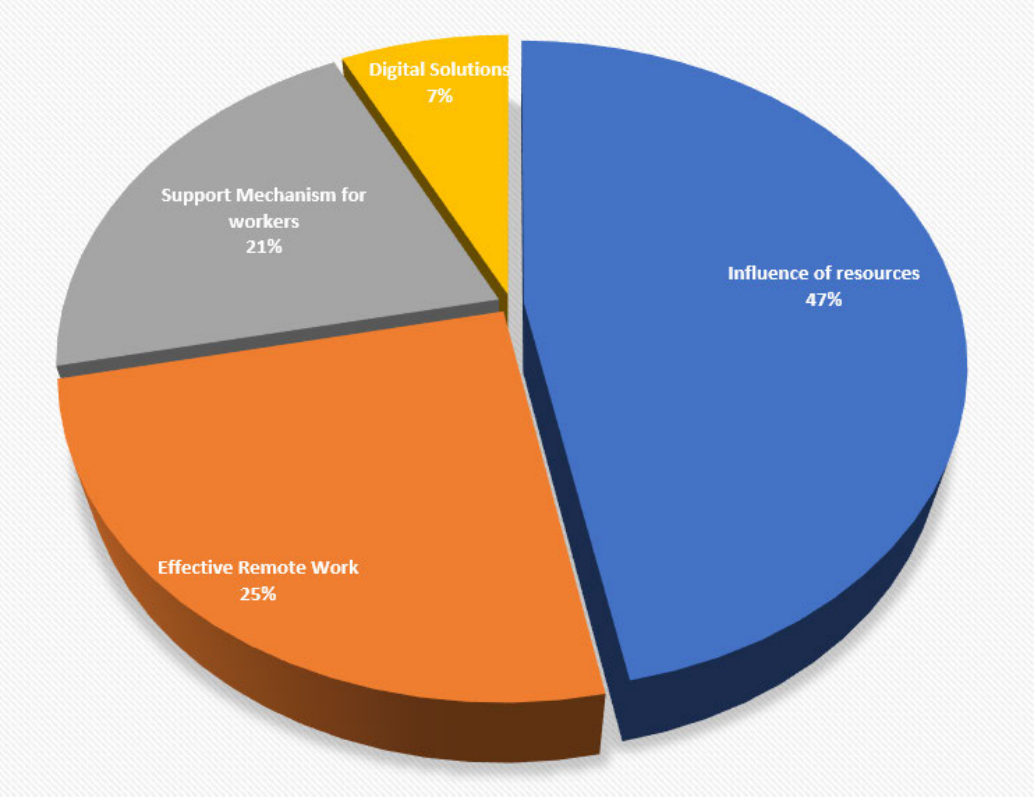

Figure 4. 4 Research Objective Ranking, (Monkey Learn Online, 2023)

According to the output of Monkey Learn Program, represented in figure 4.4 below, the first objective, *Influence of resources on the adoption of ICT Applications* ranked first at 47% in terms of the perspectives of participants. The pooling and provision of shared resources, remote working, and task-relatedness were found to have a major impact on the adoption of ICT at Durban Container Terminals. This was followed by the importance of *adopting ICT for effective remote work* which elicited with three themes with two sub-themes each. Critical consideration needs to be given to the Availability of ICT Resources in broad terms, System Uptime, and System support.

Sustenance, care and empathy come more prominent amongst the participants indicated that there is need for robust Support Mechanisms for Remote Workers such as physical and emotional support, preparing the organisation for change management, providing relevant training, and opening channels of communication and access to management. Digital solutions for the

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Management of Employees Working Remotely ranked lowest in the study's results, as most of the respondents were of the view that Transnet employees do uphold high levels of integrity and are bound by the culture of transparency and professionalism. Smart Technology was regarded by the participants as an aspect that cannot be separated from the rest of the ICT tools.

Another set of the Word Cluster generator, pertaining to its relevance that emerged from the sub-themes and their contribution to the study as depicted in table 4.2 and figure 4.5 below:

Table 4. 2 Theme Relevancy to the Study

Sub-Theme	Points
Shared Resources	156
Remote working	141
Task Relatedness	131
Availability of ICT Resources	242
Uptime and System support	112
Effective Management Communication	130
Change Management	56
Relevant training	56
Support for Employees	56
Emerging Technology	106

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In the figure below, shows the dominance of availability of ICT resources

Figure 4. 5 Theme Relevancy to the Study, (Monkey Learn Online, 2023)

4.4 ANALYSIS OF RESPONDENTS RESPONSES

The objective was to unpacked factors affecting the adoption of Information Communication Technologies (ICT) solutions at Durban Container Terminals and to promote remote working; and how adoption can be sustained going into the future. The respondents remained anonymous in this study due to confidentiality and ethical reasons. The responses provided by the participants were not linked to any personal records of the employees who participated in the research.

Codes/pseudonyms were allocated in the following sections (figure 4.6), where letter ***W*** represented Workers and ***M*** for Managers. These were followed by a suffix representing the objective and the question as seen below:

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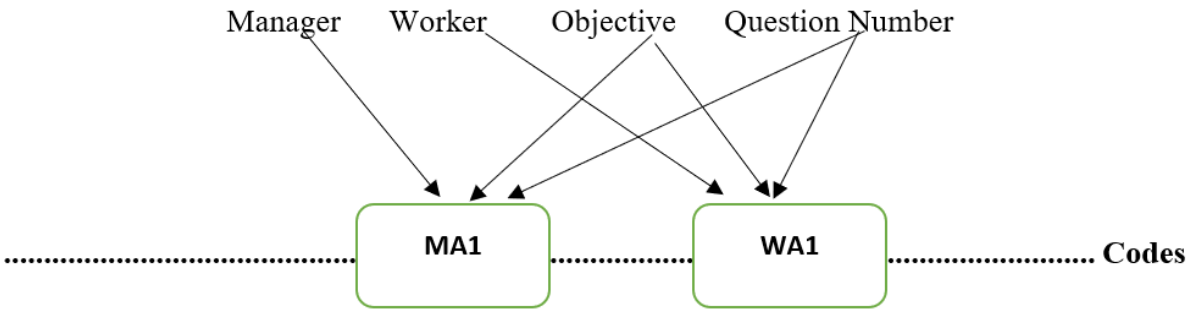

Figure 4. 6 Participants Codes Allocation

Letter '***A***' represented the Adoption of Information Communication Technology (ICT) for effective Remote Work. Each participant was represented by a number; for example, 'Respondent 1'. Questions were posed to the respondents in line with the objectives of the study.

When approaching the participants in the study, the researcher's goal was to understand their perspectives with regards to adoption of ICT technologies as viable alternative tools in the shift from predominantly onsite to remote work or hybrid - a situation that has never happened in the organisation in the past. The purpose was to interrogate the participants' contribution to ICT adoption as an enabler for Remote Work, and as a tool to assist them perform and improve productivity in their respective areas. The researcher also wanted to make-sense of what the respondents were enacting that contributed to utilising ICT tools at Durban Container Terminals. Their behaviour and attitude towards an innovation such as ICT solutions make them both innovators by being part of the implementation process, and early adopters by exploiting the opportunity to expeditiously use such a solution tool. As such, users may gain interest in the technology Palm (2020), or become 'laggards' who take long to embrace innovative strategies making it difficult for organisations to become proactive in the face of a threatening crisis (Sartipi, 2020). The responses were grouped as per objective as detailed in the following sections.

4.4.1 Adoption of ICT for effective Remote Work

Table 4.3 presented the objectives in line with the aspects of the adoption of ICT at Durban Container Terminals**.**

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Table 4. 3: Adoption of ICT for effective Remote Work

The following Table 4.3 presents the responses from both Managerial and Non-Managerial employees with regards to the objective on the adoption of ICT for effective Remote Work

CODE	QUESTIONS	RESPONDENT 1	RESPONDENT 2	RESPONDENT 3	RESPONDENT 4	RESPONDENT 5	RESPONDENT 6
MA1	Do you use any ICT applications in your work?	Most of the time	Mostly	Many times, we use it	All the time	Most of the time	Too much
MA2	Can the work be performed remotely by using ICT tools?	True	It's possible	Sometimes	Not so often	IT equipment needed	Maybe
MA3	If not, how have you managed to remain actively working during the Covid-19 crisis?	Rostering of staff to ensure those who are physically needed on the ground are present to perform hands-on tasks.	Rostering	Rostering	Rostering	Rostering	We were rotating employees: 7 days on and 7 days off to accommodate numbers in the workshops
MA4	What ICT systems are in place?	SAP	NAVIS	GCOS	NAVIS	MS Teams	SAP
MA5	Do you think these systems are adequate for port operations?	Needs more	Enough	Maybe	Upgrade needed	More is better	Not really
MA6	What is DCT's ICT adoption strategy?	Not sure what adoption strategy was used.	Very dominant	To become a technology-driven operation	Repositioning Transnet as a Globally Integrated Logistics	Paperless environment. Automation of various processes	Not Sure

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CODE	QUESTIONS	RESPONDENT 1	RESPONDENT 2	RESPONDENT 3	RESPONDENT 4	RESPONDENT 5	RESPONDENT 6
					Solutions Provider		
MA7	What was the degree of ICT preparedness at DCT for this sudden transition?	Prepared. However, most users in DCT use desktop computers and not laptops. This made remote work difficult, and hence the rostering system was favoured.	Robust technology and a committed support team	No information	4IR Adoption	Sourcing of Desktops/Laptops. Sourcing of dongles/3G cards. Introduction of electronic signatures, shared network folders. Training employees on various ICT usage such PDF documents. Introduction of MSW teams made the transition easy because we could all meet on teams to go through the work schedule.	not sure
MA8	How may have Remote Work affected productivity?	Positively. Many people can be more productive as	Not at all	In some instances, negatively; but for managers it	Delays as working under no supervisions cost someone to be discipline enough	Improved productivity. No traffic whilst travelling to the office. Time	For Managers it improved as people were working in the

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CODE	QUESTIONS	RESPONDENT 1	RESPONDENT 2	RESPONDENT 3	RESPONDENT 4	RESPONDENT 5	RESPONDENT 6
		there are fewer interruptions.		has increased production		saved was used more efficiently and effectively. Introducing MS teams made meetings more productive.	comfort of their homes.
MA9	What ICT systems do you suggest should be provided?	Laptops for all users at DCT. The desktop computer should not be used anymore across DCT.	Modern technologies to support current ICT systems and strategies.	Teams, Zoom	None	Systems that will assist to track performance during remote work.	not sure
WA1	Were you prepared for ICT usage at home in this transition?	Notice was given by	Management made plans	n/a	People were told in advance	n/a	n/a
WA2	What ICT Systems are provided to do you work with?	SAP	Other	SAP	n/a	n/a	n/a
WA3	If your response above is other, please name the System.		SAP, MDRM8 and MS teams	n/a	n/a	n/a	n/a
WA4	Does the System adequately address your work requirements?	Requirements are met	Adequate	Maybe	Sufficient	n/a	n/a
WA5	If your response is *No*, explain the shortcomings.	n/a	n/a	n/a	n/a	n/a	n/a
WA6	Do you sometimes revert to manual operations if a system is not available?	Management provides alternative	Often	Wait for power	Workaround	n/a	n/a

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CODE	QUESTIONS	RESPONDENT 1	RESPONDENT 2	RESPONDENT 3	RESPONDENT 4	RESPONDENT 5	RESPONDENT 6
WA7	What is your opinion regarding DCT's ICT adoption with regards to your work?	Our ICT does not attend to our queries as Planners.	I should be allowed to work remotely at least 60% of the time.	n/a	They assist in ensuring efficiency through task management	n/a	n/a
WA8	Do you see gaps that the system should address to promote effectively performing your tasks?	Relevant training is needed.	They need to do an analysis	n/a	Frequent training will be very helpful.	n/a	n/a
WA9	What ICT systems do you suggest should be installed?	n/a	I'm not sure what systems are out there.	n/a	PLC programmes	n/a	n/a

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The above is tabulated format of both the management and the workers' responses concerning the adoption of ICT at DCTs which related to the relevant literature review. Firstly, from the management view, all participants agreed to using ICT applications in their day-to-day work, and that 5 out of the 6 managers were confident that their departmental work can be performed remotely using ICT tools but one was not completely sure they can work entirely off-site. Two managers claimed that they started the rostering of employees to ensure that those who were physically needed on the ground were present to perform the hands-on tasks. Another manager answering the same question said that they were rotating employees on a 7-days-on and 7-days-off basis to ably manage the number of workers attending maintenance workshops. This was in line with the Covid-19 regulations of limiting the number of people in a building and adherence to social distancing.

All management personnel agreed to adopting ICT solutions in the form of NAVIS, which is a cargo planning software for resource optimisation and automation systems across the coastline which provides information to customers in real-time. This system is easy to operate, provides quick responses, and has minimal downtime. It also conforms to internal and external variables of the TAM model after having been found to be effective in information systems theoretical frameworks, (Jetter, Eimecke & Rese, 2018). Systems Application Programmes (SAP) was also widely adopted at DCT over other ICT solutions. The SAP application is an Enterprise Resource Planning (ERP) software that provides an integrated system which has been used internationally, with a market global share of 25% (Koksalmis & Damar, 2021). Koksalmis and Damar (2021) also used the modified version of the Technology Acceptance Model (TAM) by adapting SAP through considering four variables: actual usage, behavioural intention to use, perceived ease of use, and perceived usefulness. These four variables were integrated with aspects of empowerment, consultants' support and training, and personal innovation. The advantage of SAP is that it provides a single source of truth, and creative solutions for managing ports and operating facilities (Sulaiman et al., 2021).

However, in addition to NAVIS and SAP, there are other systems adopted at DCT, referred to as *other* by the participants. When asked whether these systems are adequate for port operations, 80% of them agreed, whilst 20% were undecided. Disappointingly, some managers had no idea of the organisations' ICT adoption strategy; one was clear that DCT intended to become a Technology-

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driven organisation, another indicated that DCT was repositioning itself as a Globally Integrated Logistics Solutions Provider, and one stated that DCT intends to become a paperless environment incorporating the automation of various processes.

Managers were asked the departmental ICT preparedness that was done at DCT to accommodate the sudden transition to Remote Work, most managers found it difficult since most users in DCT were familiar with using desktop computers and not laptops. This made Remote Work difficult and hence the rostering system was favoured. In other words, preparedness meant the sourcing of extra desktops and laptops, accessories such as additional screens and dongles, and 3G or 4G cards for use at home - but this was not possible at short notice. A positive development noted by one manager was the presence and availability of a robust technology and agile ICT support team. One manager proposed the introduction of electronic signatures, shared network folders, and training employees on various ICT systems. They also noted that the quick adoption of the MS Teams platform made the transition easy because the team members could all meet on MS Teams to go through the work schedule, among other items. Another manager proposed the 4IR Adoption which was recommended by Li, (2022) because it accelerated workforce-reskilling that facilitated the adoption of ICT in Remote Work in several organisations.

Most of the managers strongly believed that Remote Work had affected productivity in a positive manner, arguing that there were fewer interruptions. They reported that there were no more traffic and time delays whilst travelling to the office; time saved was used more efficiently and effectively by engaging in MS Teams sessions that made the meetings more productive. Moreover, adopting ICT meant improved quality as people were working in the comfort of their homes. However, some managers reported delays as the lack of supervision required the individual worker to be self-disciplined to be efficient and effective.

The researcher also attempted to make-sense of workers' perspectives pertaining to the same objective regarding the adoption of ICT for effective remote work at DCT. Most of the respondents said they were not fully prepared for remote work, as the period between the notice to work from home was not adequate to prepare training. Although their responses to ICT systems that were adopted at DCT were the same as those of Management personnel, as they all supported the use of technology. They complained that ICT, as a department, was supposed to be supporting them. Workers also criticised management for not attending to some of their queries during the

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pandemic, such that they would periodically revert to manual operations. This could have been attributed to external and internal variables. Similarly, Hong and Yu (2018) claim that this influences negative attitudes towards using ICT and behavioural intentional use. Moreover, Rusdi et al. (2020) highlight that cohesion between ICT adoption factors like technology utilisation, management support, and ICT training are supposed to promote smooth ICT utilisation. When asked about ICT adoption with regards to their work, they believed and of the view that if they were allowed to work remotely at least on a rotational basis, or part of the of the time of the week, with this in place the respondents felt they will be effective and efficient in task-management. Clearly, training was noted as being one of the weaknesses in the system that hampered ICT adoption amongst the employees.

4.4.2 Influence of Availability of Resources

The implementation of ICT projects depends on several factors as this process impacts on the organisation's ability to adequately fund innovations regarding ICT. Funding ensures the availability of resources, including the recruitment of skilled personnel. Mushayi & Mayayise, (2022) noted that ICT implementation and migration are often marked by huge costs which is a challenge for developing economies in the era of digital transformation. The table 4.4 below details both management and employee responses to the objective of the availability of resources on the adoption of ICT application

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Table 4. 4: The availability of resources and the adoption of ICT applications

CODE	QUESTIONS	RESPONDENT 1	RESPONDENT 2	RESPONDENT 3	RESPONDENT 4	RESPONDENT 5	RESPONDENT 6
MI1	What resources are you providing remote workers with?	Laptops, internet connections	Latest technology gadgets	Laptops, internet connectivity, listening devices	I don't have anyone working from home	Desktops/Laptops, dongle/3G connection, headphones. Activating Microsoft teams	Laptops and data cards
MI2	What, if any, resources for remote work did you provide pre-pandemic?	Data bundles, Laptops	All	Data bundles, Laptops	Laptops	Data bundles, Laptops	Data bundles, Laptops
MI3	How did management prepare employees for remote working?	Management quickly reacted to get employees ready for remote work to ensure that operations could still continue.	Very supportive	Some resisted, others embraced it	Offered computers, and data (Planning department - not operations)	We had to be the source of information for employees on how to connect remotely and how to navigate to get the work done	By ensuring that employees were given the tools to be able to work from home
MI4	What agreements were reached with the employees before remote working started?	manual timecards, rostering system.	Transnet principles of honesty, integrity, and respect	Agreements that safeguard Transnet policies and procedures	Not within operations. No idea within planning and other departments	Signing of work from home agreements which had guidelines on the employee should conduct himself /herself during the remote working	That employees should be reachable during working hours for all meetings, work-related tasks, and when needed to meet their targets.

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CODE	QUESTIONS	RESPONDENT 1	RESPONDENT 2	RESPONDENT 3	RESPONDENT 4	RESPONDENT 5	RESPONDENT 6
MI5	What have you done to ensure that employees have the tools that they need to work?	Purchased earphones for Teams' meetings for desktop computers	Kept floating stock for tools of trade	Provided them with ICT tools to enable them to work remotely	n/a	Engaged Supply Chain Department to source tools like desktops/laptops, data cards, and headphones	N/a
MI6	How do you circumvent a problem where the employee has no access to equipment?	Rostering system used. Some employees had to come in to work as they could not work remotely at all.	Offer support by issuing tools of the trade	He is not able to do his work	Remotely - n/a to operations	The employee will not be able to perform work duties	n/a
MI7	Do workers sometimes use their own equipment for remote work?	Not allowed	Policy does not allow	Not at all	Transnet provide IT equipment	Company equipment	n/a
WI1	What ICT resources has your manager provided to enable remote work?	None	Laptop and sim-card	n/a	Laptops and iPad	n/a	n/a
WI2	Do you sometimes use your own equipment such as Data or laptops?	No ways	Not allowed	Prohibited	Company equipment	n/a	n/a
WI3	Does the company provide you with data or internet access at home?	Not at all	Provides data and cell phones	Data is provided	Sometimes not enough	n/a	n/a
WI4	What ICT tools do you use to communicate with your co-workers or supervisor?	E-mails	Microsoft Outlook and Teams	Cell phone and email	phones and social media	n/a	n/a
WI5	Were you trained for the use of these ICT tools?	Trained	Does not know everything	Trained	Under training	n/a	n/a

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Table 4.4 above presented responses with regards to the availability of resources and the adoption of ICT applications. It dissected the variables of the availability of resources that influenced ICT adoption in terms of capital outlay, maintenance, and the return of investments (ROI). Resource input variables are "categorised into success factors; that is, 'drivers and enablers' of ICT, and factors for failure referred to as barriers and inhibitors" (Hina, 2022: 19, Tsiavos & Kitsios, 2022: pp.681-693).

According to the Project Management Institute (PMI, 2021), resources include human capital, assets, finance, time, knowledge, and anything that is needed to execute a task which can be the skill-sets of employees for the adoption of ICT software. Karunaratne et al. (2018) contend that key obstacles for ICT adoption were the availability of technology and infrastructure in the organisation. Further, monitoring and efficient utilisation of resources were important. Hansen (2022:2) emphasises that "optimum efficiency is so important that organisations should hire a solely devoted resource management person, also known as a Resource Manager, responsible for creating and assigning tasks to get the project done, and accountable for allocating the resources needed to make the project a success". Hence, the researcher made-sense of participants' perceptions and their experiences to explain the phenomenon of ICT adoption at DCT.

Commencing with management perspectives and experiences, six managers and four employees' perspectives were examined. The researcher asked the managers about what resources they were providing Remote Workers with, and responses included the provision of laptops, internet connection, and technology gadgets to enable ICT operation. However, respondent 4, explained that this question did not apply to him since there was nobody working from home in his department. This implied that the aspects of preparedness and availability of ICT resources were paramount, (Cianci, Weibel, & Elfering, 2023).

When participants were asked about how management assist employees in preparation for remote working, all six management members were quick to point out that they were very supportive to ensure that operations remain afloat. Participants 5 and 6 were straight to the point claiming that they had to immediately transition to utilising ICT and thus had to train employees on how to connect and navigate remotely to conduct their daily work routines, hence employees were

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provided with the appropriate ICT tools to work from home spaces remotely. Most models explore ICT adoption as a process; however, Covid-19 caused unprecedented challenges which forced governments and organisations to suddenly shift from on-site to off-site (online) collaborations (Waizenegger, McKenna, Cai & Bendz, 2020).

Management was then asked about what agreements were reached with the employees before remote working started. The responses to this question were generally unanimous and ranged from manual timecards, the rostering system, cultural issues, and calls to adhere to Transnet principles of honesty, integrity, and respect whilst engaging in Remote Work. This study found that agreements that safeguarded Transnet, policies, guidelines, and procedures were signed between the organisation and its employees, detailing how employees should conduct themselves in the remote work environment. Also, respondent 6 emphasised the need for employees to be contactable during working hours for all meetings, work-related tasks, and when they were needed on issues of meeting their performance targets, (Peterson, Lantz-Andersson, Hillman, Lundin, & Bergviken Rensfeldt, 2019) .

Another question paused on how managers ensured that their employees were provided with the necessary tools for remote work evoked the notion that management did everything in their power to engage with the Supply Chain Department to source ICT tools and computer equipment to enable employees to adopt ICT and effectively work from home (WFH). Additionally, all management participants revealed that they resorted to the rostering system in response to the question on how they circumvented situations where the employee had no access to equipment; they concurred that no employee was allowed to use his/her own laptop or any other equipment for company business although one manager indicated that employees sometimes use their own equipment.

When queried about what ICT resources managers provided to enable Remote Work, one participant indicated that there was none, while others revealed that they received laptops, data, sim-cards, and iPads. Moreover, when responding to the question about what ICT tools workers used to communicate with co-workers or the supervisor, it was noted that social media featured prominently which highlighted that it was adopted as a strong communication tool used for Remote

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Work. Again, the lack of training emerged strongly as a barrier to adopting ICT for DCT workers. Moshood et al. (2020: 1) submit that the "ICT adoption process is considered as an interaction between technology, task, and an individual, and users should be able to embrace the technology" in the long term.

4.4.3 Support Mechanisms Available for Remote Workers

This objective aimed to explore support mechanisms available to Remote Workers to foster ICT adoption for effective Remote Work. Whilst the employees were accustomed to support from colleagues, coaches, mentors, and supervisors during Work-from-Office (WfO) times, there was no one to rely on when working from home. Coupled with the need to embrace the use and adoption of ICT, this was found to have extensive and profound emotional drawbacks on the employees and their families (Xie, Ma, Zhou & Tang, 2018). In support, Zara and Monteiro (2021) assert that the Covid-19 pandemic and Remote Work may have worsened the negative mental effects of addiction to ICT in that home confinement could have serious consequences on the mental health of workers.

Research advocates that organisations are duty-bound to assist their workforce cope with and adjust to their newly-altered work environment (Carnevale & Hatak, 2020). Most workers found themselves confined at home unable to commute. Carroll and Conboy (2020) maintain that the pandemic had massive implications for the nature of work and the role that technology plays in the workplace. "Organisations have been forced into the rapid 'big bang' migration to technology and 'tech-driven' practices in an unprecedented and time-pressured manner. In many cases there has been little training or reflection on how practices associated to technology should be introduced, integrated, and adapted to suit the new workplace context" (Dhawan, 2020: 5).

In presenting the results as in table 4.5, the researcher began with the analysis of the data elicited from management. The first question was about the number of employees each manager supervises. The responses ranged from 14 to a maximum of 165 employees under one manager. Spagnoli, Manuti, Buono and Ghislieri (2021) state that supervisors must perform the important function of being a link between the strategic vision of the company and the workforce. The number of employees reflects the span of control and may influence the effectiveness of providing

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motivation and energising the workforce. Respondent 4 who had 165 employees had none working remotely. When asked about the tasks that remote workers perform, all the managers responded that they compile and write reports, perform financial transactions, enact aspects of cost engineering, conduct quantity surveying, plan risk and project management, consider health and safety aspects, attend meetings, approve of purchase orders and requisitions for spares, and execute general office work.

Managers were asked about how psychologically prepared their employees were for remote work. All of them agreed that this was wanting: some employees worked effectively, some were unable to be very productive at home as the lockdown caught everyone by surprise. However, some managed to quickly adapt, whilst others resisted the transition to the unknown remote work environment. Respondent 2 added that they provided training and counselling sessions to prepare the employees via the Employee Assistance Program (EAP). Further Table 4.5 below presented detailed responses with regards to Support mechanisms available for workers to utilise ICT effectively for Remote Work.

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Table 4. 5: Support mechanisms for workers to utilise ICT effectively for Remote Work

CODE	QUESTION	RESPONDENT 1	RESPONDENT 2	RESPONDENT 3	RESPONDENT 4	RESPONDENT 5	RESPONDENT 6
MS1	How many employees do you manage?	28	14	Project teams	165	31	127
MS2	How many of these employees work remotely?	None	14	5	0	31 during Covid- 19.	At the current moment, none
MS3	For those workers working remotely, what tasks do they perform?	Reports, project management	Same tasks as when a person is at the office	Management, planning, cost-engineering, quantity surveying, risk management, health & safety etc.	n/a	Finance tasks	Reports, attend to meetings, release requisitions
MS4	How psychologically prepared were your employees for remote work?	Not generally prepared. Some worked effectively while some were unable to be productive at home.	Not sure, as Lockdown took us all by surprise	Not prepared, but adapted	n/a	Not prepared. Some resisted because of the 'unknown'. But training and counselling prepared the employees	n/a
MS5	What Support Systems are available for your team?	Employee Assistance Programme (EAP)	EAP - should an employee feel the need	ICT Support is available	n/a	SAP, NAVIS, Microsoft Team	SAP system and IT support
MS6	In what way do your workers seek support when required?	They would usually call co-workers or	All means of communication at the beginning. Later re-	They log a call to the help-desk	emails, live requests, and phone calls (live	Contact ICT department through	We call the SAP team to assist

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CODE	QUESTION	RESPONDENT 1	RESPONDENT 2	RESPONDENT 3	RESPONDENT 4	RESPONDENT 5	RESPONDENT 6
		myself for advice	channelling to specific protocol		operation, no remote)	emails/Microsoft Teams	
MS7	What is the difference in supporting Remote Work and working at the office?	There is no face-to-face interaction - some require this interaction to be productive.	None, except for visual contact at the office	You can get assisted remotely but may have to go to the ICT office physically	Easy to communicate, walk into any office for assistance	Working in the office, you can physically visit the ICT department or via telephonically	none
MS8	Have you noticed any employees struggling with the disconnect between work-life and home-life?	I have not seen that	Not sure	Some people say so	Maybe	Many times, we notice it as management	Not really
MS9	Do you assist your employees balance work-life from home-life?	Assist subordinates	Maybe	All the times	Maybe	We do help the in many ways	too much
MS10	How much do you value that all employees have their voices heard?	Moderate. I ensure that all requests for a meeting are met	Open-door policy even though we work in virtual spaces	Highly	n/a	Important for the employees to be heard - it increases productivity and morale	
WS1	Do you feel you have all the ICT support you require to be effective in Remote Work?	n/a	Not really	n/a	More is needed	n/a	n/a
WS2	How is your manager monitoring your Remote Work?	n/a	No monitoring	n/a	never worked at home	n/a	n/a

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CODE	QUESTION	RESPONDENT 1	RESPONDENT 2	RESPONDENT 3	RESPONDENT 4	RESPONDENT 5	RESPONDENT 6
WS3	Is there any difference in the way you are being managed now, compared to the past?	n/a	No difference	n/a	Same as we are at the site	n/a	n/a
WS4	Do you have any Standard Operating Procedure for working from home?	n/a	No	n/a	No	n/a	n/a
WS5	Is there any task that you cannot do remotely?	n/a	some tasks not all	Not at all	A few things	n/a	n/a
WS6	If your response to the above question is '*Yes',* describe the task	n/a	Physically checking components on a machine	n/a	lifting of heavy equipment	n/a	n/a

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The researcher then enquired about how workers sought support when required. Respondent 1 said the workers would usually call on co-workers or the manager for advice. Management allowed any means of communication at the beginning, but re-channelled to specific individuals charged with the specific duty once the support requested had been categorised. They normally called to the help desk through emails, live requests and telephonically, or contacted the ICT Support Department. Five (5) out of the 6 managers agreed that there is a difference in supporting remote workers and those working in an office - trust is crucial in the absence of monitoring technology. Most the of the managers interviewed has no reason to suspect or believe that their subordinates are cheating the organisation by pretending to be working while in actual fact they are not on duty. They alluded to the fact that, they did not notice any signs of employees struggling because of the separation of work-life from home-life. Managers also indicated that should an employee require assistance, they (managers) were always available and this does not change with remote work.

Additionally, the managers were asked about the importance of employees' voices being heard and acted upon. One participant chose not to respond, one said he would do nothing, whilst another said he would put a moderate amount of effort into this aspect. However, some managers ensured that any request for a meeting by an employee was granted. Moreover, the open-door policy, even in virtual spaces, was encouraged by most managers – it was important for employees' voices to be heard because it increased productivity and elevated morale, (Garnett, 2020).

Thereafter, 4 Bargaining Employees were interviewed on the same objective, and the first question was about how they felt about the effectiveness of ICT support for Remote Work. Two workers refused to respond to the question, while two felt that they were not adequately supported with all ICT requirements. All participants concurred that there was no visible difference in management and supervision approaches since embarking on the rotational system. Workers believed they should have been given a standard operating procedure schedule for working from home. Lastly, when asked about any task that they could not perform remotely, they indicated that physically checking components on a machine and the lifting of heavy equipment were not possible.

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4.4.4 Digital Solutions to Manage Remote Workers

The use of digital tools requires Computer-Mediated Communication (CMC), which is important for the smooth implementation, operation, and running of the organisation, (Putri & Irwansyah, 2020). Romanovs et al. (2021) contend that there is an urgent need to explore communication approaches between managers, supervisors and subordinates to ensure quality work in general. It is important to analyse the current situation in the world to review main tele-management integration problems that prevent employees from attaining their optimum performance concerning the necessary remote tasks assigned to them. Since Covid-19 severely impacted organisational employees, leadership, and social exchanges, Chen and Sriphon (2021) assert that leaders needed more-than-ever sound communication skills to share information with empathy and optimism to be effective to manage change ethically in uncertain times

Table 4.6 below presented detailed responses with regards to the availability of digital solutions to manage employees working off-site

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Table 4. 6: Availability of digital solutions to manage employees working off-site

CODE	QUESTION	RESPONDENT 1	RESPONDENT 2	RESPONDENT 3	RESPONDENT 4	RESPONDENT 5	RESPONDENT 6
MD1	What digital solutions are available to manage employees offsite?	MS Teams, cell phones		Virtual meetings and workshops	n/a	Through Microsoft teams, emails, and deadline schedules	Laptops for managers only
MD2	How do you measure the performance levels of remote workers?	Communicate throughout the day to check on progress of a task	Our KPIs are role-specific, so one's location is immaterial	Based on output	n/a	Yes, through daily/monthly deliverables	Certain tasks are given for each day and reviewed
MD3	What digital solutions are available to measure the quality of performance for remote work?	Not sure	Departmental KPI dashboard	Output	n/a	Microsoft Teams	n/a
MD4	How do you monitor overtime and overworking in Remote Work?	Unable to do this at present	With pre-approval of any overtime work	n/a	n/a	Difficult to monitor overtime/overworking during remote work.	No overtime is given to people working from home
MD5	Has trust between you and your employees changed?	There is more trust	Trust is intact	There is trust	n/a	Trustworthy team	It has not changed
MD6	How do you conduct your meetings with Remote Workers?	MS Teams	MS Teams	MS Teams	mostly video-conferencing and MS Teams	MS Teams	MS Teams
MD7	Do you think workers are engaging in private work during Remote Working time?	I have no reason to think like that	I don't think so	Workers are faithful to the organisation	I cannot say, no evidence is available	I doubt it, it's not happening	Not easy to tell
MD8	How are you monitoring employees engaging in private work with no	Through e-mails, check if milestones and	Transnet employees live by 3 main	Check how often they are offline.	n/a	Difficult to monitor private work. Don't	nothing much

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CODE	QUESTION	RESPONDENT 1	RESPONDENT 2	RESPONDENT 3	RESPONDENT 4	RESPONDENT 5	RESPONDENT 6
	authority (if applicable) during office hours?	progress are being met	pillars: honesty, integrity and respect	Monitor their work schedule.		have the tools to do so.	
WD2	Does your manager monitor non-work-related matters?	N/A	Not really	They track deliverables	All the time	N/A	N/A
WD3	Do you feel your voice is being heard by management?	Either YES? NO or indicate the scale Yes	4	N/A	2	N/A	N/A
WD4	How do you rate your own productivity when working remotely vs working at the office? (Scale)	2	3	N/A	2	N/A	N/A
WD5	Has Remote Work affected your productivity in any way?	n/a	Still productive	No change at all	Does not see and difference	n/a	n/a
WD6	If your response to the above is *Yes*, explain.	N/A	N/A	N/A	no support structure from co-workers	N/A	N/A
WD7	Does it take the same time to fulfil a task remotely as it is the time spent at the office?	n/a	Same time	No difference at all	Same	n/a	n/a
WD8	How do you get feedback from your supervisor when working remotely?	N/A	Microsoft Outlook	n/a	Telephonically	N/A	N/A
WD9	How will this pandemic change your way of working (long term) post-Covid-19?	N/A	Less fatigue, and saving on fuel costs	n/a	My tasks will need fewer people-involvement	N/A	N/A

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The aspect of effective communication was unpacked in line with the objective 4.6 above. When asked about what digital solutions were available to manage employees off-site, respondents 2 and 4 decided to withhold their views, whilst the rest alluded to the use of MS teams, cell phones, virtual meetings, emails, monitoring deadline schedules, and workshops. Responses with regards to measuring the job-performance of Remote Workers ranged from normal communication channels throughout the day to check on the progress of a task, and tracking key performance indicators (KPI) on a role-specific basis – implying that evaluating on-site or off-site work was not a challenge. One respondent indicated that monitoring is based on output in the form of daily, periodic monthly deliverables, and that certain tasks were allocated for each day and assessed at the end of each day. Regarding the question on what digital solutions were available to measure Remote Work performance, most respondents alluded to specific KPIs, performance dashboard, and the use of Microsoft Teams. In a survey conducted by Exec Survey and iGov in partnership with AvePoint in 2021, it was found that 91% of the organisations, including a 25% of the Fortune 500 companies were using digital tools such as MS Teams, confirming that the trend is increasing at an exponential rate.

Further, the management participants were asked how they monitor overtime and overworking in Remote Work. The majority responded that currently they are unable to monitor these aspects, although pre-approval of any overtime work was required. They also maintained that trust between management and employees was not affected through Remote Working. The advantages of MS Teams, conference calls, and live meetings were highlighted when working remotely.

Although the issue of trust featured prominently, on a scale of one to five, with one being Strongly Agree, and five Strongly Disagree, management are of the view that Transnet employees are hardworking, have a culture of trustworthy, and they will not be in a position of being seen not to be honesty. Respondent number 1 strongly agreed, respondents 2 and 3 strongly disagreed and the rest were neutral. Most of the management respondents were in agreement that Transnet at the moment have no capacity to monitor employees engaging in other activities during work hours. Respondents agreed that there was no way to monitor private engagements without digital or ICT enablers. Some proffered the idea that managers need to just ensure that task allocated and work milestones and progress are being met through email proof and reporting. One manager said he believed all Transnet employees live by the main pillars which are Honesty, Integrity, Accountability and Respect.

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There were four Bargaining Employees who participated in enlightening the researcher on objective 4.8 above. When asked about how their work changed from working in the office to Remote Work, all workers were reluctant to provide any clear response, this could indicate some underlying issues, or fear of reprisals. On the other hand, only one worker-participant agreed to being monitored by the manager especially when it comes to providing feedback and progress of tasks allocated. By using a scale of 1 to 5, with 1 being 'strongly agree', most of the employees did not believe that their managers seriously pay attention to their personal or family related problems, and that Remote Work had not affected their work in any way; however, they lamented the lack of support structures from fellow workers. Workers also believed that with the provision of the appropriate ICT tools, their work performance will be enhanced such that Remote Work becomes less stressful, especially due to factors like saving on travel-time, no traffic congestion, and reduced fuel costs.

4.5 CHAPTER SUMMARY

This chapter presented the results of the study extracted and interpreted from the articulations of participants during the interviews. These were discussed in alignment with each objective which was thematically classified. Responses were coded and tabulated per objective. Perspectives and experiences were discussed in line with the review of literature.

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CHAPTER 5: DISCUSSION OF RESULTS

5.1 INTRODUCTION

The aim of this study was to investigate ICT adoption at Durban Container Terminals to promote and facilitate Remote Working during the Covid-19 pandemic and beyond. This chapter focused on analysing and discussing the results of the study which were presented in chapter three. The discussion of the results was in accordance with the literature review and the theoretical framework. This chapter also provided the answers to the research questions which originated from the purpose of the study. Answers to the questions were discussed according to the findings, facts, themes and analysis of results presented in chapter 4

5.2 OBJECTIVE 1: To investigate the adoption of Information Communication Technology (ICT) to enable Remote Work at Durban Container Terminals (DCTs)

Objective (1) sought insight and to understand the factors affecting the adoption of ICT solutions at Durban Container Terminals during the Covid-19 pandemic and in times of crisis. This entailed facilitating Remote Work and how its adoption can be sustained going into the future. This objective explored the efficacy of ICT as an enabler for Remote Work in Transnet at DCTs. Organisations worldwide are moving towards the adoption of ICT to 'provide economic value' (Laudon & Laundon, 2012). This was explored through presenting suggestions for adopting ICT-based solutions, and creating awareness about how Covid-19 taught the world that work can be effectively conducted remotely anywhere. This was achieved through enacting the following:

- Investigating measures for remote working due to Covid-19 regulations and restrictions imposed by Government; other factors such as floods, service delivery protests and
- Understanding the of role of ICT in enabling Remote Work through collaboration, communication, and innovation.

The researcher began by analysing and discussing the migration to remote working as a result of the restrictions imposed by the Government. The major finding presented in Chapter 4 illustrated that most of the respondents at the Durban Container Terminals embraced and utilised ICT solutions in their daily activities by working remotely, and using applications such as General Cargo Operational System (GCOS) developed internally, System Applications Program (SAP), NAVIS Sparcs N4, Microsoft Teams such that they were clearly confident that DCT intended to become a Technology-driven operation (See table 4,3). This engendered success in remote working at Transnet Port Terminals to a large extent which showed management's proactiveness which received its full cooperation among staff members.

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The research revealed that as soon as the outbreak of Covid-19 was announced, DCT proactive in their approach, and immediately went into action in line with Government protocols, and began providing programmes of awareness of the dangers of the pandemic and how swift the virus can spread in closed environments such as congested buildings' workspaces, (Coro, 2020). The organisation went a step further through temperature-screening of all workers entering into Transnet properties including customers and visitors through the Employee Assisted Programme. Furthermore, management started the rostering of staff to decongest the work environment, and ensure that people who are physically needed on the ground are present to perform the hands-on tasks. These measures reduced the spread of the pandemic and gave birth to work-from-home, Cicala, (2020) in Transnet Port Terminals. However, not all employees could not immediately start working from home, due to either the nature of the work or unavailability of ICT resources, (Cianci, Weibel, & Elfering, 2023).

Further, there was the realisation on the part of management to facilitate the smooth transition to Remote Working via the provision of basic ICT resources such as desktops, laptops, and accessories including additional screens, dongles, 3G or 4G cards for use at home. Most of the respondents agreed to have been prepared for Remote Work by entering into individual agreements with the organisation in supporting working from home. Bryan et al, (2020 referred to this as accelerating the requirement for workforce reskilling for the adoption of ICT in Remote Work in several organisations.

Most of the bargaining employees interviewed were of the view that being equipped with adequate ICT resources, coupled with functional role-based training, would promote Remote Work for at least two or three days a week or engage in a full-time work from home regime. This will be also be effective and efficient in task management and overall individual performance. Conversely, workers maintained that a lack of ICT and digital innovations in the organisation would force them to revert to manual operations - a small number of respondents expressed dissatisfaction and blamed management for the lack of initiative to drive ICT adoption. Rusdi et al. (2017) attributed this to relationships between ICT adoption factors such as technology utilization, management support, and ICT training. Hong and Yu (2018) contend that external and internal variables affect attitudes towards using ICT in the work environment. Remote Working is no longer an option as the pandemic and other challenges prohibiting free movement are expected to persist in the post-pandemic era (Brynjoslfsson et al., 2020: Kim 2021)

- Understanding the of role of ICT in enabling Remote Work through collaboration, communication, and innovation.

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The researcher further investigated the role of Information Communication Technology (ICT) in enabling Remote Work through collaboration, communication, and innovation, and the investigations revealed that Durban Container Terminals were quick to introduce several ICT initiatives such as the Microsoft Teams application to transition to Remote Work easily as different teams could all meet virtually to negotiate work schedules, discuss daily project scrum calls, communicate task updates, and report on progress. This recognition of the power of ICT in bringing together dispersed teams and individuals to work remotely was unanimous. This was strengthened by the fact that in 2021 AvePoint found that 91% of organisations including a quarter of the Fortune 500 companies were using digital tools such as MS Teams; and the trend seems to be increasing at an exponential rate. (Yeganeh., 2021. pp.188-209).

Emerging technologies can enhance predictive maintenance (PdM), and online condition monitoring for both staff and operating equipment thereby reducing machine breakdowns, which are expensive to maintain and disruptive in terms of operations. The adoption of Smart technology can assist by promoting innovation in different spheres of the business such as the use of driverless cranes in ports. Hence, DCT should adopt a strong digital transformation strategy to create digital workspaces that empower employees through collaboration. The executive management of DCT can engage Cloud solutions to boost corporate effectiveness and cut costs, in addition to enabling expeditious responses and ensuring data security.

Applying Artificial Intelligence (AI) and Machine Learning (ML) to automate operations leads to manual intensive operations becoming redundant as they can now be performed remotely. Most organisations are exploring the ways in which automation and optimization of everyday tasks, leveraging the DevOps philosophy and Atlassian Jira Software, which can significantly enhance workers' productivity and effectiveness in their daily routines. The use of Atlassian Jira demonstrated that workers responded positively to the implementation of various automation rules and improvements (Batskihh, 2023).

Employing Business Intelligence (BI), Business Warehouse (BW) models, and utilising Big Data Analytics has catapulted organisations into the direction of creativity and identifying new market segments and opportunities. Business access to Realtime data sets and information enhances operational transparency, visibility, and resilience. Management must implement strategic decisions to maintain an online presence to boost business leads, drive competitiveness, spruce the brand image, interact on social media platforms, and engage with customers online to maintain a sound digital environment. Also, management should strategise to assist employees in successfully fulfilling their daily tasks by revamping old processes to fully digitise the business.

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Most respondents welcomed the introduction of Microsoft Teams for meetings which made individuals and teams more productive since every team member had to report back and 'catch-up' with all team members in the same department. Remote Work at DCT became more successful as it rolled-out more ICT innovations such as electronic signatures, and the creation of OneDrive shared network folders which were accessible to all, with some level of monitoring and supervision. Also, revealed was that intensive employee training was needed regarding various ICT software and application usage such as document management systems (DMS), and conversions of various formats of documents which would accelerate the adoption of ICT for Remote Working.

These initiatives reduced disruptions of work performance which thus improved productivity. Some of the respondents felt that even when some of the teams were on rotation, the system of Remote Work ensured that there were few traffic congestions ensuring that travelling to the office was smooth and punctual which led to efficient and effective work performance.

5.3 OBJECTIVE 2: To determine whether the adoption of ICT tools is influenced by the availability of resources

This objective was pursued to understand if the adoption of ICT digital solutions as tools of the trade was influenced by the availability of resources. The objective also intended to measure the organisation's ability to adequately fund ICT innovations. This study also attempted to comprehend the influence of the availability of resources regarding ICT adoption in terms of capital-outlay requirements, maintenance, and the return of investments (ROI). The implementation of ICT projects depended on several factors: Information Technology Greenfields implementations, migrations, and landscape transformations are often marked by huge costs which is a challenge for developing economies in the era of digital transformation (Mushayi & Mayayise, 2022). Munje and Jita, (2020: 263-279) conducted an investigation on the impact of the lack of ICT resources, and found that the "lack of resources can affect adoption of ICT in any sector of the economy". In order to unpack this objective, the study also explored the impact of the lack of ICT resources by establishing the following:

- Whether remote systems and ICT applications that are in operation at DCT are being utilised; and
- The effect of ICT readiness on productivity at Durban Container Terminals (DCTs) during the sudden transition to Remote Work.

The researcher established that DCT was using two major Enterprise Resources Programs (ERP) which are SAP, a high-end German suite of products, and Navis, a port-operating system. Both

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systems required huge amounts of investments. Tallon et al. (2019) notes that organisations are increasingly turning to information technology (IT) to help them respond to the unanticipated environmental threats or opportunities. The advent of Covid-19 posed serious operational disruptions that required organisations to avail ICT resources to mitigate the pandemic's effects. The Systems Application Program (SAP) and NAVIS which are powerful applications were widely adopted at DCT as both Management and Bargaining Unit Employees agreed to use these ICT applications as part of their tools of the trade on a day-to-day basis. The systems were found to be user-friendly providing quick response with minimal downtime which conforms comparatively well to the TAM model in terms of internal and external variables (Jetter, Eimecke & Rese, 2018).

Resource availability is considered as the driver and enabler of ICT, and the lack of ICT resources is classified as a factor that causes failure, and referred to a barrier, inhibitor, and or limitation to ICT adoption. (Karunaratne et al., 2018). The study found that the sudden transition to Remote Work was difficult since most of the employees used desktops, hence this was one of the reasons to roster employees. Continued commuting to work at the height of the pandemic was exposing the staff to the risk of contracting Covid-19. Not surprising, Shouki (2018) claims that the availability of resources was not among the influential factors inhibiting ICT adoption, instead management or other organisational factors including lack of planning, resistance to change, misunderstanding user requirements, Government regulations, poor business process re-engineering, and the lack of training were key indicators that influence ICT success or failure. The study further found that ICT resource availability alone was not adequate, but the presence of robust technology and an available agile ICT support team were crucial. Also, one of the key challenges was the lack of key technical personnel onsite as DCT had been relying heavily on ICT SAP consultants, which at this point in time the organisation could not afford due to capital limitations if the funding of ICT consultants continued. This affects major enhancements required to keep these applications up-to-date with developments in the ICT sector.

- The effect of ICT readiness on productivity at Durban Container Terminals (DCTs) during the sudden transition to Remote Work.

Investigations revealed that both management and bargaining unit respondents agreed that the lack of ICT and other resources impacted heavily on their work deliverables. The lack of laptops, data cards, internet connectivity, and limited access to the latest technology and gadgets such as 5G data cards affected their ability to perform optimally. According to the output of the Monkey Learn Program analysis the objective regarding the Influence of resource-availability on the adoption of

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ICT applications ranked first at 47%, which is almost half the number of respondents who perceived that resource availability was critical to sound operations.

Additionally, results showed that management noted the pooling and provision of shared resources amongst workers through rostering of employees had a positive effect on ICT usage. Remote Working and task relatedness were found to be the major boost in adopting ICT at Durban Container Terminals.

The Durban Container Terminal was quick to adopt Microsoft Teams, making the transition smooth because the team could all collaborate on this platform. The study also found that DCT personnel wanted full 4IR adoption as it related to current practice on ICT Predictive Maintenance (PDM) by using online monitoring technology that can be adopted and implemented based on preventative maintenance. Respondents were of the opinion that SMART Technology could increase productivity at DCT which could bridge the 4IR gap with the rest of the global terminal operators. This was supported by Robelski and Sommer (2020) who note that Smart ports were high-performing as they utilise ICT to provide a wide range of Smart applications. This is in line with Klaus (2018) who claims that 4IR is much more than just a description of technologically driving change - it requires to be implemented to drive ICT benefits. Ewan (2019) also contends that the ICT within the 4IR requires corporations to start rethinking strategies and auto cannibalisation of business models. Smart Technology is implemented via the fusion of diverse technologies like sensor communications, cloud computing, internet of things (IOT), Artificial Intelligence (AI), and deep-learning (Solanki & Nayyar, 2019). Additionally, the marine industry is seeking higher efficiencies, better resource management, and looking at transformation through the industry 4.0 and the digital twin, which are representations of the physical, data, production, and other systems (Berre et al., 2019). Globally, the ports of Antwerp and Esberg are already leveraging digital Twin data visualisation platforms to identify and monitor equipment. Van (2019) contends that the adoption and impact of information technology and change on the various types of industries, stating that the 4IR refers to dramatic social and economic evolution because of an array of technological breakthrough inventions impacting on all industries. It can be described as the revolution of digitisation and cyber-physical systems.

Additionally, the analysis of results obtained from Management respondents showed deep concerns about the risks posed by cyberattacks due to exposure to foreign devices being plugged into the network at home which disrupt production causing system crashes and loss of information. Nevertheless, they all agreed that there are ICT options that can be installed in combating

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cyberattacks. The study found that Remote Work facilitated by the adoption of effective ICT solutions was the best approach for DCT, as it saves office-space costs, improves morale, stimulates productivity, and is considered as a sound working condition. Such innovations in ICT via adopting new technologies promote flexibility and the independence to work from anywhere, allowing some staff members to stay with family rather than being separated due to work commitments. As such, ICT usage is not an option, but should be mandatory as part of DCTs' operations.

Another phenomenon that came to light in this study is the vulnerability to cyberattacks. Ogunyemi and Idowu., (2023) in their study entitled Data Security Concerns Raised by 'Bring Your Own Device' in Corporate Organisations' Hybrid and Remote Work Environments in Nigeria published in Commonwealth Cybercrime Journal noted 'the fact that employees can access organisational data from their own devices at any time and from any location increases the likelihood of unauthorised access to corporate data. Finding secure technologies for conducting confidential meetings in a remote workspace and managing confidential data outside of a remote location has been difficult. These vulnerabilities include, among others, phishing email attacks, unauthorised access through insecure remote-access tools and hacking of video conference tools. Assets such as computer equipment, internet and the network used as remote work tools must be protected, periodic risk assessments and routine monitoring are required to safeguard the privacy and integrity of an organisation's information assets and resources, (Karlzen, Bengtsson, & Hallberg, 2018).

The digitisation trajectory is often hampered by inadequate funding and resources. Kniffin et al. (2020) identified resource-availability issues as items for future research, and to inform ICT enhancement. The study found that all management respondents agreed to using ICT applications in their day-to-day work and were confident that their departmental work could be performed remotely by using ICT tools successfully – but only one of them was not completely sure of working entirely off-site. Also, the rostering of employees ensured that those physically needed on the ground were present to perform the hands-on tasks which minimised the number of people working in the workshops which was in line with the Covid-19 regulations for social distancing. Bae and Chang, (2020) claim that the adoption of ICT for Remote Work will further accelerate the use of ICT tools.

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5.4 OBJECTIVE 3: To determine the support system available for workers to use ICT tools efficiently in Remote Work

This objective pursued the availability of support mechanisms factor to assist Remote Workers in line with ICT adoption. Whilst the employees were used to 'handholding' from colleagues, coaches, mentors, and supervisors during Work-from-Office (WfO) hours, they had no one to rely on at home. Employees require support regarding the work they perform as they sometimes seek help in terms of execution of some difficult work-related tasks to be able to accomplish some of their own work deliverables. They need both physical and emotional support. To unpack this objective, the researcher attempted to establish the following:

- Finding support mechanism structures, and establishing resilience among Remote Workers.
- Understanding the serious consequences of home confinement on the mental health of Remote Workers.

Investigations revealed that most of the staff, including management, were not psychologically prepared for Remote Work in terms of timeframes, job-security, or the option of Voluntary Service Packages (VSPs). The results showed that some employees worked effectively whilst some were unable to be productive working from home, although they were still earning the same rate. Since the lockdown took all by surprise, no one was fully mentally prepared, but many later adapted while some resisted because of the unknown element of the Remote Work environment. One respondent noted that they had not been provided with specific training and counselling to cope with a pandemic of such magnitude.

Importantly, Carnevale and Hatak (2020) maintain that organisations have a duty to help their workforce cope with and adjust to their newly-altered work environment of Remote Work due to crisis situations. Hence, supervisors have a critical role to play by performing the important function of being the link between the strategic vision of top-management and the workforce, (Spagnoli, Manuti, Buono & Ghislieri, 2021). Most workers found themselves 'locked' at home unable to commute. Carroll and Conboy, (2020) claim that the pandemic had massive implications for the nature of work such that technology came to the fore in the workplace. Coupled with the need to embrace the use and adoption of ICT, work-from-home has been found to have extensive and profound emotional effects on employees and their families (Xie, Ma, Zhou & Tang, 2018).

Further, the study revealed that most managers did not prepare their subordinates for Remote Work, as they were also vulnerable to the risk of contracting the virus having to be in daily contact with more than 150 people in their departments. Management claimed that it was safer for workers

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to log a remote call rather than to maintain the old-fashioned open-door-policy as this was said to be riskier given the virus' rapid spread. With regards to challenges, Wang, Liu, Qian and Parker (2020) conducted investigations to explore hurdles experienced by Remote Workers in the context of the pandemic, and found that they faced interference, ineffective communication, procrastination, loneliness, lack of social support, job autonomy, monitoring, and increased workloads. However, there has been little research in examining the challenges faced by Virtual Teams and their use of technology to mitigate Remote Work issues (Morrison-Smith & Ruiz, 2020). Research mainly focused on "social and professional isolation, and perceived threats in professional advancement" (Charalampous et al., 2019: 51-73).

An important finding in the study was the support structures that were installed through the people-management departments for employees who were unable to secure foodstuff from shops whilst working remotely; they were provided with food items at no cost which did not disrupt their daily routine - this was an example of the success of Remote Work at DCT.

- Understanding and dealing with the serious consequences of home confinement on the mental health of Remote Workers.

The analysis of the results of the research indicated that most of the psychological and sociological challenges affected employees from Transnet. Provision of such programmes in the form of counselling sessions adequately prepared the employees and managers through the Employee Assistance Program (EAP) at Transnet Durban Container Terminals. The need for Covid-19 awareness created sudden shifts such that both individuals and organisations had to proactively adapt to a rapidly transitioning business environment (Howe, Chauhan, Soderberg & Buckley, 2021). In this regard, Rudnicka, Newbold, Cook, Cecchinato, Gould and Cox (2020) based their research on policy-implications for supporting Remote Workers when managing digital self-control, productivity, and work-life balance during and beyond the Covid-19 pandemic.

However, job-rationalisation was one negative impact of Covid-19 which was a cause of concern for Remote Workers which would require emotional support; global estimates are still being calculated about how many jobs may have been lost - the unskilled and women workers have borne the brunt of this impact (Jacks, 2021). In this study, the researcher evoked participants' perceptions concerning workers who, due to fear of losing their jobs, take on multiple off-site remote employment as safety nets; and how management ensure that this will not happen at Transnet. The finding revealed that there was no mechanism to detect such practice as management rely on the honesty and integrity of Transnet employees.

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5.5 OBJECTIVE 4: To examine digital innovative management solutions to monitor off-site employees

This objective intended to examine the availability of digital technology to monitor employee activities whilst they worked remotely. The Remote Worker, if not able to self-manage, can be tempted to take on extra piece jobs at the expense of Transnet deliverables. Romanovs et al. (2021) advocate applying effective approaches for communication between managers, supervisors, and subordinates to control the quality of work in general. The study established the following to achieve the objective:

- Management approaches should facilitate the organisations' digital systems, prevent cybersecurity attacks, and monitor employees' Remote Work activities so that they do not harm the system
- Leadership and communication styles should promote the dissemination of authentic information with empathy and optimism, while developing leaders to be thoughtful, ethical, and capable to handle change in uncertain times.

The study found that Transnet Durban Container Terminals do not have a surveillance system to monitor employees, or a monitoring mechanism to measure individual employee progress as most respondents alluded to the use of MS Teams, cell phones, virtual meetings, emails, deadline schedules, and workshops to ensure that work deliverables and progress were being met through email proof. One respondent alluded to the fact that Transnet employees live by three main pillars which are honesty, integrity, and respect. Loyalty to Transnet would not allow them to engage in activities that will bring the organisation into disrepute; for example, engaging in 'other' employment whilst working for Transnet.

However, it is important to analyse current situations in the world, and review main tele-management integration problems that prevent employees from performing all necessary tasks remotely due to either the social set-up of the office or home where the employee does not have adequate workspace. The other issue that emanated from the research was the home set-up where more than one person was working for different organisations, thus compromising organisational data and the safeguarding of sensitive information. Hence, Covid-19 impacted organisational employees, leadership, and social interactions. Further, findings from the study indicated that management relied on communication throughout the day to check on the progress of a task via the tracking of key performance indicators (KPI). However, management was unable to monitor any overtime work so they relied on trust, although pre-approval was a pre-requisite for this.

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Remote Working has empowered workers and professionals especially in the ICT and technology sectors to take up more than one job at the same time, this poses a real threat and practical risks to Durban Container Terminals, should some employees be tempted to take up additional jobs with other employers. In this regards the use of ICT technologies that monitors the geolocation and detection of corporate devices through use of Instant IP Address Lookup and 'traceroute' command to find clues to the location of the Internet Protocol (IP) address, might need to be thoroughly examined, (Dan, Parikh, & Davison, 2021). This will deter unethical employee-behaviour from utilising the employer's time and resources on other assignments outside their scope of work and ensure employees dedicate their time entirely on Transnet business to improve performance and quality of work.

The study found overwhelming support for the concept of ICT digital Emerging Technologies and Smart technology to be used to operate the Durban Container Port Terminals effectively. These includes but not limited to port equipment training simulators for Drivers in Charge (DIC), Specialist Operators and Technicians, tracking management systems for tracking container locations, monitoring budge boats in and around the berth and Vehicle to Vehicle (V2V) for mobile equipment, Vehicle to Pedestrian (V2P), and Vehicle to Infrastructure (V2I) systems.

The open-door policy and equal employee access to management were central to the objective of facilitating Digital Solutions for the management of employees working remotely. Leadership and communication styles should adhere to sharing true information with empathy, ethically, and with optimism, and developing leaders to be thoughtful and capable to handle change in uncertain situations (Chen & Sriphon, 2021). Although digital solutions for the management of 'remote' employees ranked lowest in the study, most of the respondents were of the view that Transnet employees do uphold high levels of integrity, and are bound by the culture of integrity and professional standing. Concerning Smart technology which featured in the output, the participants articulated that it could not be separated from the rest of the ICT tools in managing employees off-site.

Results from the study revealed that the adoption of new ICT technologies is the future path of Remote Working at DCT. Respondents favoured applications such as Inbox for Workplace Management, automated email reminders, and better working systems on MS Teams, Live Dashboards, and a tracking system to monitor an individual's activities during working hours. Participants pointed to the challenge of people not answering their phones because of network connectivity issues, and the inability to motivate and uplift the team while being physically absent calls for new leadership models.

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According to BCG, COVID-19 Employee Sentiment Survey, May 21 to June 13, 2020 (N = 12,662 in the US, Germany, and India), unweighted, representative within +/-3% of census demographics, noted that many people have maintained or improved productivity during covid-19, but fewer have done so on collaborative tasks. Employers need to unlock productivity on collaborative tasks, especially if employees work remotely, (Dahik at el.,2021).

5.6 APPLICABILITY OF THE TAM AND DOI MODEL

Outlining the key elements of the Technology Acceptance Model (TAM) which are Perceived ease of Use PEOU), Perceived Usefulness and a positive attitude, (Davis, 1989). The model was applied in this study in terms of adoption of ICT in remote work, taking into account the usefulness of ICT in facilitating remote work through computer equipment and applications such at Ms Team as collaboration tools. Whilst digitalisation is not perceived to be ease, training and a positive attitude allows adoption and system maturity amongst users, (Chocarro et al., 2021).

Forced interventions are normally a management decision and may not necessarily be an innovation. The Diffusion of Innovations (DOI) identifies innovators and early adopters who were environmentally conscious, technology enthusiasts, or motivated in the obtaining circumstances. In order to survive pandemics such as the Covid-19, times of crisis such as the July 2021 riots and looting, the persistent violent service delivery protests and the 2022 floods that hit the KZN region, organisations needed to be proactive and be prepared for future eventualities. Limitations of Diffusion of Innovation Theory in this study were that there was limited space with regards to comparability, trialability and observability especially when the pandemic was spreading globally and a crisis was unfolding before the world. The relative advantages were forward planning and the preparedness of the organisation, (Lund et al., 2020).

5.7 CHAPTER SUMMARY

The study's objectives were successfully achieved as indicated in the results provided in this chapter. The results and findings of the study showed that there was need for the adoption of ICT solutions, not only for crises like the Covid-19 pandemic, but also that digital innovation and transformation is the future of the business world. The organisation should focus on ICT infrastructure investments and leverage on Cloud services for long-term return on investment. A complete migration to ICT and Remote Work will give Durban Container Terminals the competitive edge over other shipping and port markets. Since the port does not compete on its own, considering that global players are faced with a myriad of choices in terms of which port

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gives them convenient, fast and reliable marine and logistical service delivery, it is imperative that innovations via ICT tools are utilised expeditiously so that DCT becomes among the best internationally.

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CHAPTER 6: CONCLUSIONS, AND RECOMMENDATIONS

6.1 INTRODUCTION

This chapter presented the conclusions, and implications of this study. It also explained the study's contribution to the body of knowledge and suggested areas for future research. Further, this chapter outlined the limitations encountered regarding the adoption of ICT digital solutions to facilitate Remote Work within Durban Container Terminals during the Covid-19 pandemic and beyond. Lastly, the summary to the study was provided at the end of the chapter.

6.2 CONCLUSION OF THE STUDY

The study's aim and objectives were successfully achieved. The results and findings indicated that there was a greater need for the adoption of ICT solutions, not only during the Covid-19 pandemic, but also for the future of the business in this sector. A complete adoption to ICT solutions, Remote Work and Onsite Work will give Durban Container Terminals the competitive edge in the shipping and ports market. Digital innovations and ICT tools and application will provide DCT with agility, and swiftness to respond to unexpected events such as political unrest, pandemics such as Covid-19, floods, and protracted strikes. It is envisioned that the findings of this study motivate the executive management of all container terminals globally to adopt ICT solutions to circumvent crises in the future, as well as to beef-up present operations to sustain the profitability of the organisation.

The conclusion is presented in alignment to Rodgers' (1995) Diffusion of Innovation (DOI) theory, and the Technology Acceptance Model (TAM) developed by Davis (1989). The major findings of this study were:

- Digital innovation and ICT Systems are important for DCTs to operate smoothly, especially during times of crisis when online working from home is critical to keep the organisation functional. In other words, it is critical to adopt ICT solutions for effective Remote Work through innovative planning. This is supported by TAM variables that consider external factors such as indefinite lockdowns during crises, such as the Covid-19 pandemic. Similarly, the Diffusion of Innovations theory assisted in clarifying the *how, why*, and at *what rate* new ideas and technology can be facilitated among individuals and organisations to limit disruptions in their operations.

- The study highlighted some of the impact of the lack of resources on the adoption of ICT digital solutions. Most of the respondents believed that the adoption of Smart technology for port operations will allow the DCTs to reduce their reliance on manual operations. Therefore, applications such as Smart technology, Machine Leaning (ML), Internet of Things (IOT), Industry 4.0, or 4IR will perform some of the tasks presently being done manually. However, sufficient and relevant resources are necessary to facilitate projects such as online conditioning monitoring for predictive maintenance.

- Organisations are moving away from on-premise to embracing Cloud Solutions and collaborative ICT applications such as MS Teams makes the adoption of ICT solutions less costly and more effective. With the effluxion of time, opportunities for innovative applications at ports should be grasped at an early stage. Early adopters of ICT solutions are more likely to benefit with lower investment costs, as opposed to late adopters who will experience stiff competition, while jostling for Cloud services will likely escalate start-up and investment costs.

- Employee loneliness in remote work circumstances, stress, physiological and emotional burden were common among workers due to issues such as caring for Covid-19 patients and loss of beloved family members. Support mechanisms to assist workers to cope with both emotional and physical stress during crises, was deemed necesary. Remote Work with its resultant set of problems affects the organisation and the employees. This situation requires astute leadership and innovativeness to create support mechanisms to support employees' wellbeing, especially whilst working from home. This requires knowledge, skilful decision-making, and socioeconomic support such as the EAP programmes initiated at Transnet. Management must communicate truthfully, cordially, and effectively throughout the organisation to collect information in order to create relevant support structures for those working online from home.

- At the time of the study, the organisation's offering of the Voluntary Retirement Package (VSP) needs reconsidering - a transformed format is needed. One possibility to consider is offering an alternative package to those employees who are nearing retirement, and those with chronic illnesses and disabilities. Instead of accepting resignations from employees with critical skills, that will be important in the transformation of the organisation in its digital drive.

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6.3 IMPLICATIONS OF THE STUDY

The implications of the study of the study are presented in line with the research questions and objectives Since Covid-19 was a phenomenon that came suddenly upon us, this research proffers ideas for adoption as organisational practice in response to similar future devastations. Covid-19 taught the world that workers can be effective anywhere. Adopting ICT solutions for Remote Work could enhance organisations' effectiveness by optimising resources through automation, even in 'non-pandemic' periods.

Durban Container Terminals port handle huge imports and exports into and out of the country. The port is a regional gateway to most Southern African countries, and economies stretching to as far as the Democratic Republic of Congo, (DRC), Zimbabwe, Malawi, Zambia and others. South Africa is bound to lose business should neighbouring countries start to seriously consider alternative routes and ports in neighbouring countries such as Tanzania and Beira, Maputo in Mozambique.

Promoting digitalisation, Automation and ICT will help ease truck congestion at the Durban Container Terminal and other neighbouring terminals such Agriport, Maydon Whaff, RORO or the Durban Car Terminal. The port experienced heavy traffic congestion as importers and exporter queued for their goods resulting in customer complaints. These in turn has the potential to affect the movement of goods, logistics and supply chain of downwards business

6.4 RECOMMENDATIONS OF THE STUDY

Since an ineffective port will negatively affect the Southern African economy, the advancement of ICT solutions will provide TPT, Durban Container Terminals with the flexibility and agility to respond to unexpected events such as protests, political unrest, massive floods, and health crises such as the Covid 19. Although the study was conducted at one port, Transnet controls all ports in South Africa, hence the validity of the study's findings can be generalised to all ports in the country.

6.4.1 Promoting the adoption of Information Communication Technology (ICT) for effective Remote Work

According to the findings of the research, it was revealed that the adoption of technology is largely dependent on the availability of ICT resources, and a reliable system with sustained uptime that is managed and professionally supported by IT experts. A further imperative was the availability of an agile ICT support team at the Durban Container Terminal that can manage ICT resources

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effectively and enable systems to be accessible and user-friendly. Since the purchase and servicing of resources require large investments, the organisation has to reconfigure its Capex budget to be more ICT-orientated which requires investing in ICT infrastructure, systems, and modern equipment. The return on Investment (ROI) in ICT equipment, infrastructure and implementation may not be realised in the short term; however, a long-term vision is important to grow the organisation. This will engender workplace transformation that extends to workers' homes and offices.

Since some employees claimed that management was reluctant to acquire all the necessary ICT equipment by citing budgetary constraints, it is crucial that DCT creates an awareness that challenges and brings changes in the workplace such as attitude and culture are inevitable to promote digital literacy and establish new programmes to facilitate the adoption of technology-based ICT solutions to enable Remote Work. The innovative management of workers can be effective despite the location such that productive work can be executed successfully from anywhere.

This research strongly recommends DCT to leverage new collaboration applications such as Office 365's MS Teams, Zoom and other teleconferencing facilities. These can be incorporated mostly for office workers such as the ICT staff, administration, finance, human resources, or mostly by the shared services units or departments. Providing the workers with the necessary tools of the trade such as portable ICT gadgets, laptops, data, and enabling connectivity through VPN to collaborate with peers and co-workers. This is likely to motivate the employees to perform better; hence, hence shifting to working from home is recommended in this study.

6.4.2 Availability of ICT Resources

The findings of the study support the notion that the availability (or lack) of Information Technology Communication resources has an influence on the adoption of ICT systems in an organisation. However, the implementation of transformation systems requires huge investments in ICT resources. Hence, the researcher recommends that Transnet Durban Container Terminals consider revising its funding and budgeting models by allocating capital investments to ICT, in addition to investing in reskilling its personnel. Furthermore, training and reskilling of staff should be conducted by internal experts at Transnet rather than relying on external ICT consultants – this safeguard against cyber-attacks and huge costs as a result of such attacks. In summary, there is a need for leadership commitment to avail ICT resources to all employees.

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6.4.3 Employee Support systems

Approximately 21% of the participants agreed that there was a need for a robust Support Mechanism for Remote Workers by creating structures that promote the physical and emotional wellbeing of staff. Additionally, preparing the organisation for change by providing relevant training and keeping open channels for communication and access to management, was strongly recommended. Since the study established that Transnet employees uphold high levels of integrity and are bound by the culture of openness and professional standing, Digital Solutions for managing remote working employees were not recommended, as this could be viewed as invading the privacy of employees. The open-door policy, even in the virtual space, was welcomed since it was important for employees' voices to be heard because it leads to better performance and improves morale.

6.4.4 Supervising and Monitoring Employees Remotely

Transnet Port Terminals (TPT) at the Durban Container Terminals is likely to benefit more with the increase through the implementation and application of digital technologies, including those that enable monitoring the employees' utilisation of ICT by installing software that detects and quarantines suspicious non-related files. The ICT support team is better placed to create employee awareness on the threats of cyber-attacks. Long absences and an inactive laptop can also be checked.

The advantage of ICT is that it can turn around businesses to become profitable, through better work efficiency and data tracking, greater accessibility and collaboration through cloud computing, support and consistent software upgrades, data safety, cyber security and important data backups in case of physical damage and greater ease of access and customer satisfaction. While not embracing new technologies can jeopardise the business as the organisation will remain behind the competition, through lack of ICT innovations. Also, DCT should identify technical bottlenecks to gain valuable insights into ICT digital solutions. The management of DCT needs to build resilience and agility by adopting IoT and Blockchain to develop strong business ecosystems.

Further, management can identify employees with strong technical skills to assist less tech-savvy staff members. Executive management can also identify specific business areas that maximise business digital transformation benefits to direct future ICT investments. Lastly, management should encourage a culture of change by keeping the organisation's employees inspired, gainfully involved at all levels, and ensuring that everyone is informed via democratic communication channels.

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6.5 SUGGESTIONS FOR FUTURE RESEARCH

The research was conducted at the peak of the Covid-19; hence, it is suggested that future researchers investigating this topic should do so in a free pandemic period. Further, they should gather information from Transnet stakeholders, the customers, shipping-lines and government to understand the impact of any issue that affects the organisation. Another aspect that can be investigated is related to employees' wellbeing in terms of the effectiveness of Transnet's People Management model, especially the Employee Assistance Program (EAP) - this can be researched in line with the benefits to the employee and the organisation.

Other important aspects for consideration are ICT data information storage and cyber-security, since the organisation may shift from on-premises servers to futuristic Cloud solutions. Most medium to large organisations are moving toward ICT landscape transformations that include Cloud technology. This calls for further studies on the opportunities to implement ICT solutions.

Since the study was qualitative, and confined at the Durban Container Terminal, future researches are recommended to employ quantitative study that include a large sample, population and cover bigger geographical area, ports under the management of Transnet Port Terminals, examining proportional relationships between remote working, ICT digitalisation and Port performance

Further, there could be need to seek alignment of Transnet investment and funding model, Technological strategy to Organisational strategy and Port Performance. The government fiscal allocations from the annual budgets need to be adequate to allow Transnet the flexibility required by organisation to implement digital innovations strategies

The study recommends joint Ventures and public-private partnership (PPP)s with the objective to fulfil sustainable skills transfer and funding requirements in ICT infrastructure through mobilization of private sector funds, to improve the quantity, quality, and efficiency of services through healthy competition. Further studies could also examine customer concerns, in a view to understand the impact exploring agile service delivery model in the ports logistics and supply chain and seek to incorporate the finds into Transnet's service delivery strategy

6.6 CHAPTER SUMMARY

This chapter presented the conclusion, implications, recommendations and suggestions and direction for future research. It also affirmed that the study's aim and objectives were successfully achieved as detailed in the preceding chapters and as supported by the findings. The study intended

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to investigate Information Communication Technology (ICT) opportunities to promote remote working at DCT, determine the extent to which availability of ICT resources such as computer equipment affect the effective implementation of ICT tools. Further the study sought to understand support mechanisms to support remote workers who were affected by the pandemic and forced into working from home, and lastly assess digital innovative management solutions for monitoring employees working off-site.

The study effectively managed to satisfy the objective of the research as it showed that there are huge opportunities in ICT growth, and that digitalisation is developing at a fast pace and is expanding. Hence effective remote working can be sustained through the availability of modern computer hardware equipment, secure network and software application resources. Information Communication Technology also require appropriate levels on funding. The study showed that Durban container Terminal employees are trustworthy, honesty, have a good culture of hardworking, performance and empathy and can be trusted to work remote on Transnet network and ICT equipment

A further recommendation is for Durban Container Terminals to seek partnerships with other public and private players from the ports and marine sector from other regions, in the digitalisation strategy, including a reconsideration of the organisation's ICT policy, Cloud Integration Strategy, and identifying areas of ICT inefficiency, redundancy, and opportunities for improvement.

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APPENDICES

APPENDIX 1: Information Sheet and Consent to Participate in Research

Date:……

Dear Sir/Madam

My name is Gibson Nyarugwe from the University of KwaZulu-Natal, Graduate School of Business and Leadership, College of Law, and Management Studies (CLMS). My contact details are: [redacted] / +[redacted] and my email address is 221013397@ukzn.ac.za.

Participate by opening or copying and pasting the URL below into your internet browser:

https://forms.gle/nunnV544K8JoTPf19

You are being considered to participate in a study that involves research interviews on Information Communication Technology (ICT) innovative solutions. The aim of this study is to promote an effective technologically driven environment at Durban Port through Information Communication Technology (ICT) solutions supporting operations over remote work, by providing systems that identify bottlenecks and early warning for potential failures. Furthermore, the intention is to improve employee contribution and strengthen management monitoring through ICT strategic implementation.

The study is expected to enrol a total of 8 people from Transnet Durban Container Terminal (DCT) - 5 people from Pier 2 (Two), and 3 persons from Pier 1 (One). It will involve individual in-depth interviews using a guiding questionnaire. The duration of your participation if you choose to enrol and remain in the study, is expected to be approximately 25 to 30 minutes. The study is funded by the researcher.

There are no risks in the study, although it may involve the discomfort of being interviewed by the researcher; however, all efforts will be executed for your comfort. We hope that the study will create benefits for the adoption of new ICT technology, and direct benefits to participants will be delight in working remotely fully supported with adequate ICT resources. Performance will improve and DCT will manage to hit its targets once it embraces effective ICT adoption during the Covid-19 and post era

This study has been ethically reviewed and approved by the UKZN Humanities and Social Sciences Research Ethics Committee (approval number HSSREC/00004248/2022.

In the event of any problems or concerns/questions you may contact the researcher on mobile number [redacted] or on email address 221013397@ukzn.ac.za or the UKZN Humanities & Social
Sciences Research Ethics Committee, contact details as follows:

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HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS ADMINISTRATION

Research Office, Westville Campus
Govan Mbeki Building
Private Bag X 54001
Durban
4000
KwaZulu-Natal, SOUTH AFRICA
Tel: 27 31 2604557- Fax: 27 31 2604609
Email: HSSREC@ukzn.ac.za

Participation in this research is voluntary and may withdraw participation at any point, and that in the event of refusal/withdrawal of participation the participants will not incur penalty or other benefit to which they are normally entitled. There are no potential consequences to the participant for withdrawal from the study. The Researcher will terminate participation of the participant from the study should the participant become incapable of participation.

There are no costs that might be incurred by participants as a result of participation in the study, and there are incentives or reimbursements will be given.

Data and the confidentiality of personal information will be guided by the Protection of Personal Information Act (POPI Act) and no samples will be collected from this study.

CONSENT

I (……....) have been informed about the study entitled (**Investigating Information and Communication Technology opportunities for effective Remote Work in Transnet at the Durban Container Terminal.**) by (Gibson Nyarugwe).

I understand the purpose and procedures of the study.

I have been given an opportunity to answer questions about the study and have had answers to my satisfaction.

I declare that my participation in this study is entirely voluntary and that I may withdraw at any time.

I have been informed about any available compensation or medical treatment if injury occurs to me as a result of study-related procedures.

If I have any further questions/concerns or queries related to the study, I understand that I may contact the researcher at +[redacted] or email address 221013397@stu.ukzn.ac.za.

If I have any questions or concerns about my rights as a study participant, or if I am concerned about an aspect of the study or the researchers then I may contact:

`

HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS ADMINISTRATION
Research Office, Westville Campus
Govan Mbeki Building
Private Bag X 54001
Durban
4000
KwaZulu-Natal, SOUTH AFRICA
Tel: 27 31 2604557 - Fax: 27 31 2604609
Email: HSSREC@ukzn.ac.za

Additional consent, where applicable

I hereby provide consent to:

_____ ____
Signature of Participant **Date**

Thank you for your time in considering taking part in this study.

`

APPENDIX 2: Interview Schedule

Section 1. Questions to Bargaining Employees

a) Background questions

- How long have you been working at DCT?

  1 year □ More than 1 Year □

- Where are you normally based?
  Pier 1□ Pier 2□
- Which Operations/Department are you managing?
  Operations □ Maintenance □ ICT □
- What are your responsibilities?
- What tasks do you do in your department?
- What are your daily routines?
- Do you also sometimes work remotely or you do Rotation?
- Have you worked remotely before?
- Do you have shifts when on remote work?
- If you are working Remotely, do you perform the same tasks as if you are at the office?

b) Adoption of Information Communication Technology for effective Remote Work

- Were you prepared for ICT usage at home in this transition?
- What ICT Systems are in place?

  NAVIS □ SAP □GCOS □or other□
- Does the System adequately address your work requirements?
- Do you sometimes revert to manual operations?
- What is your opinion in DCT ICT adoption with regards to your work?
- Do you see gaps the systems should address to effectively to perform your tasks?
- What ICT systems do you suggest should be implemented
- Have you heard about SMART technology (Self-Monitoring Analysis and Reporting Technology)?
- What do you think about adopting SMART technology in Remote Working and the future?

c) Availability of resource influences the adoption of ICT tools

- What ICT resources has your manager provided to enable remote work?
- Do you sometimes use your own equipment such as Data or laptops?
- Does the company provide you with data or internet access?

- What ICT tools do you use to communicate with your co-workers?
- Were you trained for the use of these ICT tools?

d) Support system is available for workers

- Do you feel you have all the ICT support you require to be effective in Remote Work?
- How is your manager managing remote workers?
- Is there any difference in the way they are managing you now from the past?
- Have you used any Standard Operating Procedure?
- Is there any task that you cannot do remotely?
- What kind of tasks are they?

e) Digital solutions are available to manage employees working offsite

- How has your work changed from when you worked in the office?
- Does your manager check-in on you for non-work-related reasons?
- Do you feel like you are being heard by management?
- How is your own productivity when working remotely vs working at the office?
- How have Remote Work affected productivity in any way?
- Does it take the same time to fulfil a task remotely as at the office?
- How has your need of feedback developed when working remotely?
- How will this situation change your way of working (long term) after covid-19?

f) Opportunities

- What opportunities have you gained from working remotely?
- Have you gained any ICT skills as a result of Remote Working?
- Do you think your tasks can be performed better with new technologies?
- What do you think management can do to enable you work Remotely?
- Which part do you find most difficult when working remotely?
- What suggestion do you have in terms of ICT usage?

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Section 2. Questions to Managers

a) Background questions

- How long have you been working at DCT?
- 1 year □ More than 1 Year □
- Where are you normally based
- Pier 1□ Pier 2□
- What does DCT do, and in which industry is the company part of?
- Which Operations/Department are you managing?
  Operations □ Maintenance □ ICT □
- What kind of work does DCT do?
- How do operations at Pier 1 differ from Pier 2?
- Have you managed remote workers before the Covid-19 pandemic?
- If the answer is No for the above question, how have you managed to deal with it

b) Adoption of Information Communication Technology for effective Remote Work

- Do you use any ICT applications in your work?
- Can that work be performed Remotely using ICT tools?
- If not how have you managed to remain open in this Covid-19 crisis
- What ICT Systems are in place?
  NAVIS □ SAP □GCOS □or other□
- Do you think these Systems are adequate for the port?
- What DCT's ICT adoption strategy?
- What ICT preparedness was DCT for this sudden transition?
- How have Remote Work affected productivity in any way?
- What ICT systems do you suggest should be implemented?
- Have you heard about SMART technology (Self-Monitoring Analysis and Reporting Technology)?
- What do you think about adopting SMART technology in Remote Working and the future?
- Can this port be turned into a SMART Port?
- How can IOT transform operations at DCT?

c) Availability of resource influences the adoption of ICT tools

- What resources are you providing workers working remotely?
- What if any, resources for remote work have you used (data, laptops, tips, etc.)?
- How did management reacted to assist employees get ready for remote working?
- What agreements were reached with the employees, before remote working started?

- What have you done to ensure your employees have the tools that they need in order to work?
- How do you articulate a scenario where the employee has no access to equipment?
- Do workers sometimes use own equipment for remote work?
- What have you done to respond to the demand of ICT resources in Remote Working?
- How much importance do you put into making sure that all employees are seen and heard?
- Do you provide for resources for individuals or resources are shared?
- In what way do you make sure that people have access to ICT shared resources?
- How do you manage scarcity of ICT resources in your area?

d) Support system is available for workers

- How many employees do you manage?
- How many of these employees are working remotely?
- For those workers working remotely what tasks do they perform
- How psychologically prepared were your employees for remote work?
- What Support Systems are available to your team
- In what way do your workers seek support when required?
- What is the difference in support remote work and working in office?
- Have you noticed any employees struggling with the separation of work-life from home-life?
- Do you try to help your employees separate work-life from home-life?
- How do you ensure employees separate work-life from home-life when they work remotely?

e) Digital solutions are available to manage employees working offsite

- What digital solutions are available to manage employees offsite?
- How do you measure the results for the workers when they work remotely?
- Does output measures differ from work at the office?
- What digital solutions are available to measure performance remote work?
- How do you monitor overtime and overworking in Remote Work?
- How has trust between you and your employees changed?
- What communication ICT applications are available to your employees?
- How do you conduct your meetings with employees working remotely?
- How do you work with giving feedback when leading remotely?
- What are your policies on non-work conversations?

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- How are you monitoring employees doing private work during office hours with no authority?

f) Opportunities

- What ICT opportunities can be adopted as a result of COVID-19 and remote work?
- Do you foresee new ICT technologies improving remote working at DCT in the future?
- What part of the ICT usage do you find most difficult when leading remotely?
- What is “new” with the way of leading remotely compared with leading in an office?
- What threats does Cyber-attacks pose in Remote Working?
- Do you see opportunities that can be implemented in Cyber security?
- How will this situation change your way of working after Covid-19 in the future?
- What advise can you give in terms of adopting new ICT technology

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APPENDIX 3: Postgraduate Supervision Agreement

GSB&L

COLLEGE OF LAW AND MANAGEMENT STUDIES

Proposed degree: Masters of Commerce

Postgraduate Supervision Agreement

Year of 1st registration: 2021

Student:

Surname:	Gibson	Name: Nyarugwe
Student number:	221013397	E-mail: 221013397@stu.ukzn.ac.za
Supervisor:	Xoliswa Majola	E-mail: Majolax@ukzn.ac.za
Co-supervisor:	N/A	E-mail: N/A

Proposed Title:

Investigating Information Communication Technology Opportunities for effective Remote Work at the Durban Container Terminal

A Purpose of the Agreement

1. The purpose of this supervision agreement is not intended to be a legally binding agreement, but an informal guide to ensure that all the parties understand and accept the expectations of a postgraduate research component at UKZN.
2. The purpose of the agreement is to protect both the Supervisee and the Supervisor(s), by setting out the duties and responsibilities of each party ensuring that each party understands and commits to the expectations of the other.
3. Both parties commit themselves to striving for a productive, trustful and honest working relationship, aiming for the achievement of a research degree award, which can be best achieved by adhering to the principles contained in this agreement.
4. Once signed this agreement should be forwarded by the Supervisor(s) to the relevant graduate school administrator and a copy kept for reference within the school. This should be completed within the first month of the student's candidature.

B Applicable Policies and Guidelines

This document must be read together with the existing UKZN and CLMS policies and guidelines, including the applicable *Handbook*, the *UKZN Guidelines on the Supervision of Post-Graduate Degrees;* the *University's policy in relation to Plagiarism*; *Research Policies I-V* including *Research Ethics;* and the *University's policy in relation to Intellectual Property Rights* together with the prescribed

[1] Approved by CMC on 31 March 2014.

format and forms for the Research Proposal; Ethical Clearance; Intellectual Property Rights; Informed

Consent and Gatekeepers Permission Letters if applicable.

C Co-authorship

The Supervisor(s) and the Supervisee must reach agreement on the terms of any possible co-authored publication which may arise out of the research. [Note: The student is generally the 1st author.]

The primary roles and responsibilities are set out hereunder. Any deviation or additions to the roles and responsibilities must be by agreement, and must be in writing.

D Responsibilities of the Supervisor(s)

During the course of the postgraduate studies, the Supervisee can expect the Supervisor(s) to:

1. To provide academic support and guidance in relation to the project (this does NOT include editing student drafts), including the completion of progress reports annually.
2. Guide the Supervisee to adhere to all the administrative requirements of the University.
3. Give guidance about the nature of the research and the standard expected, about planning the research programme, to advise the Supervisee on literature and sources in the field which might be of assistance, the requisite techniques and the avoidance of plagiarism.
4. Develop a time line with the Supervisee, which includes the finalisation of the research proposal, obtaining the necessary approvals, data collection, data analysis and the completion of the research report.
5. To maintain regular contact with the student depending on the circumstances. Contact can include through tutorials, PhD cohort and/or supervision meetings as agreed with the Supervisee.
6. Return feedback on the written work of the Supervisee within the time frame negotiated with the Supervisee.
7. To oversee and support the student in responding to examiners' requirements. Facilitate the completion of the research project within the permissible period.
8. Work towards establishing, maintaining and monitoring a professional supervision relationship and resolve conflict. This includes providing a collaborative research environment and encouraging open communication.
9. To create a Class on Turnitin and share the details of this Turnitin with the Supervisee. To ensure the Supervisee uploads all drafts to Turnitin.
10. To complete and sign the document acknowledging submission by the Supervisee as well as the Supervisor's Report.
11. To assist with the supervision of any corrections during the examination process should the need arise.
12. Not to disengage with the supervision of the Supervisee without prior approval by the ALR.

E Responsibilities of the Supervisee

During the course of the postgraduate studies, the Supervisor(s) can expect the Supervisee to:

1. Accept that the principal responsibility for the research and its progress lies with the Supervisee and not the Supervisor(s).
2. Develop a time line in consultation with the Supervisor(s), which includes the finalisation of the research proposal, obtaining the necessary approvals, data collection, data analysis and the completion of the research report.
3. Maintain ethical standards in the conduct of the research.
4. Ensure all drafts of the research are regularly submitted to Turnitin. To ensure the final draft of the completed research is submitted to Turnitin.
5. Inform the Supervisor(s) of the progress with the research process, and of any changes or significant delays. The Supervisee must have due regard to the exclusion rules of the University and also notify the Supervisor(s) if he will be absent from the university for an extended time and make suitable arrangements for other forms of contact. The Supervisee must also inform the Supervisor(s) and the PG Office about any intention to suspend registration.
6. Keep copies of all work and documentation about progress – including approvals, permissions, and letters of consent, raw data and analyses.
7. Keep proper minutes of all meetings with Supervisor(s) and deadlines agreed to.
8. Submit written work to the Supervisor(s) by the agreed deadline.
9. Submit all written work in full; on time; properly typed and formatted; comprehensively and correctly referenced; and fully edited to eliminate grammatical and spelling errors.
10. Familiarise themselves with all the administrative requirements of the University.

11. Work towards establishing, maintaining and monitoring the supervision relationship and resolve conflict.
12. Read in the research area and pass on any key articles to the Supervisor(s) to read.
13. Submit / proceed with the following timeously to the supervisor(s) / PG Office as determined in the various policy documents:
    a. Registration per semester
    b. Annual progress reports
    c. Notice of intention to submit
    d. Ethical clearance application / Application for change of title
    e. Turnitin Report with the final submission of the thesis / dissertation.
14. Note: The Supervisee should not be expected to perform additional duties for the supervisor unless specifically agreed upon and formalised in terms of the University rules and regulations.

F Responsibilities of the Schools:

During the course of the postgraduate studies, the Supervisor(s) and the Supervisee can expect the school to:

1. To ensure that the appointed supervisors have sufficient knowledge in the specific discipline.
2. To provide a conducive environment for both the supervisor(s) and the Supervisee to carry their responsibilities in a meaningful way. The school will assist with conflict resolution should it be necessary and the parties cannot resolve it themselves.
3. To exercise a monitoring role over the progress of the supervisees.
4. To provide the necessary resources for research supervision.
5. To assist the Supervisor(s) and the Supervisee with the information to acquaint themselves with the guidelines and policies relating to research supervision.
6. To ensure the annual submission of progress reports to the School Research Office.
7. Ensure that the Supervisor(s) is not already overcommitted in terms of the Senate norms and will remain fully conversant with the project. [In addition, the supervisor will ensure continuing supervision of the Supervisee during any sabbatical or leave of absence from the University, whether it is to appoint a new Supervisor(s) or arrange interim supervision of the Supervisee.]
8. To appoint suitable examiners and administer the examination process diligently.
9. To ensure the collation of the required documentation for the possible DC of the Supervisee.

G Details to negotiate and agree:

1 Frequency of meetings:[2] …once after 2 months…

2 Person responsible for arranging meetings / drafting agenda / minutes: the student

3 Maximum agreed period of time for feedback on drafts: a month

4 Projected date for the submission of the research proposal: 15/09/2021

5 How often will the Supervisee present written work? Example: once every month

Supervisor [redacted] ..... Date: .....15-10-2021.....

Supervise [redacted] ..... Date: .....15-10-2021.....

AL: R & [redacted] ..... Date: 19 October 2021

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APPENDIX 4: Permission to Conduct Research at Transnet SOC Ltd

25 October 2021
Mr. G Nyarugwe
9 Samson Place
Montclair
4004
Gibson.Nyarugwe@transnet.net

Dear Mr. Gibson Nyarugwe

Re: Request for permission to conduct research at Transnet SOC Ltd

Your email of request for permission to conduct research at Transnet on "Remote Working: Opportunities for ICT Solutions in Transnet Port Terminal at Durban Container Terminal" is acknowledged.

We note the conditions of the study for strict academic purposes, the results of the study will be submitted to Transnet, and the research will be confidential and that anonymity for both respondents and the organisation is guaranteed. Should you or The University of Kwazulu-Natal want to publish the study in any other manner than the final assignment, Transnet will be approached for permission to do so.

Based on the above conditions, your request to conduct the research study in Transnet is granted. We are looking forward to the outcomes and recommendations of your study and the positive contributions towards the strategy of Transnet.

Yours sincerely,

[redacted]

Mr. Itumeleng Matsheka
Head of Transnet Academy
Date: 27/10/202

`

APPENDIX 5: Research Agreement

("Investigating information communication technology opportunities for effective remote work in Transnet at the Durban Container Terminal")

Between

TRANSNET SOC LTD

(Hereinafter referred to as "Transnet")

and

Gibson Nyarugwe

(Hereinafter referred to as the "student")

Mark with X

Internal Student	**X**	**External Student**	

Whereas:

The student has been granted permission to conduct research at Transnet SOC Ltd for the year October 2021 to December 2022.

UNDERTAKING BY THE STUDENT

The student undertakes to:

1.1. Submit proof that the research request was approved by (University of Kwazulu Natal)

1.2. Submit and/or disclose:

- Name of the Institution,
- A letter from the University/ institution stating the objective of the research,
- A Research Ethics Clearance Letter from the University/ Institution,
- Topic to be researched,
- Approved bursary letter for internal students Methodology to be used to collect data,
- Duration of the research, and
- Disclose the category of employees to be impacted by the research

Confidentiality

2.1 The research student agrees to treat sensitive data with confidentiality.

2.2 The research student undertakes not to disclose to any party any information obtained from Transnet during the research without prior written consent from Transnet. agrees to disclose data collected with Transnet.

2.3 Transnet reserves the right to have access to any data collected and to the results of the study.

2.4 Transnet reserves the right to withhold access to and/or publication of sensitive and confidential data.

Data Collection Methods

3.1 Data collection shall be done in a structured fashion to avoid disruption of normal business activities.

3.2 Where interviews are conducted, confidentiality and anonymity of the Respondents shall be ensured and respected by the student.

3.3 The research student is responsible to schedule his/her own data collection sessions once access is granted.

3.4 Transnet will not be held liable for inadequate data or late submissions, should data collection be disrupted in any way, such as business disruptions, non-attendance of interviewees, etc.

3.5 Upon completion of the research, the student is required to submit a hard / soft copy of the final research report to Transnet.

Cost

4.1 Transnet will not be liable for any cost incurred during the research period in the company.

4.2 The student at his /her own cost will carry any budgeted activities on the student's research plan.

4.3 Transnet part-time bursary students will be governed by their bursary contract.

Indemnity

5.1 Transnet will not be liable for any injuries or loss of life suffered by the student during the research period in its premises.

5.2 Transnet will not be liable for any damage to or losses of personal belongings by the student whilst in Transnet premises during the research period.

Domicilium

6.1 The research student elects as his/her *domicilium citandi et executandi* as address where service of documents and notices may be effected, as (which must be a street address):

Research Student:

9 Samson Place

Montclair

4004

Transnet:

Transnet Academy

Esselen Park

1626

Jurisdiction

7.1 The parties agree to the jurisdiction of the Magistrates' Court in respect of any litigation arising from the conclusion of this agreement

S[redacted]t Rep:

[redacted]

....

Itumeleng Matsheka

Signed at Esselenpark ______ on this ……………27……… day October……………2021

Witness: for Transnet SOC Ltd

[redacted]

1. P Maseko ....

....

Name

.... Signature

2. J Madihlaba ....

Name

... [redacted] ...

Signature

Research Student

Signature of Research Student: [redacted]....................................

Gibson Nyarugwe

Signed at Durban ....on this 27 ....day October ....2021.

Witnesses: Research Student

Zaire Iyoob

1. ..... [redacted]
   Name Signature

2. Rivaaj Ramdhin ..... [redacted] .
   Name Signature

APPENDIX 6: Ethical Clearance

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

12 July 2022

Gibson Nyarugwe (221013397)
Grad School of Bus & Leadership
Westville Campus

Dear G Nyarugwe,

Protocol reference number: HSSREC/00004248/2022
Project title: Investigating information and communication technology opportunities for effective remote work in Transnet at the Durban container terminal
Degree: Masters

Approval Notification – Expedited Application

This letter serves to notify you that your application received on 27 May 2022 in connection with the above, was reviewed by the Humanities and Social Sciences Research Ethics Committee (HSSREC) and the protocol has been granted **FULL APPROVAL**.

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

This approval is valid until 12 July 2023.
To ensure uninterrupted approval of this study beyond the approval expiry date, a progress report must be submitted to the Research Office on the appropriate form 2 - 3 months before the expiry date. A close-out report to be submitted when study is finished.

HSSREC is registered with the South African National Research Ethics Council (REC-040414-040).

Yours sincerely,

[redacted]

Professor Dipane Hlalele (Chair)

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