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Digital skills for managing a digital environment: The case of e-government delivery in Namibia

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A research report submitted to the Faculty of Humanities, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Arts (in the field of ICT Policy and Regulation)

ABSTRACT

Despite efforts to implement e-government in Namibia, there is limited progress in availing online services, interactive websites, and related initiatives. This study explored the digital skills that are required by management for the effective implementation of e-government interventions. Specifically, it identified the required digital skills and examined how emerging technologies and the characteristics of the digital environment influence these skills. The study also investigated varying approaches to the process of developing digital skills.

The research adopted a case study approach focusing on the progress of e-government implementation in Namibia. Responses were drawn from respondents directly involved in the implementation of e-government. The findings indicate a consensus that digital skills are required in e-government and also revealed a gap between the understanding of digital skills and the awareness of how the characteristics of the digital environment shape digital skills. The findings also indicated the need for appropriate measures to address the limited availability of these skills.

The study concluded that the concept of digital skills is still evolving and has various defining implications. Furthermore, there are divergent viewpoints about the availability of digital skills that are required to implement e-government. The study informs decisions that minimise obstacles to the acquisition of digital skills and shares innovative approaches to developing the skills required to implement e-government initiatives. It further contributed to the formulation of relevant policies, best practices, and strategies for digital skills undertakings.

DEDICATION

To God Almighty for granting me strength to finally see the completion of this study. To my family - husband, children and niece, thank you for your understanding, patience, love and support.

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I am deeply grateful to my supervisor Mark Burke for his continuous support and unwavering commitment, thank you for not giving up on me. To Lucienne Abrahams, thank you for your encouragement to ensure this report was completed. Special thanks to all postgraduate Master's research group for your support.

DECLARATION

I hereby declare the following;

I declare that this report is my own, unaided work. It is submitted in partial fulfilment of the requirements of the degree of Master of Arts (in the field of ICT Policy and regulation) in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in any other University.



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Henda Pombili Dias

31 March 2021

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Table of Acronyms

3D	Three dimensions
3G	Three-generation cellular technology
4G	Four-generation cellular technology
5G	Five-generation cellular technology
ACE	African Coast to Europe
AI	Artificial Intelligence
ASYCUDA	Automated System for Customs Data
DEU	Department of Business, Innovation and Skills
BPR	Business Process Reengineering
CRAN	Communication Authority of Namibia
DPSITM	Department Public Service Information technology
DTT	Digital Terrestrial Technology
EGDI	E-government Development Index
eGSAP	e-Government Strategic Action Plan
EU	European Union
FOSS	Free open source
GCI	Global Competitiveness Index

GDP	Gross Domestic Product
GNI	Gross National Income
GRN	Government Republic of Namibia
HCI	Human Capital Index
HPP	Harambee Prosperity Plan
ICSF	Integrated Client Services Facility
ICT	Information communication technology
ICTC	Information and Communications Technology Council
IPPR	Institute for Public Policy Research
IT	Information Technology
ITAS	Integrated tax administration system
ITU	International Telecom Union
KPMG	Klynveld Peat Marwick Goerdeler
MHAI	Ministry of Home Affairs
MICT	Ministry of Information Communication and Technology
MIT	Massachusetts Institute of Technology
MTC	Mobile Telecommunications Corporation
NAMPA	Namibia Press Agency
NAO	National Australia Organization
NBII	Namibia Business Innovation Institute
NCRST	National Commission on Research Science and Technology
NDP5	National Development Plan 5
NDS	National Digital Strategy
NGN	Next Generation Networks
NPC	National Planning Commission
NPRS	National population registry system
NSA	Namibia Statistics Agency
NUST	Namibia University of Science and Technology
OECD	Organization for Economic Co-operation and Development
OMA	Offices, Ministries, agencies
OPM	Office of the Prime Minister
OSI	Online services index
TII	Telecommunication Infrastructure Index
TN	Telecom Namibia
UN	United Nations
UNAM	University of Namibia
UNICEF	United Nations International Children's Emergency Fund
WACS	West African Cable System
WEF	World Economic Forum

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Chapter 1: The importance of digital skills in digital transformation in the public sector

There is an increased demand for digital information and services across different sectors around the world. This demand has allowed the public sector, through e-government services, to transform their services, processes and business models to render public services to citizens, businesses and other arms of government. E-government has received considerable critical attention; however, it has also become increasingly apparent that appropriate digital skills are required to realize fully fledged e-government efforts. Lack of digital skills hampers the progress of e-government and limits the potential of e-government to deliver services for public value and economic growth (Ndou, 2004).

Namibia has recognised the need to use e-government to deliver more efficient and effective public services by launching its five-year e-government strategic action plan (eGSAP) (OPM, 2014). Despite efforts to implement the eGSAP, there is minimal progress that has been made in the availability of online services or interactive websites. As technology is rapidly evolving, emerging technologies are transforming the digital environment in which they operate, thus shaping the demand for digital skills. The slow start in progress made towards e-government in Namibia could lead to the public sector lagging in adopting appropriate technologies for the purposes of online service delivery.

Recently, researchers have shown an increased interest in the subject of digital skills, but in a broader context of advancing the digital economy and achieving the digital society. Much focus has been on digital skills as a way to meet the demand-side needs, i.e., skills for end-users and the general workforce. However, Nadkarni and Prugl (2020) emphasised the relevance of management and their skills contribution to the transformation process. The complexity of running an e-government project demands specialised digital skills, and the ongoing development of such skills as technology changes to meet the dynamicity of the digital environment is required.

1.1. Research Introduction

1.1.1 Problem statement

Despite efforts to implement the eGSAP, there is minimal progress that has been made in the availability of online services or interactive websites through e-government implementation in Namibia (Amukugo & Peters, 2016; Maritz, 2015; MICT, 2020; Nengomasha & Uutoni, 2014). The project take-off is slow, taking into consideration that there are ten identified OMAs that are prioritised to lead in the development of online services, and to date limited services are fully operational (OPM, 2014), and concurrently, the eGSAP's period of 2014-2018 has come to an end.

Past research (Amukugo & Peters, 2016; Maritz, 2015; MICT, 2020b; Nengomasha & Uutoni, 2014) indicates that a lack of skills is a major factor hampering the implementation of e-government. Similarly, the e-Government Policy and HPP emphasise the lack of skills as a foreseen obstacle during the implementation. The eGSAP points out that “the weak delivery capacity stems from a number of factors, such as deficit of skills at critical management level” (GRN, 2016, p. 21). This means that it is an anticipated issue that needs to be addressed. The e-Government Policy fashioned a framework for developing the required skills, and eGSAP maps out the training plan, however, there is no evidence of executed strategies to develop the skills or to mitigate the challenge of a lack of skills. Moreover, there is no evidence of an investigation of what can be done to address skills shortages in crucial positions such as managerial roles, in view of e-government as far as the present researcher is aware.

The implications for the slow start could lead to the public sector lagging in adopting appropriate technologies for the purposes of e-government implementation and online service delivery. Technology is rapidly changing; the longer the public sector takes to implement e-government, the longer the wait to exploit the full advantage of affordable and less complex technology. The slow start also limits the potential of e-government to deliver to the public value and economic growth (Ndou, 2004). At the time of writing this paper, Namibia was experiencing an economic slowdown and an increased budget deficit and state debt. The incumbent Minister of Finance, Iipumbu Shiimi, confirmed this during the briefing on the overview of the state of the economy (Ministry of Finance [MOF], 2020).

Therefore, it is necessary to develop digital skills to accelerate implementation so as to achieve economic growth and advance the digital economy.

1.1.2 Purpose of the study

The study explored the digital skills required by management for the effective implementation of e-government interventions. To achieve this, the research identified the digital skills that are required, and examined how these skills influence digital transformation efforts in e-government implementation. It also investigated how these digital skills are developed. The study adopted a case study approach that focuses on the progress of e-government implementation and the delivery of services in Namibia to gain deeper insights. Hence, the focus of the study was limited to the supply-side of digital skills only. The study further suggested appropriate measures to address the limited availability of digital skills from a policy perspective.

1.1.3 Research objectives and questions

The following research objectives, main question and sub-questions were used to guide the research:

The objectives are to determine:

1) Which digital skills are needed for the management of e-government in Namibia;
2) Whether these skills currently exist; and
3) How these skills can be developed or improved.

The main research question:

What is the current state of digital skills for the management of e-government in Namibia and how can these skills be developed or improved?

Sub questions:

1) What are digital skills?
2) What are the digital skills that are required by management for the successful implementation of e-government in Namibia?

3) How do the characteristics of a digital environment and emerging technologies shape digital skills?

5) How can the required digital skills for e-government in Namibia be developed or improved?

1.1.4 Research methodology

Based on the research problem and the research questions, this study adopted a qualitative research approach. Based on the selection of the qualitative research approach and the methods employed in this research, social constructivism in the context of interpretivism supported the purpose of the researcher and helped to prompt the most relevant data. The data collected were based on the elements identified in the conceptual framework through an open-ended data collection method, thus assuming a deductive approach. The case selected is the management of the Department of Public Service IT Management (DPSITM) within the Office of the Prime Minister (OPM), which is the lead coordinator of e-government initiatives in the Public Service.

1.1.5 Justification of the study

This research contributes to the body of knowledge on e-government digital skills by adding the experiences from Namibia. The findings of this research can contribute to the formulation of more effective and relevant policies and strategies for digital government, and the development of digital skills. In addition, the findings present an overview of practical inputs in the academic field, which stimulate and guide key considerations in re-examining sustainable modes of re-skilling and upskilling in the infinite wave of technology changes.

Investigating digital skills in the context of e-government is important to determine how better digital skills can facilitate the delivery of e-government services to accelerate progress towards achieving e-government targets. NAO (2017) highlights that a major challenge is that the public sector is not fully aware of the different types of digital skills available, and to what extent they are correctly aligned to advance e-government implementation. This has implications for planning public service reforms, policies and

transformation initiatives. Finally, the study sets a research agenda to stimulate and guide future research on digital skills in the context of e-government in Namibia.

1.1.6 Delimitation of the study

The focus of the study is limited to the supply-side of digital skills. Digital skills for both supply and demand would be for future work as the sample size would be too big to cover within the timeframe that constrains the current study. Additionally, the case adopted (DPSITM) is the lead implementer of e-government initiatives in the public service. Meaning that it is a core institution responsible for creating digital public services, hence the study is focusing on the supply-side of digital skills.

1.2 Background and context

1.2.1 Digital transformation

Transforming the public sector has recently emerged in many countries as an essential mode for adopting new technologies and adapting to new ways of operating and has thus placed new demands on this innovative environment (Hanna, 2014, p.10; UN, 2008). This trend is supported by fact that society has shifted to a knowledge-based economy and highly skilled workforce, hence the need to adapt skills to new organisational needs and master core competencies resulting from these new developments (Gilster, 1997; Levy & Murnane, 2004).

Transformation is a significant change in an organisation's key domain of operations, including strategies, structure and processes (Liu et al., 2011). The proliferation of technologies has triggered such changes to support the transformation process. Digital Transformation is defined as the process of reform and reengineering of people, processes, technology, and overall governance (Brown et al., 2015), using digital technologies such as social media, mobile, analytics, or embedded devices (Fitzgerald et al., 2013, p. 4). Li et al. (2011, p. 1730) define it as "the integration of technologies and business processes in a digital economy".

1.2.1.1 Key features of digital transformation

A key characteristic of digital transformation includes enabling significant improvements, such as enhancing customer experience, streamlining operations, and creating new business models (Fitzgerald et al., 2013; Joseph & Kitlan, 2008; Westerman et al., 2014).

Organisations undertaking digital transformation must understand customers' needs and their market segments to transform the service delivery experience. The streamlining of processes, which involves digitizing internal operations, allows organisations to, for example, automate routine and standard tasks to refocus on strategic matters (Westerman et al., 2014). The purpose is to reduce labour requirements and maximise cost efficiency and effectiveness while improving the quality of services by incorporating emerging technologies. Digital transformation also allows organisations to redefine their business models, for example, by using technology to introduce new products and services or to improve traditional services and establish value propositions (Brown et al., 2015). This has created not only new ways of doing business but also a new digital environment that operates under unpredictable conditions brought about by the waves of technological changes (NAO, 2012).

It is important to note that the use of technology and efforts to transform and redesign operational and business models span across and beyond private organisations and agencies into the public sector as well. The public sector is equally under pressure to transform its operations in response to citizens' demands (Hanna, 2010; Li et al., 2011) and with acquiring necessary skills (i.e. digital skills as referred to in this study) to advance the transformation process (Bokova & Gavin, 2017).

1.2.2.2 Digital transformation in the public sector

There is ongoing pressure on the public sector to improve its processes to meet citizens' demands (Brown et al., 2015). Citizens and businesses are demanding improved services and easy access to information. The public sector's operations and structures are complex to manage, thus making its processes cumbersome and time-consuming (Ndou, 2004; Negumbo, 2018). Digital transformation in the public sector concerns realigning technology and operations to more effectively engage citizens, other public sector agencies and businesses (Brown et al., 2015). This transformation process has the

potential for overhauling the face of service delivery in the public sector (Li et al., 2011). This is usually achieved through initiatives such as e-government. E-government provides an opportunity to better manage public sector processes, roles, and activities using ICT (Brown, 2005).

1.2.3 E-government in the context of digital transformation

E-Government is a powerful ICT innovation that transforms how the public sector handles its daily operations and processes, most notably through interactions with citizens, employees, and engagement with other governments and businesses (Joseph & Kitlan, 2008). The International Telecommunications Union [ITU] defines e-government as "the use of ICT in government to provide public services, to improve managerial effectiveness and to promote democratic values and mechanisms; as well as a regulatory framework that facilitates information-intensive initiatives and fosters the knowledge society" (ITU, 2008, p.15). The definition emphasises service delivery to citizens, good governance, and a knowledgeable and skilled society as the goal of e-government. This indicates that e-government as an initiative of digital transformation is a complex process that requires "new thinking and leadership to ensure that the initiative realises its full potential" (Brown, 2005, p. 241).

1.2.3.1 Impact of e-government on public sector

Brown (2005) states that e-government "has given rise to a phenomenon that has become a feature of a redefined public sector environment" (p. 246). The researcher further states that e-government has made a direct and critical impact on the public sector domain in terms of citizen-centred service delivery, the emergence of information, accountability, management models, new skills, and collaborations (Brown, 2005). E-government has the potential to change the environment in which the public sector operates by handling the citizens' needs through electronic transactions (Joseph & Kitlan, 2008) and by bringing to light the importance of government information as a key resource (Brown, 2005). It enables the public sector to share information with its stakeholders, thus exercising accountability, transparency and building trust among citizens, as a measure of good governance (Brown, 2005).

International benchmark initiatives, such the UN e-government survey, have also intensified the impact of e-government in the public sector. The benchmark initiatives have created a competitive environment among different countries as they implement e-government initiatives. This is triggered by comparisons of the level of e-government implementation among countries. As a result, it has intensified competition in public sector reforms in which governments are contending to feature at the top and create a platform for sharing e-government experience (Brown, 2005). Likewise, Namibia has devised an action plan for implementing e-Government to make an impact in public service delivery (OPM, 2014, p. 2) and has earned a position among the countries with high e-government presence indicators (UN, 2020, p10).

Another notable impact of e-government is on skills and technological capacities, which is the objective of this study. E-government has shaped the knowledge and skills required by the public service workforce. The workforce requires skills to render services to citizens and businesses and manage the environment (Brown, 2005). To achieve a skilled workforce, the public sector must establish strategies for expanding its technological capacities (Bannister & Connolly, 2014), which include establishing external relationships and collaborations with the private sector (van der Waldt, 2016). The complexity of e-government has caused an increased gap in both institutional and citizens' capacities, which has occurred in many countries, irrespective of the country's socio-economic status (Hanna, 2010, p. 12). Thus, although e-government results provide evidence of the significant positive effect in the public sector, its implementation also comes with implications and variations that must be understood.

1.2.3.2 Implications of e-government

The complexity, high costs, and risks associated with e-government initiatives have created challenges in providing public services. The demand to implement e-government services is on the rise amidst financial and resource limitations, lengthy project duration, and ever-changing technology (Brown, 2015; NAO, 2017; Njuru, 2011). These issues were also noted as part of the backdrop to this study with particular concerns over the shortage of digital skills and how this influences Namibia's ability to manage, improve, and sustain the complex implementation of e-government.

E-government projects have financial implications that are negatively affected by the lack of available funding and high implementation costs. E-government projects require significant financial resources to prepare an enabling environment such as developing infrastructure for access, revisit legal frameworks to ensure sustainability because of the ways technological changes influence the dynamics of the digital environment and technological changes.

Due to economic and social challenges facing many countries, it is recommended that countries invest in revolutionising government services through ICT and procuring significant investments that aid national development (Butt et al., 2013). However, the lengthy period of implementation and financial sustainability makes it difficult for countries to realise returns on investment (Brown, 2015; NAO, 2017; Njuru, 2011).

Likewise, it is recommended that countries invest in e-government transformation to attain a knowledge-based economy (Hanna, 2010). Hence, digital development demands new or upgraded skills to operate in a digital environment (van der Waldt, 2016; Brown, 2005; Hanna, 2010). The complexity of running an e-government project demands specialised digital skills and ongoing development of such skills as technology changes. But it is important to note that specialised skills that are required for e-government implementation are not widely available and thus expensive to procure (Brown, 2005, p. 252). Additionally, there is a need to consider that several factors that influence the acquisition and sustainability of digital skills exist. Besides political, social, and economic factors, the driving forces of the digital environment and the emerging trends in the ICT industry place demands on skills. Therefore, to understand the demands in the context of the Namibian environment, it is essential to be cognizant of the ICT evolution in Namibia and its implications on ICT-related developments geared towards e-government implementation.

1.3 Profile of digital transformation and e-government in Namibia

This section presents information about the demographics, socio-economic state, ICT, and e-government indicators for Namibia. The section outlines the pace at which Namibia is embracing ICT initiatives and maximizing gains from its ICT development. ICT indicators are essential in measuring ICT development and benchmarks for ICT adoption

and uptake in general (ITU, 2005), hence they are important to this study because they have implications for implementing ICT-related applications such as e-government.

The data on ICT usage is useful to know the level at which ICT-related applications and e-government are effectively used and the impact thereof. The ICT profile provides an outlook on the impact of ICT services that can help plan and improve service delivery in the public sector. It is important to note that the section only reviews a select number of indicators linked to the potential for e-government development.

1.3.1 Demographics and socio-economic sectors

Namibia is a large semi-arid and sparsely populated country located on Africa's south-west coast, bordering Angola, Botswana, South Africa, and Zambia, with an area of 824,290 square km. The country has an estimated population of 2.324,388 million (NSA, 2016). Based on the last census data, 57% of the population lives in rural areas, whereas 43% lives in urban areas (NSA, 2011). The country's large expanses of empty spaces and sparse population make the implementation of e-government in Namibia a significant challenge not only in terms of infrastructure and access but also in terms of opportunities and available channels to developing the required skills to exploit digital benefits.

1.3.2 Economy

The main sectors for the economy are Primary (agriculture and mining), Secondary (manufacturing and utilities), and Tertiary (wholesale & retail, information communication, and other services). National statistics projected that Namibia's gross national income (GNI) stands slightly above N$ 173,080 million. Namibia is classified as a middle-income country but with unequal income distribution. The gross domestic product (GDP) is at N$ 181,234 million, and the GDP per capita is N$ 73,704 million (NSA, 2019). Considering this, there is an increasing importance for understanding the impact of e-government and financial development on economic growth (Corsi et al., 2006; EU, 2004). Studies have shown that when a large share of GDP belongs to the public sector, implementing e-government can become a driver which helps to shape economic growth by enabling efficiency, accountability, and transparency in public sector administration (Gustavo, 2017, p. 16). At present, economic conditions and budgetary constraints have adversely affected the implementation of key activities.

The information and communication sector contributed 1.4% to the GDP for two consecutive years (2018 and 2019), compared to 1.5% in 2017 (NSA, 2019, p. 25). Information and communication activities play a significant role in contributing to economic growth, when used to exploit digital communication channels. When assessed holistically, the adoption of digital activities and the impact of digital penetration in major sectors of the economy become determinant factors of e-government policy implementation (ITU, 2005, p.21; Economic Commission for Africa, 2011).

Table 1: *Summary of the economic figures*

Indicator	2018	2019
GDP (N$)	181,009	181,234
GDP per capita (N$)	74,994	73,704
GNI per capita (N$)	72,725	71,660

Note. Adapted from *Annual National Accounts,* by NSA, 2018; 2019 (https://nsa.org.na/).

Table 2: *Sector performance - Percentage share to GDP*

Sector	2018	2019
Primary	16.7%	16.4%
Secondary	18.2%	17.9%
Tertiary	57.7%	58.3%

Note. Adapted from *Economic Statistics*, by NSA, 2018; 2019 (https://nsa.org.na/).

1.3.3 ICT developments

In terms of communication and technology, Namibia has made notable progress in the development of ICT infrastructure. Namibia became a landing point of the African Coast to Europe [ACE] undersea cable, owing to the individual cable West African Cable System [WACS], launched in 2011 (Telecom Namibia, 2011). In the broadcasting industry, migration to Digital Terrestrial Transmission occurred in 2015 and this was marked by the ITU as a successful project (ITU, 2015).

The key stakeholders in the ICT industry are the mobile network operators, Mobile Telecommunications Corporation [MTC] Namibia, and Telecom Namibia [TN], for both

mobile and fixed lines. Paratus Telecom and Mwireless (Pty) Ltd t/a Africa Online are also some of the service providers in the telecommunications industry (Communication Regulatory Authority [CRAN], 2016, p.19).

The country has also sought to maximise benefits arising from ICT developments through innovation centres and science hubs such as the Namibia Business Innovation Institute [NBII] and FabLab Technology Center and in addition, National Commission on Research Science and Technology [NCRST] (World Bank, 2016; GRN, 2018). These hubs are used for research and development activities, training, knowledge sharing platforms, and innovative initiatives within a wide-ranging sphere, including mobile technology, disruptive technology, application development, and social networking (World Bank, 2016).

1.3.4 ICT indicators

Statistics indicate that an equivalent of 113% of the population is mobile users, and 51% are internet users (World Bank, 2019). Mobile subscriptions have increased by 59% as of 2018, while 83% of the population has 3G coverage compared to 36% of the population with 4G coverage (CRAN, 2019, p4). Mobile access is an indication that more people are using technology as a means of communication and accessing services via mobiles.

Table 3: *Key indicators for access and subscription*

Indicator	2017	2018	2019
No of fixed line subscribers	0.19	0.17	139,698
No of mobile subscribers	2.65	2.76	2.82 mil
No of Broadband subscribers per 100 people (fixed)	0.064	0.062	0.063

Note. Adapted from *ICT Database Indicators*, by The World Bank, 2017; 2018; 2019 (http://dataportal.afdb.org/) and *Annual Report*, by CRAN, 2019 (https://www.cran.na/annual-reports/).

1.3.5 International benchmarks

The Global Competitiveness Index [GCI] of 2019 shows that Namibia is ranked 94th out of 140 countries. The overall ranking on ICT adoption and innovation capacity was 91st

and 80th, respectively. These pillars look at the possibilities of adopting the latest technology and the likelihood to successfully develop inventions and create new forms of technology. ICT adoption, the rate of technology absorption, and innovation, advance digital transformation. Low levels of access to technology prevent progress in the development of online services. It limits access to vital ICT services, which impedes citizens' ability to take full advantage of e-government services. Citizen-driven services have created a demand for efficient service delivery, and as a result, transforming the way government operates. In respect to infrastructure indicators in an e-government environment, infrastructure is required to enable efficient public services delivery to meet various technology demands to improve productivity and improve online services quality (Archmann & Iglesias, 2010, p. 29; Lomheier, 2012).

The capacity to innovate provides the ability to create new opportunities, boost growth, and address challenges in a digital environment (OECD, 2007). Limited innovation capacity does not only limit opportunities to innovate but also confines chances of acquiring a new set of digital skills necessary for advancing the use of ICT in Namibia.

The skills component speaks to the purpose of this study, and it is the centrepiece of other indicators in the sense that skills acquisition and investment (in skills), increase significantly as technology advances. According to the World Economic Forum [WEF] (2019) there should be a balance between technology integration and skills investments.

Table 4: *Global Competitiveness Index for 2019*

Index component	Rank (2019)
Overall GCI	94/141
Enabling environment	
ICT adoption	91
Infrastructure	94
Innovation ecosystem	
Capacity for innovation	80
Human resources	
Skills	98

*Note***.** Adapted from *Global competitiveness report,* by WEF, 2019 (https://www.weforum.org/reports/global-competitiveness-report-2019).

1.3.6 E-government indices

The United Nations uses E-Government Development Index (EGDI) indices as an acceptable measure of e-government implementation development. According to the UN e-government survey, Namibia was ranked 121 in 2018 with a score of 0.4514 towards online services. In 2020, the country moved up to position 104 out of 193 countries scoring 0.5235 towards online services. These results indicate that in 2020 Namibia's EGDI increased while infrastructure and human capital development indicators advanced more than the online services provision indicator. The above-mentioned statistics played in large part a motivating factor for the study's objective of investigating e-government implementation progress in Namibia.

The present researcher's interest in these survey results is driven on the premise that it provides the status of e-government development and performance (UN, 2020); and these can be analysed to unpack the influence of skills and other factors in the implementation of e-government.

Table 5: *E-government Development Index for Namibia*

Indicator	2018	2020
Overall Rank	121	104
EGDI	0.4554	0.5747
OSI	0.4514	0.5235
HCI	0.5850	0.6558
TII	0.3299	0.5447

Note. Adapted from *UN E-Government Survey* by United Nations, 2018, 2020 (https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2020).

The underlying drivers the indicators represent influence the implementation of e-government because e-government requires sound access and the availability of technology to enhance public service delivery and devise innovative ways of delivering

such services. Considering those factors, it is therefore crucial to analyse these indicators.

Despite the global position and positive light in some indicators, there remains some areas of concern affecting the implementation of e-government. Among these concerns include a lack of skills (Amukugo & Peters, 2016, p. 4; Negumbo, 2018, p. 55; OPM, 2014; OPM, 2017), low adoption of technology (MICT, 2018; OPM, 2017), and factors affecting institutional arrangement (OPM, 2017a, p.41) that remain a challenge.

1.4 Towards e-government implementation in Namibia

The Namibian government began e-government implementation efforts in 2005 when the first e-government policy was formulated (OPM, 2004). The Office of the Prime Minister (OPM) is mandated by the Constitution of the Republic of Namibia and other relevant legislation to lead Government business in Parliament and execute special projects as assigned, such as the e-government project. Several studies (Al-Khouri, 2011, p. 22; Hanna, 2010, p.119; OECD, 2014) indicate that the arrangement of institutions with the highest authority such as the OPM are in the best position to lead e-government projects. In 2011, the government conducted an e-readiness assessment to determine the degree to which stakeholders participate in e-government (OPM, 2014). The focus of the assessment was based on five categories of e-government readiness, i.e., Policy, Access, Content, Capability, and Willingness (OPM, 2014). According to the eGSAP, “the model is tailored to the requirements of the measurement exercise after due consideration of various readiness measurement tools currently being used by governments across the world” (OPM, 2014, p.3) The results of 2011 indicated that out of four, Namibia scored 2.11 on Policy; Access 2.17; Content 1.95; Capability 2.21 and Willingness 2.05. The overall score was 2.2, indicating average readiness (GRN, 2011; OPM, 2014). Overall, the indicators suggest that there is a will, and the environment is favourable for e-government implementation.

In 2014, the government made efforts to chart a five-year e-Government Strategic Action Plan (eGSAP) to guide the implementation and make e-government project initiatives a success (OPM, 2014). The eGSAP has since expired at the end of 2018. Subsequently,

the Department of Public Service Information Technology Management [DPSITM] within the Office of the Prime Minister (OPM) was restructured to become the institutional focal point focusing on e-government initiatives (OPM, 2014). The strategy identified a need to strengthen implementation efforts by recommending an e-Government Coordination Committee, the e-Government Advisory Committee, the e-Government Programme Coordination Committees, the e-Government Project Coordination Committee, and the Programme Implementation Task Force responsible for governing, owning and driving the implementation of the various programmes (OPM, 2014, p. 68). Some committees comprised of experts from private institutions and academia to provide guidance and strengthen capacity.

The eGSAP listed 10 government Offices, Ministries and Agencies (OMAs) to prioritize online services with high citizen impact and visibility to meet citizens' demand for efficient public service. The online services are listed in table 6 below.

Thenceforward, the Harambee Prosperity Plan (HPP) 2016-2020 was developed as a catalyst to expedite development plans (National Planning Commission, 2018; GRN, 2016). HPP is a strategic outline set by the incumbent President of the Republic of Namibia, His Excellency Dr Hage Geingob, to accelerate socio-political development plans. One of the pillars in the HPP is Effective Governance and Service Delivery, which has emphasised the need for the government to put services online in order to achieve the objectives of e-government.

1.4.1 Policy environment

Namibia has developed robust national policies and frameworks that contribute to the overall development of the country, such as Vision 2030 launched in 2004 and the National Development Plan 5 [NDP5] (2017-2021). However, in terms of ICT-related policies, the following has been achieved: Overarching ICT Policy of 2009 (which encompasses the IT policy, Telecommunication policy, Postal Policy, DTT policy, Broadcasting policy, etc.), e-Government Policy for the Public Service of 2005 and eGSAP 2014-2018 (OPM, 2005; OPM, 2014).

In addition, the IT Policy of 2017 for the public sector was revised in response to the challenges pertaining to the management of IT Services and IT governance to deliver customer-focused and effective services to the Public Service (OPM, 2017b, p.11). Another initiative towards e-government realization is the drafting of a National Digital Strategy (NDS) under the auspices of the Ministry of Information Communication and Technology (MICT). The aim is to provide coherence, effective prioritization of interventions, governance, and management of digital activities nationally. It is important to note that some of the policies listed are under review at the time of conducting this study.

Despite the enabling environment and sound strategic plans, recent local studies indicate that the overall progress is moving at a slow pace (Froehlich, 2019, p.111; GRN, 2016, p.59; MICT, 2020) and Namibia is still at the basic level of digitizing services (MICT, 2020, p.11).

1.4.2 Assessment of online e-government progress

Namibia has made notable progress in e-government project initiatives such as the implementation of the interoperability solution (OPM, 2018) and the review of the IT policy at Public Service level to strengthen ICT governance (OPM, 2017).

The Online Integrated Tax Administration System (iTas) was successfully launched and it has been in use since January 2019 (MICT, 2020, p. 6). For developing countries such as Namibia, it is necessary to prioritise such services because of the value earned by generating income, expenditure, and transparency. The other service that was recently launched in December 2020 is the Integrated Client Service Facility (ICSF) under the Ministry of Industrialization, Trade and SME, as with iTas, was developed with the assistance of foreign consultants. The system allows online business registration and processing of investor services (Ministry of Industrialization, Trade and SME, 2020).

In a separate arrangement outside the eGSAP and HPP, the e-Birth and e-Death for registration systems of new-born babies and deaths are successful initiatives and although not part of the planned roll-out of online services under the eGSAP or HPP

(GRN, 2016); the systems were implemented with the assistance of UNICEF. The systems notify the National Population Registration System (NPRS) at the Ministry of Home Affairs and Immigration (MHAI) of births in hospitals or deaths in hospitals or police mortuaries. The implementation of this initiative has progressed well, and the systems are in use. Another essential service is the Asycuda World, which is used for processing imports and exports, and is deployed nationally to handle border customs and trade system transactions.

Unfortunately, many online services have made little impact on the citizens because the services provided are mere queries for information purposes only (Amukugo & Peter, 2016; Froehlich & Peters, 2017; MICT, 2020, p.11). Most online services are at the early stages of digitisation or digitalisation with a basic level of interaction (MICT, 2020, p.11), for example, Online Business Registration and ID tracking system.

The researcher has noted and observed that online services under the stewardship of foreign or external consultants appear to progress more effectively than initiatives implemented by local advisors. This may be interpreted in the context of the available local capacity to develop online services. Table 6 indicates a list of e-government online services by various Ministries as indicated in the eGSAP.

Table 6: *The state of e-government online services in Namibia*

Office/Ministry/Agency (OMA)	Services identified	Status/stage of development	Implementer	GRN Portal/ SMS functionality available
Office of the Prime Minister	Online recruitment	Not implemented	n/a	None
	Self-service: leave application	Not implemented		
	Self-service: Performance appraisal	Not implemented		
	Disaster Management	Not implemented		
	Electronic Document and Record Management (EDRMS)	Live, system operational.	Developed by external consultants	

Ministry of Finance	Online Integrated Tax Administration System	Live, system operational	Developed by external consultants	Tax notification via SMS
Ministry of Home Affairs and Immigration	Online applications for permits and certificates	In progress	Developed by external consultants	ID and Passport status enquiry, Tracing of lost ID/Passport via web.
Ministry of Health and Social Services	Electronic Health Management System	Not implemented, but consultations with World Health Organisation in progress	n/a	n/a

Office/Ministry/Agency (OMA)	**Services identified**	**Status/stage of development**	**Implementer**	**GRN Portal/ SMS functionality available**
Ministry of Industrialization, Trade and SME Development	Online Business Registration	Not implemented. Integrated client service portal for business activities & Trading export & import permits launched.	Developed by Singapore Government	Search for Proposed business name in use via web.
Ministry of Education	Online Applications for the Namibia Students Financial Assistance Fund	Not implemented	n/a	Grade 10 & exam results query via sms/web
Ministry of Agriculture, Water and Forestry;	Online Permit Application to Import or Export Plants, forestry and animals	Implementation in progress	In-house development	Information not available
Ministry of Environment and Tourism	Online Permits Application	Trophy hunting permit system implementation in progress	In-house development	Information not available
Ministry of Land Reform	Online Deeds Registration	Partially computerized, process to be re-engineered.	n/a	Information not available
Ministry of Mines & Energy	Online License monitoring System	Not implemented	n/a	Information not available

Note. Adapted from *OPM Strategic Action Plan* by OPM, 2014 (https://opm.gov.na/documents). Data in columns: Status of development, Implementer & SMS/Portal availability are the author's compilation.

1.4.2.1 Other e-government milestones

Hanna (2014) states that to realise the potential of e-government, governments must invest in an interoperability framework to map standards and support data exchange and information sharing. The Namibian government has followed suit and implemented the Interoperability Solution in collaboration with the e-Government Academy and Cybernetica in Estonia (Ndilula, 2015). It must be noted that the interoperability platform is ready for use, however it is not yet fully optimised due to the absence of legal requirements.

The implementation of NPRS as a Civil Registration and Vital Statistics System, is a success story in the realm of e-government initiatives (MHAI, 2019; van Staden, 2018; World Bank, 2016). The system holds vital records of a person's life events from birth to death with child-parent links, thus feeding vital statistics for the National Statistics Agency.

The year 2018 also saw initiatives in the communication services in OMAs through the Unified Communication System (OPM, 2018). The purpose of the initiative is to maintain a common platform for communication technologies, particularly to improve the government email system and ensure twenty-four-hour access to any device if there is connectivity (OPM, 2015).

1.4.3 Key constraints to e-government

The implementation of e-government is affected by multiple factors. A study by Alshehri and Drew (2012) indicated that e-government is affected by technical, organisational, social and financial constraints. Technical constraints include lack of infrastructure, privacy, and security matters. Social constraints include the digital divide and cultural issues while financial constraints include lack of funds while organisational constraints point to change management and lack of training and skills. These constraints, to an extent, limit access, delivery, and provision of e-government services (Alshehri & Drew, 2012).

In general, lack of skills trigger constraints across internal and external factors such as technical, social, financial, and organisational factors. Therefore, with the right digital skills to manage e-government initiatives, such constraints are manageable when managers

possess the right skills (van der Waldt, 2016). Thus, it is based on this premise that this study focused on the necessary skills to advance e-government.

1.4.4 Lack of skills as a key constraint to e-government implementation

The use of ICT has raised the demand for new skills in the public sector (OECD, 2016; Maihemuti, (2011). Research conducted by MIT Center for Digital Business Research indicates that more than 80% of organisations recognise the digital skills gap and acknowledge its importance, but only about 46% have invested in digital skills (Capgemini Consulting, 2012). This finding is consistent with survey results published by NAO in 2015, in that there is a widespread shortage of digital skills, and there are numerous challenges hindering investment in such skills.

E-government is not only a complex process that is affected by socio-economic issues but also a complex blend of technology, management, and policy related issues (Hanna, 2010; Maihemuti, 2011). The success of implementing e-government requires an innovative set of skills to cope with the complexities and radical changes in public sector operations and structures (van der Waldt, 2016).

Due to the growing concerns of e-government project failures, lack of skills has become a major constraint to e-government implementation. A lack of the necessary skills to manage implementation results in high costs and project failures (Maihemuti, 2011). This occurs because skills are a primary enabling pillar for digital transformation. Additionally, the lack of skills may widen the digital divide gap that e-government is trying to break by providing access to services (Hanna, 2010).

Evidence in HPP (2016) and eGSAP (2014) indicates that skills are indeed a constraint to e-government implementation in Namibia. The e-Government policy of 2005 (which is the latest at the time of writing this paper) equally recognized the need for skills upgrade across government units. The policy proposed a skills acquisition strategy by identifying a list of skills to be adopted in an effort to advance e-government implementation (OPM, 2005).

The availability of skills provides an opportunity for a successful e-government implementation (Angelopoulos et al., 2009; Lam & Lee, 2005; Karunasena, 2012) and allows for ongoing support of service delivery in a digital environment. In this study, such skills are referred to as 'digital skills'. Managers require digital skills to effectively engage in e-government decision-making, but lack of digital skills can impede the provision of e-government services.

1.5 Digital skills

The concept of digital skills has continued to evolve (Bawden, 2001; Bokova & Gavin, 2017; Ilomaki et al., 2014). The definition, types of skills, methods of measuring digital skills, skills frameworks and the tools used initially focused on the use of computers, from mainframes to handheld devices (Bokova & Gavin, 2017; Ilomaki et al., 2014). Researchers have not yet reached consensus on the conceptualisation of digital skills (Gekara et al., 2019; Shortt et al., 2020).

Digital skills provide the ability to manage and evaluate information, use digital communications, apply IT safety and security measures, solve problems, and apply strategic planning in the digital environment (Digital Economy Unit [DEU], 2016; van Deursen & van Dijk, 2010).

Some studies have identified different broad categories of digital skills such as generic digital skills to engage with technology, digital skills for performing digital tasks at work (OECD, 2016) as well as digital skills for professionals and or management to use digital technology in a transformative manner (Bokova & Galvin, 2017). The category of digital skills for professionals is the focus of this study with an emphasis to identify digital skills required by management to effectively manage their work environments.

Generally, management performs functions to plan, organise, lead, and coordinate (Maheshwari, 1997). Similarly, management in the ICT sector involved in the implementation of digital activities carries out the same functions, but in this case, the focus is specifically on digital activities required to achieve the goals of e-government initiatives. Thus, it is imperative that management possesses digital skills to strategically

design an e-government vision, to build e-government solutions and manage e-government projects (KPMG, 2000).

1.5.1 Drivers of digital skills

Specific disruptive technologies such as Internet of Things (IoT), Social media, Networking, Cloud Computing, Big Data, Artificial Intelligence (AI) and Robotics, etc. are believed to shape the demand for digital skills (Bokova & Galvin, 2016; Lyytinen et al., 2016; Vey et al., 2017). Several studies indicate that emerging technologies are transforming the digital environment in which they operate. Simultaneously, studies also suggest that emerging technologies are determining new skills and re-skilling requirements (Davies et al., 2011; ITU, 2018; ITU, 2017). Davies et al. (2011) posit that although these are individual technologies, in most cases they converge, making it even more disruptive, e.g., AI and Big Data.

Another notable driver of digital skills is the aspect resulting from the dynamism of the business or working environment (El Sawy et al., 2010). The continuously exponential advancements in the environment (referred to as the 'digital environment' in this study), are not only causing it to operate under several unpredictable conditions and uncertainties but have become driving forces in the digital environment that are shaping the development of digital skills. The digital environment has triggered the reliance on business architecture (DEU, 2016; El Sawy et al., 2016; NAO, 2017); the need to focus on unforeseen rising project costs and the risks of implementation (Gustova, 2017; NAO, 2017; Waller & Weerakkody, 2016); dependence on infrastructure for hosting and access (Brown, 2005; Hanna, 2010; Joseph & Kitlan, 2008; Ndou, 2004); and the importance of privacy and security implications. Lastly, the digital environment has intensified the need to be guided by policies and regulations (Dillon et al., 2020; Hanna, 2014), hence the characteristics of the digital environment have an influence on the acquisition, sustainability, and development of digital skills.

As technology and the demands of the digital environment continue to outpace human capacity and skills to fully utilise them, it is imperative to explore the drivers shaping digital skills.

1.6 Chapter summary

E-government online services have paved the way for efficient and effective public services delivery in many countries. The implementation of e-government requires implementers and managers to possess the appropriate skills set to facilitate the delivery of online public services. Considering the above, it is imperative for Namibia to harness the potential of ICTs to transform the public sector and promote public value through e-government interventions (Hanna, 2010).

Chapters in the thesis are outlined as follows:

Chapter 1: Introduces the background of the study and provides a short description of the research purpose and objectives, problem statement, significance of the study and limitations.

Chapter 2: This chapter presents the current literature on digital skills in the context of digital transformation. It proposes the underpinning theories that inform the study's conceptual theoretical model.

Chapter 3: Presents the methodological approach to understanding digital skills using a case study methodology.

Chapter 4: Presents the insights on digital skills from data collected using a methodology presented in chapter 3.

Chapter 5: This chapter discusses the findings from data analysis. Findings for this study are compared to those in the literature.

Chapter 6: Lastly, chapter 6 outlines the conclusion of the study.

The next chapter presents the literature review of the study.

CHAPTER 2: Current literature on digital skills in the context of digital transformation

Having contextualised the research background and the problem statement, a review of the existing body of literature on digital skills was conducted to advance knowledge in the field. The present chapter explores the relevant literature, from the digital transformation perspective but with a focus on the institutional arrangements for e-government implementation and the identified the concerns about the conceptualisation of digital skills and the application of digital skills to advance e-government implementation. The critical analysis of the literature assisted the researcher to formulate a theoretical and conceptual framework of the research.

2.1 Elements of transformation

Hanna (2011) posits that ICT could become a tool to transform development globally, promote knowledge, and drive innovation. Organisations are using ICT to transform their business models and strategies. The e-transformation framework weaves key ingredients to integrate and deploy ICT, thus maximising developmental impact in the economy and society (Hanna, 2011).

The framework highlights key dependencies about leadership, cyber policies, institutions, human resources, technological competencies, information infrastructure, and ICT uses for the government, business, and society. These elements are interdependent and they are crated to stimulate strategic and creative thinking in transforming the government and all other sectors of the economy.

The element which is fundamental to this study is the Human capital, which refers to skilled users and producers. Human resources as an internal organisational factor that affects e-government is believed to be the most critical factor (Hanna, 2010; Hanna, 2011; Hanna, 2014) that contributes to the success of e-government. The aspect of human resources comprises of the components of skills and capacity development. According to Hanna (2010, p. 41), “skills are at the heart of ICT evolution”, and the presence of skills is an opportunity for successful e-government implementation (Angelopoulos, Kitsios & Papadopoulos, 2009; Lam, 2005; Karunasena & Deng, 2012). In support, Nadkarni and Prugl (2020) emphasises the relevance of management and their skills contribution to the

transformation process, hence the need to recognise the impact of digital transformation on leadership in terms of skills.

The current research selected one out of five elements for study, however it must be noted that the research does not seek to undermine the importance of the rest of the elements, but rather to focus on the human resources because of its importance to the study of digital skills.

2.2 Digital literacy

Earlier work on Digital literacy concept is traced back to Paul Glister (Bawden, 2001; Lankshear, & Knobel, 2006). He defined digital literacies as "the ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers". It is clear from the definition that Gilster made a distinction between digital and analog media by emphasising that formats are presented via computers as a medium, especially a "networked medium" (Gilster, 1997, p.19). A networked medium is fundamental to the interconnectivity and the connectedness of a digital environment that is prevalent in the digital environment. In support, Fulton and McGuiness (2016) posit that digital literacy provides the ability to use communication tools networks to locate, evaluate, use and create information. In digital literacy, there is often an emphasis on the ability to perform tasks effectively in a digital environment (Fulton & McGuiness, 2016; Glister, 1997).

The author emphasised a deeper understanding and mastering of four key competencies, i.e., knowledge assembly, evaluating information content, searching the Internet and navigating hypertext (Gilster, 1997). The competencies cover the broader aspects of performing digital activities which are sufficient for the early years of the Internet. The competencies may require technical or non-technical dimensions, however, Gilster did not provide a comprehensive list of skills but rather broad competencies with sub components, e.g. the study did not explicitly define the types of skills that are required for Internet Searching or Hypertext navigation.

Notably, Gilster (1997) brought in a vital and engaging perspective that digital literacies require not only technical ability but also "a special kind of mindset or thinking" (Bawden,

2001, p.19; Gilster, 1997). Gilster's conception has since been appreciated and reviewed by subsequent studies in the field of digital literacies and skills (Bawden, 2001; Eshet, 2002; Lankshear & Knoble, 2006; Lankshear & Knoble, 2016). As technology evolves, authors are now motivating for a shift in focus of current technology (Eshet, 2014; Mesko, et al, 2015; Ilomaki et al., 2014; van Deursen et al., 2009; van Laar et al., 2017). Mesko et al (2015) stated that digital literacy refers to the "evolving digital and social media applications, including, but not limited to, search engines, medical blogs, Twitter, YouTube, Facebook, Wikipedia, and other social media channels" (Mesko,et al, 2015, p. 57).

The work of Gilster has built a premise about adapting our skills to the evolving media and it is measured by internet mastery and experience (Bawden, 2001 as cited in Lankshear & Knoble, 2006). As such, there is a need to understand that digital skills evolve to the maximum lasting value that continuously sustain the changing digital environment and to form the basis of the concept of digital skills which is the focus of this study.

2.3 The role of digital skills in digital transformation

The process of digital transformation requires the human capacity to respond to the driving forces of the digital environment, therefore, the role of skills in the digital environment cannot be overlooked (Brown et al., 2015). Several countries have made efforts to establish frameworks and agendas to promote digital skills development (UK Digital Skills Framework, 2016; Australia Digital Skills Office; Digi Comp framework; ITU Digital skills agenda) to reap the benefits of digital transformation (Bokova & Gavin, 2017; Ferrari, 2012; OECD, 2016).

Digital transformation has impacted skills development in two different ways. Firstly, it presents an opportunity to acquire skills. Secondly, it may expose a skills gap. There is consensus that a lack of digital skills is a critical challenge impeding countries from attaining the goals of digital transformation (Brinkley et al., 2012; Coad et al., 2014; DEU, 2016; Hanna, 2014; NAO, 2015; Ndou, 2004; OECD, 2016). On the contrary, there is a strong emphasis hat digital transformation is changing the demand for digital skills hence a high risk of a growing skills gap as the digital transformation unfolds (Bokova & Galvin,

2017; Information and Communications Technology Council [ICTC], 2016; OECD, 2016; NAO, 2017). The most notable insight from this perspective is that digital transformation may lead to an increased skills gap within working environments and among the workforce (Kohli & Johnson, 2011). To improve the reasons for this, it is critical for this study to develop a better understanding of how digital transformation drives the demand for digital skills in a digital environment.

The subject of digital skills is not new (Glister, 1997) and in the context of digital transformation, it has been studied from different dimensions and is continuously evolving. One dimension is the need for digital skills from the supply side, industry and organisations undertaking digital transformation processes and the other dimension is the availability of such skills to meet the demand, i.e., digital skills as required by end-users and the workforce to advance the transformation process. Much focus has also been placed on the demand side of public and citizens as end-users to take up the benefits of digital transformation for the purpose of building an information society and digital economy (Arfee & Khan, 2011; Bokova & Galvin, 2017; NAO, 2017; OECD, 2016).

Nadkarni and Prugl (2020) emphasise the relevance of middle management and their skills contribution to digital transformation. The authors pointed out that digital transformation demands not only a new mindset but also different skills (Nadkarni & Prugl, 2020, p. 26). According to Nadkarni and Prugl (2020), digital transformation is the “most pervasive managerial challenge” even for decades to come, because skills are required to reveal its transformative power.

From the perspective of managing a digital transformation, the role of digital skills is to enable management to exercise the ability to strategically align digital transformation goals with the overall goals of the public sector, which further cascade into national priorities (OECD, 2014). This sets a clear agenda for the present study because it validates the need to identify digital skills in public sector reform initiatives such as e-government.

2.4 The role of digital skills in contributing to e-government implementation

An analysis of scholarly articles in the subject of the digital skills required for e-government revealed several areas of exploration, ranging from different research streams, but primarily in the pedagogical domain for the purpose of specialised educational programmes and training (Glister, 1997; Lim et al., 2013), designing of conceptual frameworks, and assessing skills for the readiness of e-government (Leitner, 2006; van der Waldt, 2016). Regardless of the focus of the research stream and different dimensions, past studies acknowledge that digital skills have gained prominence in advancing government service delivery (Brown et al., 2014). These skills influence the uptake of e-government services (Leitner, 2006; van der Waldt, 2016) and the lack thereof hinders the progress of e-government projects (Leitner, 2006; Lim et al., 2013 van der Waldt, 2016).

Furthermore, the role of digital skills in e-government has garnered considerable academic attention as stated earlier, but the focus was generally on public servants at large (Bershadskaya, 2012; Schuppan, 2008). However, currently, a shift of attention is narrowing this focus down to the management of digital transformation leaders (Nadkarni & Prugl, 2020). This is supported by Cortellazo et al. (2019) who found that managers are at the helm of implementation and they have become a driving force and key determinant behind transformation, hence exploring the skills among management has become a matter of interest.

The importance of digital skills in e-government is heightened by emerging technologies that further impact the nature of e-government reform initiatives. E-government aims to offer efficient and effective public service delivery using technology (Berman, 2012). Griffins et al. (2012) attest that this requires new or improved skills to address new ways to operate and manipulate new tools and devices. However, van der Waldt (2016) argues that the public sector strives to use advanced technologies to deliver efficient and effective public services through e-government. This is because the rate of adoption of the latest technology is lower in the public sector than in the private sector, thus the concentration of appropriate skills is more prevalent in the private sector (Hanna, 2010,

p.140). From this point of departure, this study found it relevant to delve into digital skills and e-government with insights from management directly involved in e-government implementation instead of such skills among general public servants.

2.5 The analysis and conceptualisation of digital skills

2.5.1 Defining digital skills Understanding the concept of digital skills

There is no universal definition of the term 'digital skills' at the global level (Bokova & Gavin, 2017; Ilomaki et al., 2014; Shortt et al., 2020; van Laar et al., 2017). Several factors have been attributed to this, firstly, the term 'digital skills' is broadly conceptualised and operationalised with a diversity of definitions and variations in the terminology, and hence it cannot be easily defined.

In the 70s, the term “computer literacy” was born (Bawden, 2001; Gilster, 1997; Leahy & Dolan, 2010) to refer to those who can operate a computer. Lately, the term ‘digital literacy is used in the technology domain (Ilomaki et al., 2014). More terminologies continued to emerge as technology advanced, such as ICT skills (Arfee & Khan, 2011; Patterson, 2012; OECD, 2016), digital skills (Bokova & Galvin, 2017; DEU, 2016; NAO, 2017; van Deursen et al., 2009; van Deursen et al., 2014; van der Merwe & Heeden, 2015; van Laar et al., 2017;), e-skills (Fernández-Sanz et al., 2017; Korte & Husing, 2016; Varallyai & Herdon, 2013). Other terms are Internet skills (van Deursen & van Djik, 2008), digital competencies (Ferrari et al., 2012; Ilomaki et al., 2014) and 21st century skills (Ananiadou & Claro, 2009; Duderstadt, 2000), with some researchers and government bodies and departments such as the OECD referring to them as ‘skills in a digital environment’ (OECD, 2016).

The variation in terminologies brought debates in the subject of skills and this has led to unclear definitions of the concept of digital skills; unclear frameworks for skill assessments (Eshet, 2014; Ilomaki et al., 2014, van Deursen et al., 2009; van Laar et al., 2017) and diverse interpretations in policies, scholarly articles, and learning fields (Coiro et al., 2008; Ferrari et al., 2013).

Literature highlights that a lack of common nomenclature to define digital skills is exacerbated by the continuously evolving nature of the skills (Bokova & Galvin, 2017;

Ilomaki et al., 2014; Shortt et al., 2020; van Laar et al., 2017). The factors driving the evolvement are the emergence of digital technologies (Bokova & Galvin, 2017; Janevski, 2018; ITU, 2019), the increased demand for technology-based jobs (Shortt et al., 2020), the converging or blurring of disciplines and shifting roles (Shortt et al., 2020), and sectoral differences in digital skills requirements (DEU, 2016).

The other major debate is on whether to call it ‘skills’ or ‘competences’. Suleman (2016) concluded that the term skill refers to the skills acquired through learning, experience, or observations. In contrast, Chappell et al. (2003, p.15) claim that the definition of skills has gone beyond the ability to do a specific task to include “general and personal capabilities and attitudes” required in the work environment. Similarly, Ilomaki et al. (2014) argue that competence is more appropriate because it refers to “more than just knowledge and skills, it includes the ability to meet complex demands” (Ilomaki et al., 2014, p. 658).

Past research has brought in another dimension about whether digital skills are underpinned by technology or not. Sturgess et al. (2016) note that the term ‘digital’ on its own is used for technologies only, i.e., online services, and may apply to an activity performed on computers as well. Van Laar et al. (2020) state that digital skills are underpinned by ICT. In contrast, NAO (2017) argues that the word ‘digital’ means more than this, and has extended to interdisciplinary skills among different sectors, including those not entirely underpinned by ICT (DEU, 2016). Considering the point made by Maihemuti (2011), Alsheri and Drew (2012), and Waller and Weerakkody (2016) that e-government is a complex blend of technology, management, and policy-related issues, this strengthens the evidence that digital skills’ support of e-government cut across different domains and may not entirely consist of technical skills.

According to Shortt et al. (2020), there is a demand for a broad range of skills beyond technology. Basing the definition of digital skills on emerging technologies can challenge efforts to achieve a consistent and unvarying definition because of the pace of change and the rate at which new technologies are emerging.

Another aspect that led to the broadness of the definition of digital skills is combined skills or hybrid roles from multiple disciplines – creating a new market. Shortt et al. (2020) confirm that digital skills are now sought in combination with skills from multiple

disciplines, for instance, marketing, business, and project management. Although this is likely to inform new ways of measuring digital skills, it creates diverse ways of categorising relevant skills.

The debates around literal meanings vis-à-vis the shifting of terms need to be considered in a way that fulfils the objectives of this study. As a point of departure for this study, particular interest is in the skills that management requires to support e-government initiatives which are a blend of administrative issues in social, political, legal, and economic sectors, and technology – which is the digital part. Therefore, the present study refers to the term ‘digital’ to accommodate the technology context, specifically online services, and the term ‘skills’ as the ability to perform online activities in different sectors.

2.5.2 Defining digital skills

The UK digital skills framework defines digital skills as the skills that are needed to work across the diverse IT sector and develop new digital technologies and new products and services (DEU, 2016). OECD (2016) defines the term as the complementary skills to carry out work within a digital environment as shaped by technology at work, whereas Bokova and Galvin (2017) proffer that digital skills are related to using digital technology in empowering and transformative ways.

Against the background of the broad categories of skills cited in the literature, digital skills for management can be defined as the skills required for “using digital technology in empowering and transformative ways” (Bokova & Galvin, 2017, p. 30) to carry out activities within a digital environment as shaped by technology (OECD, 2016, p. 9), and “manage the development of improved or new digital technologies, products and services across diverse IT sectors” (DEU, 2016, p. 23).

Literature further indicates that the skills are required to operate technologies, resolve complex issues related to technology, content, and information management. Bokova and Gavin (2017) posit that digital skills are the individual's ability to make use of technologies from basic to advanced functionalities. In addition, the authors emphasise that it is not just about usage but also about achieving the benefits of using such technologies.

Digital skills also involve creating and sharing content (Ferrari et al, 2012). Content creation is considered an integral dimension to the definition of digital skills as it promotes the value-added to e-government in pursuit of relevant, reliable, and up-to-date information (Ferrari et al., 2012; Hanna, 2014). However, Hanna (2014) indicates that the scarcity of digital content developers in the context of e-government is worrisome. This indicates a strong link as to why content creation ought to feature in the spectrum of digital skills.

Other views suggest that digital skills involve understanding, evaluating, prioritising, formatting, channelling, and managing information (Ferrari, 2012). Digital information needs to be understood and evaluated to ascertain its validity (Bokova & Gavin, 2017; Ferrari, 2012; OECD, 2016; ITU, 2018). Studies suggest that individuals must be able to make meaningful sense from the available information (Bokova & Gavin, 2017; Ferrari, 2012; ITU, 2018; OECD, 2016), and with the plethora of data and information passing through various networks or stored on the cloud, the effective management of information becomes critical.

Lastly, another important consideration when defining digital skills is the comprehension of complexities. Hanna (2014) expounds that the augmented complexities are brought about by digital transformation processes through various complexities of interrelated components in the digital ecosystem such as emerging technologies, a demanding policy environment, multi-stakeholder collaboration, competition, and markets. Technological complexity requires skills that can aptly analyse the impact of technological change and any other created complexities.

The definition of digital skills given the technology, content, and information management, is crucial for the current study as it aims to unpack the important components and dimensions informing digital skills in order to develop a better understanding.

2.6 Dimensions informing digital skills composition

2.6.1 Digital skills user categories

Past studies and skills frameworks have distinguished between different categories of users (Ananiadou & Carlo, 2009; Bokova & Gavin, 2017; DEU, 2016; OECD, 2016;

Ilomaki et al., 2011). Studies note that significant research has been prioritised to ICT professionals' category of digital skills, but the literature review conducted by Cortellazo (2019) illustrates that digital skills for managers is under-researched. However, an interesting finding by Gekara et al. (2020) is that advanced skills are equally demanded by other non-ICT categories (Gekara et al., 2020) and this has given rise to the demand for the least digitally intensive skills (Shortt et al., 2019).

2.6.2 Digital skills as sets of skills

Many studies have referred to digital skills as sets of skills instead of single skills (DEU, 2016; Ferrari, 2012; ITU, 2018, p. 2; OECD, 2016) that lead to a certain goal or rather a completed action. Principally, it takes several activities, mostly sequential, to complete a digital transaction, e.g. performing an online transaction, which requires a user to access a portal, navigate, understand the information, and finally transact. Hence, one needs skills to navigate, which are different from skills to evaluate information and the skills to transact online.

2.6.3 Digital skills and soft skills

Janevski (2018) identified different types of soft skills in the context of emerging technologies, such as the ability to research new digital products, services, and paradigms; the ability to determine the impact of new technology, and project management (ITU, 2018, p. 46). However, Grugulis and Vincent (2009) argue that soft skills have little to do with digital activities or the capabilities to work in a digital environment. Shortt et al. (2020) add that the challenge lies in the methods of teaching or transferring soft skills. It is important to uncover the extent to which soft skills contribute to the spectrum of digital skills or at least how they supplement the technical skills required, as it may shape the ways digital skills are perceived and defined.

2.7 Digital skill in Africa

The demand for digital skills in Africa is expanding speedily and it is expected to surge in the years to come (Cabarello & Bashir, 2020). A study by International Finance Corporation (IFC), a member of the World Bank Group, predicts that "230 million digital jobs in Sub-Saharan Africa by 2030" (IFC, p.10). However, the demand varies across

sectors and will be required in both the formal and informal economy. According to the report's findings, Kenya, Mozambique, Nigeria, Cote d'Ivoire, Rwanda and Kenya will require about 25-55% of some level of digital skills and this would require skilling and re-skilling. The growing demand requires teaching methods and curricula in academia and other learning institutions to respond to the changing digital environment and introduce rapid skilling courses and programmes to address the immediate need for specialised skills.

Much attention has been paid to the end users' skills for the uptake of e-government services and ICT adoption in Africa. NEMISA (2020) conducted an environmental scan of digital skills in South Africa to determine the state of digital skills and their related key skills indicators. The study focused on a broad scope of the demand side of skills in preparation for the Fourth Industrial Revolution (4IR) and the future of work in South Africa. The authors found that there is a need to develop specialised digital skills which are unique to each economic sector in order to appropriately address the demand for digital skills. In addition, the authors noted limited research in digital skills and a systematic audit of digital skills in South Africa, and this seems to be the case for many African countries including Namibia. Moreover, a study conducted by Links (2010) in Namibia noted the need for a comprehensive skills assessment with detailed breakdown of critical skills shortages across all sectors.

2.8 Emerging technology trends underpinning digital skills

The ongoing development of technologies and emerging trends have culminated in changes in working environments and impacted all aspects of life (Hess et al., 2016; White, 2012). This has caused considerable attention among researchers, especially in the context of how it affects skills development. Studies demonstrate that engagements and interactions either in workplaces or leisure are becoming complex and interactive, which demands new skills and reskilling in managing digital environments (Bokova & Galvin, 2017; Ferrari et al., 2013; van Laar et al., 2017).

The advent of big data, IoT, robotics, mobile technologies, cloud computing, other concepts like convergence or search-based applications and other new developments are impacting digital skills (Bokova & Gavin, 2017; Eshet, 2014; Ilomaki et al., 2014;

Révészová, 2016; Shubha, 2017; Toner, 2011; ITU, 2017;). Emerging technologies increase diverse and heterogeneous skills which demand harmonising such skills in different domains (Lyytinen et al., 2016). Literature shows a commonality in recognising the technology trends apart from minimal variations of other recently evolving trends such as 3D printing and differentiation in labelling the technologies such as robotics versus automation.

However, several studies confirm that emerging technologies are impacting digital skills, and yet the conceptualisation of identifying the actual skills associated with emerging trends is missing, especially in the context of e-government. Skills frameworks have tried to group related skills and technologies together, but in the broader context of what the skills are for instead of pinpointing actual skills. Bokova and Gavin (2017) briefly examined major technology trends and associated skills but focused on the broad skills required in the digital society, while Janevski (2018) conducted a more comprehensive study but focusing on the telecommunication sector. Nevertheless, the two studies provided a foundation for this study to build upon in identifying technology trends underpinning digital skills. The following technological trends as drivers of digital skills are identified below.

2.8.1 Networked computing and convergence

Digital technologies are interconnected to people, objects, and information, to produce or transmit data (Bokova & Gavin, 2017). This has changed the way data is “collected, stored, annotated, presented and accessed to reduce costs, increase quality, increasing flexibility of access and increasing bandwidth” (Earnshaw & Vince, 2008, p. 2). Convergence is an integration of multiple technologies and applications or information into a single platform on a single device (Liu, 2013; Menon, 2011). Technically, this translates to the skills required in designing, operating, and deploying ultra-broadband networks, mobile broadband, and learning Next Generation Networks (NGN) standards and implementation (Janevski, 2018). The integration of data, voice, and video on networks is the basic manifestation of convergence (Liu, 2013). Ultimately, skills are required to be able to identify, retrieve and organise information. Therefore, the workforce

is expected to be cognisant of the content, understand a diverse audience, and become acquainted with interactive forms of exchange (Bokova & Gavin, 2017, p. 23).

2.8.2 Data-based and computational

The plethora of information has resulted in an excessive generation and processing of data in a digital environment, such as, wearables, trackers, and sensor-based devices which are designed to create, transmit or produce data. Other applications use large-scale computational and complex algorithms to, for instance, produce internet search results and predictions such as Big Data sets, Social Media Analytics, and Predictive Analytics (Bokova & Galvin, 2017). However, there is a shortage of skills to operate and build new data sources and this may hamper the adoption of big data and similar technologies (Munne, 2016). This is driving the need to develop digital skills in the use of large-scale computational techniques, i.e., machine language, IoT and AI (ITU, 2018) and other skills such as data mining, algorithms, and automated processes (Bokova & Galvin, 2017, p. 25).

2.8.3 Remote and automated systems

The ongoing development of artificial intelligence, robotics, the Internet of Things, intelligent automation or smart systems, and embedded systems have impacted the digital environment (Bokova & Galvin, 2017; Davies et al., 2017; KPMG, 2017). The main demand for skills in remote and automated systems is to create the ability to understand how these systems are making calculations and how they are making decisions to ensure that the types of applications are thoughtfully and strategically designed to support and deliver different automated services (Bokova & Galvin, 2017, p. 26). Furthermore, considering security, privacy, and ethics issues, either in implementing or using such technologies and the potential to aid for transformation efforts triggers the need to develop skills to understand how to work and live with ubiquitously connected systems and intelligent systems (KPMG, 2017).

2.8.4 Social and collaborative media and (co)creation

The use of social media and other collaborative media to improve communication and teamwork is on the increase. Social media technologies are changing the way people interact, connect, and share information through online communities (Chun, 2013). It is

the driving force for mass socialisation (Bokova & Gavin, 2017), interactivity and collaboration through social linking to create value (Bokova & Gavin, 2017; Chun, 2013). Social media applications such as Facebook, Twitter, YouTube, Wikis, mash-up web techniques and blogging promote content generation to facilitate information sharing through interactions (Chun, 2013).

Davies et al. (2011) posit that media related skills are required to critically assess and develop content using social media tools and technologies, virtual collaboration skills and design skills. This demands improved skills to creatively collaborate, collate online groups and modes of mashing-up (Bokova & Gavin, 2017), programming fundamentals and technologies, and web technologies (Janevski, 2018).

2.8.5 Proprietary and open forms of technology

Digital services and technologies are either provided on a commercial basis, i.e., proprietary, or accessed for free as open technology (Bokova & Galvin, 2017; Melody, 2017). Proprietary technology is usually owned by an organisation and protected as intellectual property, which may be restricted through licensing practices. Open technologies are available to the public, whereby the technology is distributed at little or no cost (Pasad, 2013). Open technologies can be software (or free/libre/open-source software –FLOSS) or hardware or services. Besides the cost, ownership and licensing issues, open technologies are adopted to address challenges pertaining to vendor lock-in, interoperability and costly maintenance of such services (Lundell et al., 2017). This requires skills to understand how internet users can engage with commercial and non-commercial platforms in a cognisant manner and be aware of the kinds of business models used in proprietary and open forms. Kilamo et al. (2012) identified technical skills such as patents and licensing, intellectual property for proprietary models, and for open technology, the authors cited skills related to expertise of copyright laws, while Bokova and Galvin (2016) suggested design and programming skills.

In sum, the advent of the digital technologies described in this section has impacted the environment in which they operate (Bokova & Galvin, 2017), including e-government environments. The next section reviews the characteristics of the digital environment

since emerging technologies have stimulated some aspects that are now playing a role in the digital environment.

2.9 Characteristics of the digital environment

Scholarly attention is on a steady rise leading to a significant increase in addressing aspects that play a role in the digital environment. Studies confirm that the digital environment operates under several unpredictable conditions, i.e., the characteristics of the digital environment making it unstable, volatile, and unpredictable (Bharadwaj et al., 2013; Nadkarni & Prugl, 2020; Patzak & Rattay, 2009; Peppard & Ward, 2016) hence making the environment dynamic (El Sawy et al., 2010, p. 835). The environment is expected to be “compliant, adaptive, predictive, imaginative and location-independent” (Nadkarni & Prugl, 2020, p. 26; White, 2012) and these characteristics influence the environment.

However, the characteristics of the digital environment are widely discussed focusing on digital transformation, but the context of digital skills is rarely emphasised. Moreover, the approaches are restricted to their domains impeding a holistic perspective. Nadkarni and Prugl (2020) highlighted the pace of change and the importance of business architecture. Other characteristics identified are privacy and security (Fernandez-Sanz, 2017; Ferrari, 2012; NAO, 2012; NAO, 2017a OECD, 2016); network and ICT infrastructure (Bharadwaj et al., 2013; Brown, 2005; Joseph & Kitlan, 2008; Hanna, 2010; Nadkarni & Prugl, 2020; Ndou, 2014) costs and project risks (NAO, 2017; NAO, 2017a; Waller & Weerakkody, 2016) and lastly, policies and regulation issues (Dillon et al., 2020; El Sawy et al., 2010; Grover & Kholi, 2013; OECD, 2016b; Hanna, 2014).

It is imperative that management responsible for e-government considers these characteristics as part of their digital skills development. This is because the adoption of emerging technology and the ever-changing nature of the environment need to be aligned with the business architecture; may affect the cost of implementation; demands interconnected infrastructure for hosting and access; necessitate considerations of privacy and security implications, and lastly requires to be guided by policies and regulations. The characteristics of the digital environment have implications for the

development of digital skills, especially in this increasingly digital environment. van Laar et al. (2020) claimed that it is still unclear what variables influence digital skills, hence it is useful to synthesise the existing knowledge by investigating how the characteristics of the digital environment are playing a role in shaping digital skills from a more holistic perspective.

2.9.1 Unique characteristics of a digital environment

i. Pace of change

The rapid pace of change characterises the digital environment. The rate at which technology changes provides less time to respond to disruptive threats (Gover & Kohli, 2013; Nadkarni & Prugl, 2020). The continuous improvements in digital technologies are causing short lifecycles of products and services (Bharadwaj et al., 2013; Nadkarni & Prugl, 2020; NAO, 2012). The pace of change has also impacted the process and pace of turning innovative ideas into a business (Nadkarni & Prugl, 2020; Vey et al., 2017) and the pace of acquiring skills. This affects not only the decisions taking place in the digital environment but also the methodologies and processes employed in delivering services (Fernandez-Sanz, 2017; NAO, 2012). Simon and Yasmeen (2018) argue that mastering digital skills at a given time is likely to be lost because of the pace at which technological changes occur.

Considering lengthy periods of e-government implementation and it being prone to failures and uncertainties, it is crucial to discern how efficient and effective an organisation responds to opportunities by finding ways to balance rigid processes and understanding the constraints within the development cycles (NAO, 2017).

ii. Business architecture

Business architecture is a discipline that maps and defines an organisation's business process models, product hierarchies, and business capability models to contextualise the strategic goals and objectives (Luisi, 2014). Studies have reported that digital projects are reliant on business architecture (DEU, 2016; Iribarren et al, 2009; NAO, 2017;) because digital activities and business activities can no longer operate in isolation (Nadkarni & Prugl, 2020). Similarly, Hanna (2014) stresses the importance of aligning business

architecture with ICT by stating that ICT generates value for the business. Therefore, the acquisition of digital skills demands understanding the business architecture concept, such that people, processes, financials, and organisations can be responsive to the digital environment (NAO, 2015).

iii. ICT and Network Infrastructure

The digital environment depends on ICT and network infrastructure to function optimally so as to provide access to services (World Bank, 2009), and it is becoming increasingly interconnected, thus becoming complex (Grover & Kohli, 2013; Nadkarni & Prugl 2020). Several studies have reported that lack of infrastructure impedes connectivity and access to basic public services, which leads to the digital divide (Brown, 2005; Joseph & Kitlan, 2008; Hanna, 2010; Ndou, 2004). This situation hampers the availability of information and deters the adoption of technology-based services (Joseph & Kitlan, 2008). In the context of e-government, ICT and network infrastructure are regarded as key pillars (ITU, 2008), hence infrastructure is the backbone of technology that allows access to government services (MICT, 2018). This mean that the digital environment heavily depends on infrastructure to operate optimally, and the lack of it impedes connectivity and access to basic services.

iv. Project costs

Although cost reduction is believed to be one of the potential impacts of digital transformation, Heek (2003) found that the government's transition to digitalisation does not always result in cost reduction. The author alludes that costs vary greatly depending on the complexity of processes, and while only a lesser percentage is technology related, the greater costs contribute to related institutional costs such as skills and organisational changes (Heek, 2003). For developing countries with low internet penetration and low adoption of technologies, the investment cost in infrastructure and other enablers escalates more than in developed countries (Hanna, 2014; Heek, 2003). However, according to Hanna (2010), forming a partnership may reduce the cost of investment. The challenge is that there is a high probability that cost assumptions made at the beginning of the project may surge at project completion. This is because unforeseen additional

costs emerge as the transformation process unfolds (Gustova, 2017, p. 43). This calls for flexible approaches to e-government funding that makes provisions for changing requirements (NAO, 2017; Waller & Weerakkody, 2016).

v. Privacy and security

The importance of privacy and security in the digital environment is paramount. There is a strong emphasis on privacy and security while operating technologies, and due to convergence and automation, there is a demand for a real-time network (Goecks et al., 2009; Holtsnider & Jaffe, 2012; Karat et al., 2006) and massive data generated by technologies (Mumford et al., 2000). Janevski (2018) claims that concerns over privacy and security have created a new mind shift in the skills required to operate in the digital environment, not only for hands-on technical professions but also for public awareness. These are the complexities facing digital skills development and should be considered articulating cybersecurity and privacy skills.

In the context of e-government, securing the government's and the public's sensitive information, transactions, and infrastructure is a critical priority (Ferrari, 2013). Technologies and standards for privacy and security should be developed to maintain a secure e-government environment and enforce compliance with relevant standards (Karat et al., 2006; Goecks et al., 2009).

vi. Policy and regulation

Policy and regulation have become significant characteristics of digital environments owing to the vast extent and complexity of emerging technologies. The adoption and use of emerging technologies are shaping policies and regulations (Hanna, 2014; Melody, 2003). To accommodate the exponential growth of emerging technologies, formulating or adjusting policies and regulations to examine the impact of innovation, the rate of diffusion and adoption becomes a necessity (Hanna, 2014, p. 62; van der Waldt, 2016). Management should be able to analyse policies and regulations to ensure that they are supportive of the technologies and not blocking potential benefits of using them and

mindful that frameworks are continuously aligned with the realities of technology, markets and society challenges (Hanna, 2014, p. 62; OECD, 2016, p. 27).

2.10 The implications for the development of digital skills in an increasingly digital environment

The increasingly changing environment has become a challenge in developing digital skills (Ilomaki et al., 2014). The ever-changing environment demands fast decision-making and implementation; thus, demanding fast and adaptable ways of developing skills. Bokova and Gavin (2017) argue that the development of skills has gone beyond just skilling and reskilling to the extent of expanding the parameter of an individual's capacity to understand how to deal with emerging technologies and collaborate in the digital environment (Bokova & Galvin, 2017).

Several studies have revealed the methods to develop digital skills from traditional to modern ways, and some suggested a blend of the two both at a broader level (individual or role-based level) and at the macro level, government, academia, and industries (Cortellazo et al., 2019; Lisk et al., 2012; Lu et al., 2014; Robin et al., 2011). Boe and Torgersen (2018) suggest disseminating skills from an individual to a group method, however, their focus is on the experiential learning theory and this is mostly applicable in smaller settings. Lu et al. (2014) suggest simulations through training in virtual spaces, but Robin et al. (2011) countered that simulations do not yield effective results unless combined with traditional methods. Schuppan (2008) argues that the development of skills is not transformed or recognised into concrete demands for training, hence the incongruities in choosing the best method of developing digital skills.

Given the increasingly changing environment, Stone (2014) argues that the main challenge is not entirely the changing environment, but the pace at which education systems and other learning domains responsible for developing skills need to be aligned with technology change and trends. The author indicates that one of the main reasons for this academic and training lapse is because of the time it takes to change educational curricula (Stone, 2014; ITU, 2018) or educational policies on skills (Borisov & Tantau,

2013). Besides institutions lagging behind technology, ITU (2018) noted a lack of collaborations, limited focus on research, theoretical education, and lack of reskilling and upskilling programs (ITU, 2018, p. 55). The element of an increasingly digital environment is not fully considered in the development of skills. Given that much of the literature on digital skills primarily focused on the international level, with broad objectives of meeting the digital society or digital economy, the scope of this study shall explore the implications of skills development in the context of Namibia.

2.11 e-Readiness

The adoption of ICT and digital technologies is influenced by various aspects, internal and external to the environment hence requires a thorough assessment to determine an enabling environment. E-Readiness models encompass all stakeholders' degree of eagerness and preparedness in e-government. e-Government readiness refers to "how ready the Governments are in employing the opportunities offered by ICT to improve the access to, and the use of, ICTs in providing basic social services" (UN, 2005, p. xi). The e- readiness is important for identifying priority areas for action before implementing digital initiatives to ascertain realistic goals (ITU, 2010). Since e-readiness is conducted at national level, it is important to understand the country's context in order to clearly define opportunities that can be realistically pursued (Mkude & Wimmer, 2013). While readiness exercises focus on e-government readiness in general, some studies focused particularly on skills readiness (Khan et al, 2010; Leitner, 2006; Ojo et al, 2007; van der Waldt, 2016) but in a broader context of the public sector agenda.

This study took a narrow approach by focusing on the team responsible for e-government coordination in order to contextualise unique governance aspects along with other key factors that contribute directly to skills acquisition such as leadership, training strategy and budget, impact assessment of e-government, determination of skills requirements and organisational conditions (Ojo et al, 2007, p. 2).

2.12 The conceptual framework

The conceptual framework is informed by two major concepts brought together, namely digital transformation and skills. It is built on three views that emerged from the literature

review. Firstly, the concept of digital skills is emanating from a historical perspective, but due to the evolving nature of the concept, the present study is informed by Gilster (1997) as a starting point. Gilster (1997) emphasised that digital skills involve adapting skills to new realities and mastering the core competencies of the Internet. The framework is further guided by propositions from Hanna's (2014) e-transformation framework, the Human capital component. Hanna (2014) emphasises that skilled human resources are driving the ICT revolution from both the supply side and the demand side, however, these skills are limited. According to the e-government index of 2020, Namibia is ranked 98th position in 141 countries in terms of skills (WEF, 2019), and eGSAP has noted the shortage of skills to implement e-government (OPM, 2014), hence the need to explore the skills required to implement e-government.

Secondly, the literature confirms that emerging technology trends shape digital skills (Bokova & Galvin, 2017; Hess et al., 2016; Nadkarni & Prugl, 2020; White, 2012;), thus demanding new skills and reskilling in managing digital environments (Bokova & Galvin, 2017; Ferrari et al., 2013; van Laar et al., 2017).

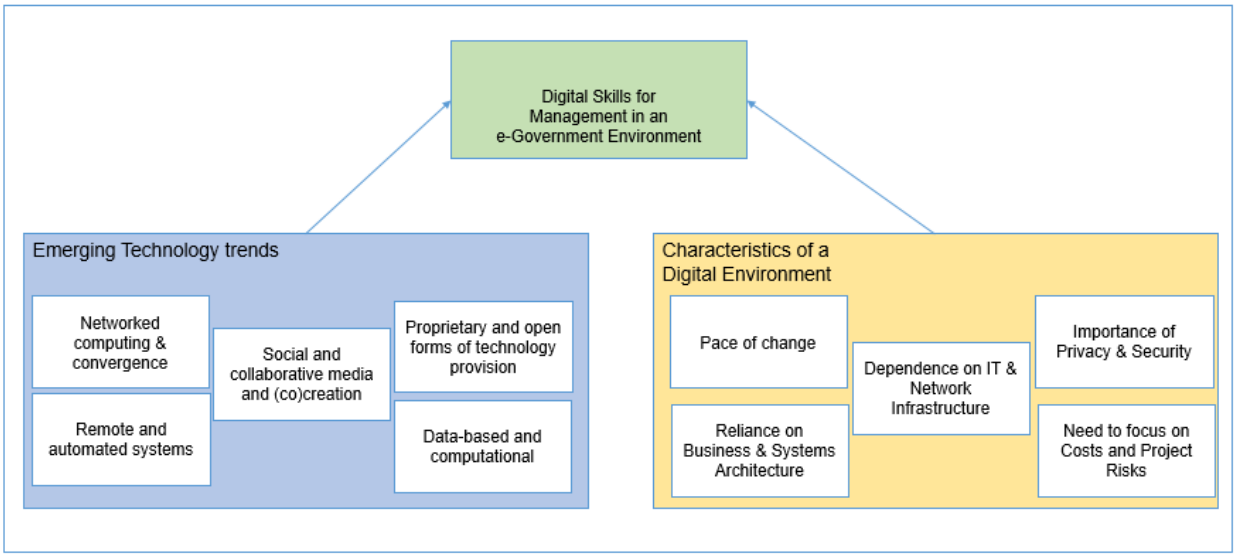
The emerging technologies were adapted from Bokova and Gavin (2017) in a report that examined digital skills development. The current study maintains that the demand for digital skills derives from emerging technology trends. Drawn from experiences and insights from international environments, including Africa, the study underlines the unwavering commitment to developing digital skills through illustrative case studies.

Thirdly, these trends influence the environment in which they operate, thereby triggering other driving forces, i.e., unique characteristics within the environment, thus making managing projects in the digital environment uniquely different to traditional project environments. The characteristics were informed by the literature acknowledging the dynamicity of the digital environment (Bharadwaj et al., 2013; Grover & Kohli, 2013; El Sawy et al., 2010, p. 835; Nadkarni & Prugl, 2020).

Due to the diversity of terms used to describe digital skills and numerous frameworks designed to address digital skills, an extensive literature review was conducted to affirm the types of digital skills required by management. This study reviewed the prevalent skills framework and strategies worldwide such as the European e-Competency (EU, 2014), Digi comp (Ferrari, 2013), UK Digital skills for the economy (DEU, 2016), OECD skills for a digital world (OECD, 2016) as well as Canada's skills framework (ICTC, 2016). The study reviewed the frameworks mentioned above to support the literature from other studies (Bokova & Galvin, 2017; ITU, 2018; Janevski, 2018; KPMG, 2000; NAO, 2015 van der Waldt, 2016; van Laar et al., 2020) that investigated digital skills also directly used in this research.

To sum up the three views, the present study argues that the combination of skills required can be assessed by determining the influence of emerging technologies and the characteristics of the digital environment in which e-government operates and how this shapes the skills required by management to implement e-government initiatives.

Figure 1: The conceptual framework



Chapter summary

This chapter provided a critical review of the evolution of the concept of digital skills, starting with its conceptualisation as it has been influenced by the growing impact of digital transformation. The review focused on the emerging technologies and the dynamism of

the digital environment as characteristics shaping the need for and acquisition of digital skills. Furthermore, the review revealed the implication of developing digital skills in an increasingly changing environment. The conceptual framework lays the foundation for the research design, which reveal the digital skills required to advance e-government initiatives. The next chapter outlines the research design and strategy employed to answer the research questions.

Chapter 3: Methodological approach to understanding digital skills

This chapter explains the study research design and the methods used to guide data collection and analysis. The study was carried out through exploratory research to provide a better understanding of the evolving concept of digital skills in the context of e-government. The study followed a qualitative research approach to answer the research questions and a case study research methodology to provide insights into the digital skills required by management to implement e-government interventions.

The following research objectives, main question and sub-questions were used to guide the research. The objectives were to determine the digital skills which are needed for the management of e-government in Namibia; whether these skills currently exist, and how these skills can be developed or improved.

The main research question was as follows:

What is the current state of digital skills for the management of e-government in Namibia and how can these skills be developed or improved?

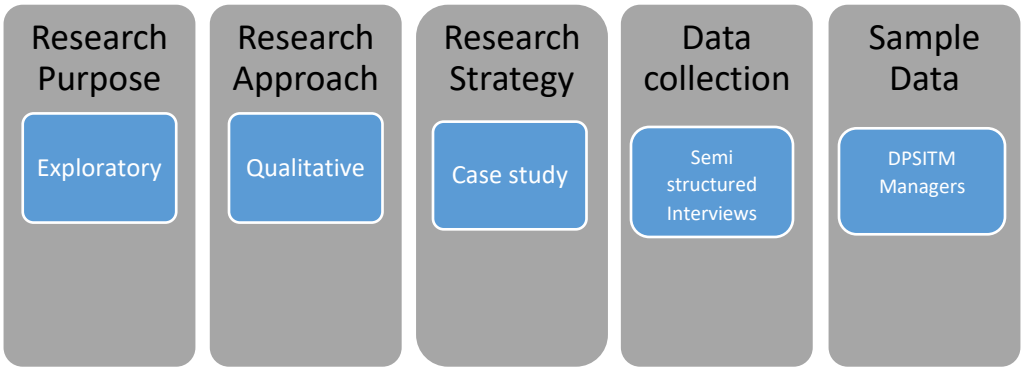
Sub questions:

1) What are digital skills?
2) What are the digital skills which are required by management for the successful implementation of e-government in Namibia?
3) How do the characteristics of a digital environment and emerging technologies shape digital skills?
4) How can the required digital skills for e-government in Namibia be developed or improved?

Based on the problem and the research questions, the study adopted a qualitative rather than a quantitative approach. According to Leedy and Ormrod (2013), qualitative research aims to examine the characteristics or qualities of a phenomenon rather than numerical values. Qualitative research was used to describe different viewpoints from management within DPSITM and other supporting arms involved in the implementation of e-

government. This is because the study sought to describe them with words and expressions rather than numbers or statistics. Figure 5 depicts a summary of research the methodology used.

Figure 2: Summary of research methodology



3.1 Research purpose

Babbie (2013) states that there are three common purposes for conducting social research, i.e., "exploration, description, and explanation" (p. 90). The author further states that the goal of exploratory studies is to explore a new area or a persistent occurrence. It aims to formulating a problem, familiarising with the occurrence, gaining insight to clarify concepts, and conducting an in-depth investigation into the problem to develop a hypothesis (Babbie, 2013). The current study adopted an exploratory approach to explore the digital skills required by management for effective implementation of e-government interventions in Namibia. The study further explored how emerging technologies and the specific characteristics of digital environments influence the digital skills required for effective e-government implementation. Furthermore, Babbie (2013) posits that exploration research requires specific subjects that are knowledgeable in the process or topic under investigation. For this reason, the current study sought to engage with the management involved in e-government interventions as subjects on the ground with first-hand information on the skills required to advance the implementation and approaches to develop such skills.

3.2 Qualitative research paradigm

It is commonly assumed that qualitative research follows an inductive approach. However, Hyde (2000) argues that in most cases qualitative and quantitative researchers

demonstrate both deductive and inductive processes but fail to recognise the same processes. In addition, Yin (2011, p. 94) states that there is nothing wrong with taking a deductive approach in qualitative research. The present study reviewed the background of existing international approaches, models and practices as indicated in Chapter 2, literature review, as benchmarks for her Namibian application, thus assuming a deductive approach.

3.2.1 Social constructivist

Creswell (2014) proposes social constructivism, that is, to understand reality based on an individual's or group's own meaning of the real-world experiences. In this context, social constructivism was adopted to allow the researcher to interact with participants, search for patterns that lead to answers about a particular phenomenon and finally construct a shared understanding based on individual ideas and reflections (Creswell, 2014). It seeks to socially construct meaning based on the experiences and diverse views of people directly experiencing the occurrence, process, or subject matter (Schwandt, 2000; Creswell, 2014). The researcher ensured an interactive researcher-participant dialogue, engaged with the management involved in day-to-day activities of e-government with the aim to unpack digital skills. The constructivist worldview further allowed the researcher to reach a satisfactory understanding of management views.

Social constructivism is adopted in a broader context of interpretivism. Interpretivism allows knowledge to be created through real-life experiences (Rossman & Rallis, 2003), such as conversations, personal interactions, experiences, views, and interpretations. This leads to acquiring a deeper meaning of events in a social context (Cantrell, 2011). According to Schwandt (2000), the key point is to understand the lived experiences from the perspective of those who live it every day. Therefore, it is against this background that the findings of this study are based on the experience and views shared by the participants about digital skills required.

Based on the selection of qualitative research and the methods employed in this research, social constructivism in the context of interpretivism supported the purpose of the researcher and prompted the most relevant data. To best address the research problem

in alignment with the research paradigm, a case study was chosen as an appropriate element of the research design.

3.3 Case study research design

Case studies allow an in-depth analysis of the subject under investigation, an activity, process, event, programme, or individuals (Creswell, 2014). A case study focuses on a specific organisation or institution (Babbie & Mouton, 2001) in its natural setting (Creswell, 2014; Yin, 2003). Considering that this study took an exploratory approach, the researcher used the DPSITM to develop a greater understanding of digital skills within the context of e-government.

Given (2008) defines an intrinsic case study as a "case study of a particular situation selected because of its uniqueness and inherent interest, importance or likely insights, without regard to its applicability to other situations" (p. 69). DPSITM was deliberately selected as a case because of its responsibilities to lead and administer e-government interventions. The department has three directorates, i.e., Quality Assurance which responsible for standards, policies, research and skills development. The Directorate of Technical Support and Network Services is responsible for infrastructure and support, and the third directorate, Solutions Architecture is responsible for developing solutions and online services. According to the e-Government policy (2005) and eGSAP (2014), DPSITM is tasked with the following functions, to mention but a few:

i. Regulate and enforce all standards, frameworks, and guidelines;
ii. Promote e-government awareness and adoption;
iii. Extend strategic advisory and policymaking inputs to the government in required domains;
iv. Take ownership and management of all shared infrastructure for implementing e-government;
v. Undertake research and innovation, and evolve new ways of discharging e-government functions;
vi. Develop cross-cutting services; and
vii. Coordinate action on the Information age.

The functions listed above made the department an ideal purposive case study.

In addition, case studies can focus on a few instances and they are not limited to one observation, hence they can have multiple units of analysis (Given, 2008, p. 68). Yin (2003) argues that the purpose of multiple cases is to indicate expected similar results or contrasting results in the study, which adds to the value of the research findings. Apart from DPSITM, the governance structure of the e-government project comprises of advisory bodies such as the e-Government Legal Committee that form part of the project (OPM, 2005, p. 50). The committee was selected to provide insights into the legal environment. This is because the eGSAP emphasises that the legal framework is the foundational support structure of the successful implementation of e-government (OPM, 2014, p.10). In addition to the e-Government Legal Committee, MICT was also selected, as the entity responsible for "accelerated use and development of ICT in Namibia, and coordinate information management within Government" (MICT, 2019). Lastly is the academia domain as they are involved in the development of skills.

E-government operates in the digital environment that is further affected by the advent of emerging technologies and driven by characteristics that have overhauled the traditional way of operating, which has influenced the acquisition and development of digital skills.

To understand the details of this phenomenon and identify relevant digital skills required, the case study methodology offered deep insights into the events of how digital skills unfold in the context of e-government. In addition, the applicability of the multiple cases in this study allowed the researcher to explore the research from different perspectives. Considering the broadness of the concept of digital skills, a case study as a unit of analysis supplemented the data that resulted in a holistic view of the identification of digital skills that led to a holistic conclusion of the results.

3.4 Qualitative data collection

In this study, data collected was based on the elements identified in the conceptual framework stemming from existing theories, assumptions and practices as indicated in Chapter 2 (literature review) thus assuming a deductive approach.

At the same time, the study collected data through open ended interviews. According to Neumann (2014), a deductive approach moves towards “evaluating the concepts and propositions against concrete evidence” (p.69), hence existing concepts and theories of digital skills were then compared with open-ended interviews data.

3.4.1 Secondary data collection

Examining documents is part of data collection whereby public and private documents (e.g., official reports, newspapers, and minutes of meetings) are reviewed and interpreted to allow the researcher to understand the problem and the research question (Creswell, 2014, p. 240). For this reason, the study employed document review to find, select and understand the data to support and challenge the information collected from the interviews. The data was collected from theoretical sources as well as from e-government and ICT development instruments such as policies, progress reports and strategies. The purpose of reviewing the documents was to set a context in which DPSITM is operating. Therefore, the data helped to explicate the researcher's understanding of the status quo of the institutional arrangements and the factors influencing the overall coordination of e-government implementation. Furthermore, it allowed the research to formulate a clear view of factors influencing not only e-government initiatives but also the development of digital skills and provided insights that led to relevant data to address the research problem. In this way, secondary data was also used to strengthen the credibility of the research findings and conclusion. The information below indicates the list of empirical policy documents reviewed.

Documents reviewed
e-Government Policy of 2005
e-Government Strategic Action Plan 2014 - 2018
Harambee Prosperity Plan 2016 -2020
Harambee Prosperity Plan Progress reports 1 & 2
OPM strategic Plan 2017-2022
MICT strategic Plan 2017-2022
OPM Annual Reports (2016 – 2017; 2018 - 2019)
OPM Annual Procurement plans (2016, 2019, 2020)

National Development Plan 5 2017-2020

IT Policy for the Public Service 2017

Training and Development Policy

Electronic Transactions Act 4 of 2019

3.4.2 Purposive sampling

The sample, which made up of slightly half the IT management team, comprised of chiefs, seniors, deputy directors and directors responsible for e-government implementation. The participants were selected, based on more than five years' experience of being in a digital environment, so that accurate findings can be made representing the general held truth.

The sample was well represented given that all the three departments within DPSITM, i.e., eight out of 15 managers were sampled to augment a holistic view of the skills required. Furthermore, Yin (2011) suggests that sampling should include participants with different views so as to eliminate biased opinions. To expand the views on digital skills, and as explained in section 3.4, the researcher sought to select participants from the e-government committee, MICT and academia to gain a broad perspective and thus rule on various views and meanings about digital skills from different participants within the e-government environment. The e-government committee advised DPSITM on legal matters concerning e-government initiatives, while MICT is the leading office responsible for ICT development nationally, this includes promoting e-government agenda at national level. Participants from academia were senior lecturers, who were chosen for their role in developing digital skills.

Additionally, the purpose is to bring diverse viewpoints, and experiences through in-depth interviews hence the size that is sampled is adequate "to allow a deep case-oriented analysis" (Sandelowski, 1995 as cited in Omona, 2013, p.170), thus improving the quality of the research outcomes. The researcher could not sample less than the current size as it would be difficult to achieve saturation (Sandelowski, 1995 in Omona, 2013, p.170). Table 7 indicates the list of participants

Table 7: *List of participants*

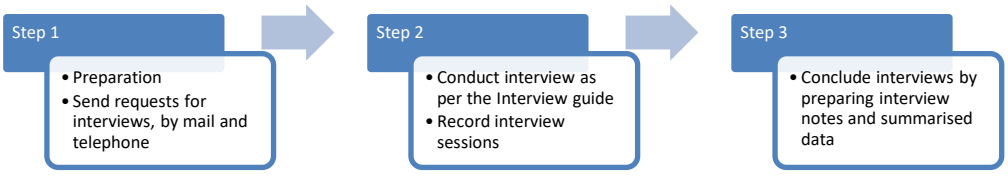
Naming convention	Participant	Motivation for selection
QA1	DPSITM 1	This team is responsible for the conceptualisation, design and administration of all standards and guidelines that are required to be adopted and adhered to by OMAs for implementation of e-Government projects and practices; Provides support and assistance to OMAs in the identification, planning and execution of e-Government project interventions.
QA2	DPSITM 2	
QA3	DPSITM 3	
SA1	DPSITM 4	This team is involved in developing and deploying online solutions, services and processes automation as well as website maintenance. This is the fundamental part of the output of e-government that citizens can see, e-services.
SA2	DPSITM 4	
SA3	DPSITM 6	
TN1	DPSITM 7	This team is responsible for government- wide Network and Infrastructure support; ensure protection of e-Government systems and data.
TN2	DPSITM 8	
MC1	Ministry of ICT 1	Participants need to be familiar with ICT policies, especially for access to ICT services to give insight about the skills required in that aspect.
MC2	Ministry of ICT 2	
LC1	e-Government Legal Committee 1	Participants need to share insights on the importance of digital skills in non-technical fields such as policy formulation and legal matters, etc.
LC2	e-Government Legal Committee 2	
AC1	Academia 1	Participants need to provide insight into the development of digital skills from the academic point of view.
AC2	Academia 2	

Source: Author (2021)

3.4.3 Primary data collection – semi-structured interviews

The process used for interviews started with scheduling the interviews with participants. Interviews were conducted using an interview guide, and the sessions were recorded in conjunction with the interview notes for later analysis. The interview guide was used to draw focus on the core questions, and interview notes were necessary to ensure proper recording of the precise details used to strengthen the analysis and findings. The interview process is shown below.

Figure 3: Interview process



This study conducted in-depth interviews as a method to collect data. In-depth interviews refer to face-to-face interactions with the participants to understand their viewpoints, situations, or experiences (Tailor et al., 2016). To achieve this, the researcher engaged in face-to-face interviews with the participants to understand viewpoints, directly from the implementers' perspective, on how digital skills facilitate the implementation of e-government interventions.

Given the fact that digital skills are vast and have multiple dimensions, semi-structured interviews were employed to focus the discussions during interviews. Semi-structured interviews allow the researcher to control the aspects to be discussed, choose the interview dimension, and allow the participants to speak freely and get a chance to expand on their responses (Given, 2008, p. 422). This allowed flexibility while following a systematic approach to ensure that the most important aspects are covered as per the researcher's objectives.

However, the participants' reactions during the interview were that the questions were intense, which could be due to limited familiarity with the subject of digital skills and emerging technologies. Also, it became apparent that most participants loosely refer to emerging technologies as skills instead of pointing out the underpinning skills required for a particular technology. This could be due to limited familiarity with the subject of digital skills and emerging technologies. Therefore, to provide clarity, the researcher, at times,

rephrased the open-ended questions to ensure that they were understandable to the participants and probing questions were used throughout the interviews to stimulate the discussions. Furthermore, the researcher put different emphases on interview questions for participants to set the context of the discussions and improve the quality thereof.

3.5 Qualitative data analysis

Given (2008) posits that "Data analysis is an integral part of qualitative research" (p.186). Qualitative data analysis defines how the data has been recorded and organised during data collection. Data can be words in a non-numerical form, which can be from both verbal and nonverbal data sources (Given, 2008). The data analysed was in the form of words, including quotations and accounts from the participants and data from documents as non-verbal data. Creswell (2014) recommends that data analysis should be performed simultaneously with data collection and notation of findings. This approach allowed the researcher to strengthen data collection and ensure ongoing verification in the context of research findings.

3.5.1 Data organisation and coding

Interview data collected was recorded and transcripts were generated. The recordings were imported, stored, and transcribed in NVIVO 12. Each transcription was thoroughly analysed individually.

Interview scripts, document excerpts and notes were organised first according to the group of respondents, then based on the concepts used in the conceptual framework. The first group was the DPSITM respondents, followed by MICT, then e-Government legal committee and lastly academia, in that order as listed in Table 6. This enabled the researcher to ascertain a first-hand sense of the information to detect any patterns within the data by sensing, e.g., the broader picture, tone of the idea, and impression of the idea (Creswell, 2014).

Thereafter, the process of coding began with open coding. Creswell (2014) defines open coding as the process of organising the data by breaking it down into categories and labelling the categories. The study employed open coding and by creating nodes in NVIVO to identify key themes and categories emerging from participants' responses. This was followed by another layer of coding (see annexure G).

3.5.2 Thematic analysis

Thematic analysis is a flexible and widely used method of qualitative data analysis that allows researchers to make sense of the collective, shared meanings and experiences on data derived from interviews, surveys or conversations (Braun & Clarke, 2012, p. 2). The aim is to look for subjective information such as participants' view and experiences. This study followed a deductive approach to derive codes and themes from the data emanating from prior researches, existing theories, ideas and concepts covered in the literature review. According to Braun and Clarke (2012, p.3), during analysis, researchers rarely completely ignore the data since they have to know what is worth coding, neither do they approach the data without any preconceptions. Hence, the researcher adopted semantic coding to describe the obvious meaning of the data as per participants' meanings; however, this did not entirely limit the researcher to look for underlying meanings from the data. Thus, some data was coded from participants' experiences. This is because the main research question was exploratory, although drawn from theoretical concepts. The researcher predominately followed a codebook thematic analysis for the initial coding process.

3.5.3 Triangulation, reliability, and validity

In qualitative research, triangulation is referred to as the multiple methods which are used in data collection so as to increase the consistencies of findings (Given, 2008, p. 892; Yin, 2003, p. 81). Data was collected from different informants so as to eliminate biased views, e.g., data from academia and data from members of the e-government legal committee were collected in their own setting, separately from the management of DPSITM. Additionally, other multiple data sources such as document review (Given, 2008) were performed on eGSAP, e-Government Policy and HPP and other official documentation to collect data pertaining to the skills and insights on e-government initiatives. These were used as triangulation to capture different perspectives of the same phenomenon to strengthen the researcher's standpoint thus heightened the validity of the research.

Unlike quantitative research where researchers are expected to arrive at similar conclusion when they have followed same procedures, qualitative research is pragmatic, and with diverse methods involved, researchers may not arrive at similar results

(Given, 2008, p.753). Therefore, to achieve increased levels of reliability in this study, the researcher performed data collection and analysis simultaneously to ensure ongoing verification. Additionally, the linkage of the main and follow up question ensures consistent and repeatable responses from respondents.

3.6 Ethical considerations and limitations

Babbie (2001) states that research participation should be voluntary, and researchers should adhere to fundamental ethics. To ensure adherence to ethical requirements, the researcher sought ethical clearance from the academic institution prior to collecting data, which was duly approved and annexed hereto (see Annexure C). The researcher ensured prospective participants' privacy and confidentiality in taking part from the onset. Participants were informed about the study's purpose and objectives; non-disclosure of information, and that content of the information provided may be reported anonymously. Besides, participants were also informed about their right to decline or to terminate the interview at any time. The researcher ensured that each participant read the Participant Information Sheet and signed the Consent Form before proceeding with the interview.

The focus of the study was limited to the supply-side of digital skills. However, it must be noted that the researcher did not seek to undermine the importance of the demand side, but rather to focus on the scope and objectives of the study. Digital skills for both supply and demand would be for future work as the sample size and scope would have been too big to cover within the timeframe.

The study could not cover all implementation structure committees for e-government; only the Legal e-Government committee members were selected. Although this may have some limitations in gaining diverse insights from other implementation committees, the researcher was able to gain deeper understanding from the DPSITM management, since they have a wider experience and complete overview of e-government implementation.

The researcher did not directly investigate the development of digital skills pertaining to DPSITM in particular but rather opted to broadly explore the industry, government and academia efforts in skills development as the agenda for digital skills is relatively

immature at the national level and has not been cascaded to the level at which DPSITM is.

Lastly, because the researcher is part of the DPSITM team might be a case of ethical concerns to both the institution and the social environment as it might influence the gathering, analysis and interpretation of data. Proof of formal approval by the OPM to conduct the research is attached, annexure F.

3.6.1 Role of researcher

In qualitative research, the researcher is the primary research instrument, hence, possibly, there may be a degree of subjectivity in the research (Lincoln & Guba, 1985). The researcher acknowledges that her profession, position and work background as part of DPSITM team could influence the interpretation of data. The researcher's experience in working in the ICT environment has triggered the interest in the subject of digital skills because she believes that appropriate skills are essential for e-government and key factors in determining the success or failure of technology applications. The researcher fervently wished to create awareness nationally about the understanding and importance of the right skills required to advance e-government.

To minimise personal bias on the study, data was collected from other structures outside DPSITM, i.e., MICT, Academia and e-Government legal committee, and this strengthens the accuracy of the information hence this boosted the credibility of the research outcomes. In addition, after interviews, the researcher shared transcribed notes with respondents to review and ensure accuracy of the content (see annexure). The analysis included direct quotes from participants to substantiate the findings. Lastly, the study was supervised by experienced researchers who ensured that the methods employed were credible.

Chapter summary

The chapter explained the design and methodology adopted to structure the study. The study followed a deductive approach by exploring the existing theories and practices in digital skills that form a basis on which empirical results were tested. The chapter further captured the data collection approach and the sampling method used to gain deep insights in the identification of digital skills required to implement e-government initiatives. The chapter concluded with the methods followed to achieve validity and ethical consideration to provide assurance that the methodology was followed diligently and has led to reliable findings and results.

Chapter 4: Digital skills required for e-Government implementation in Namibia

This chapter presents the research results gathered using an e-government case study to answer the research question: How do digital environments influence the digital skills required by management for effective implementation of e-government interventions? The case setting was chosen because it represents the e-Government Programme Coordination and Implementation Committees.

Data was gathered using multiple sources of evidence, i.e., qualitative data collected through interviews and documents data from policies, strategies, and other official documents. Interview data locate an account of respondents understanding of digital skills, how these skills are influenced by emerging technologies; and how the characteristics of a digital environment shape these skills. Furthermore, the chapter presents respondents' views about the digital skills requirements for management in the implementation of e-government and the extent to which these skills are available to support its implementation. The last part of the interview data reflects respondents' views on the development of digital skills in Namibia. Document data situates the findings in the context of the research setting and describes the institutional arrangements, major activities towards e-government development and other initiatives.

The first section of the chapter begins with the case description, followed by what documentary analyses of policies, strategies, and reports, and the final section detailed discussions of individual interviews emerging from the data.

4.1 Institutional arrangements for e-government development in Namibia

4.1.1 A case of e-government

This section presents a brief overview of government structure so as to understand the implementation modalities that characterise e-government development in Namibia.

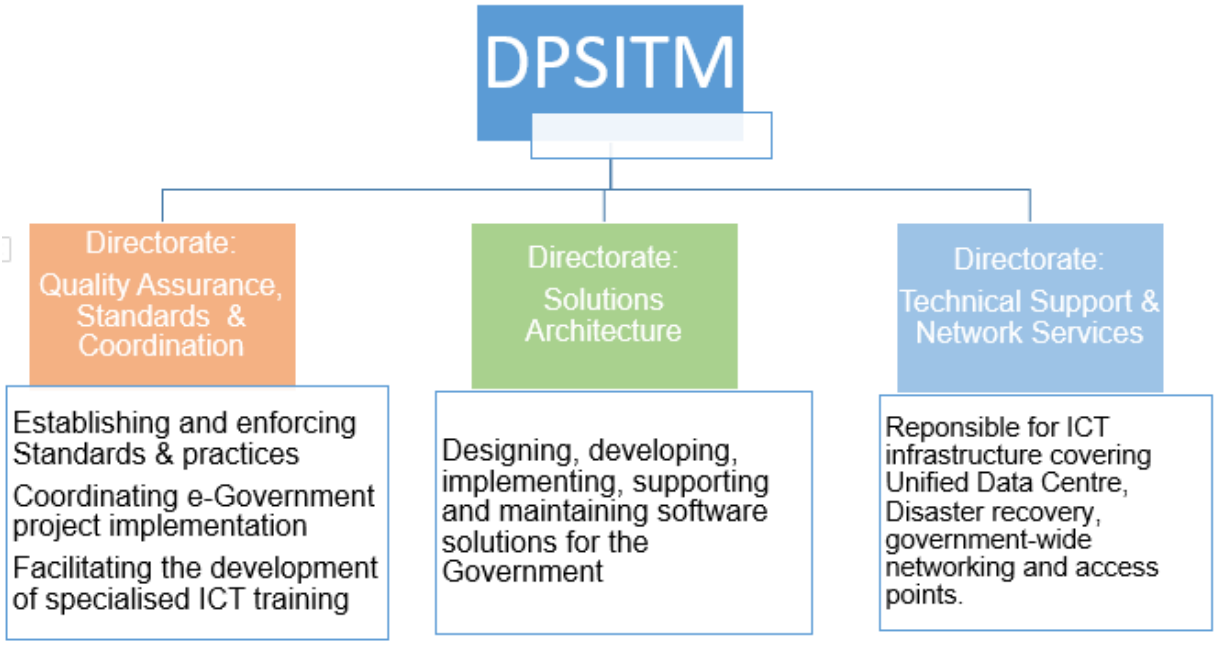
Namibia being a vast and sparsely populated country, with the largest population living in rural areas and the large expanses of empty spaces and sparse population (NSA, 2016), this makes the implementation of e-government in Namibia a significant challenge, not

only in terms of infrastructure and access but also in terms of defining and developing required skills. Namibia became an independent democratic state following a protracted struggle against colonial rule by South Africa in 1990, adopting a representative democratic model of governance in which the separation of power vests in the Legislature (Parliament), the Judiciary (the Courts) and the executive (the President and his Cabinet).

The executive structure consists of thirty-four Offices, Ministries and Agencies (OMA's), including the Office of the Prime Minister (OPM), where DPSITM is located and is mandated by the Constitution of the Republic of Namibia and other relevant legislation to lead Government business in Parliament and execute special projects assigned to the office, such as e-government project. DPSITM came into existence following a Cabinet Decision No. 41st/7.12.93/009 that approved the establishment of IT Divisions in OMAs and its retention in the Office of the Prime Minister to act as a nerve centre for governance, coordination, monitoring, and controlling Government IT activities. However, the department was restructured in 2014 to serve as a technical unit empowered to lead the implementation of ICT programmes and e-government (OPM, 2014, p60. OPM, 2005, p.49). In fulfilling this objective, the department structure comprises three directorates, as shown in figure 4 below, with staff complement of 58 including 15 management positions. At the time of conducting this study, out of 104 total staff complement, 46 positions were vacant.

The Directorate of Quality Assurance has seven managers and is responsible for rendering technical advice, policy guidelines and standards concerning the planning, development and implementation of systems (OPM, 2017, p. 2). Solutions Architecture comprised of four managers responsible for developing and maintaining systems, the portal, and shared applications, while the Directorate of Technical Services is responsible for ICT infrastructure and operational networks and data provision with a staff complement of four managers.

Figure 4: DPSITM's structure



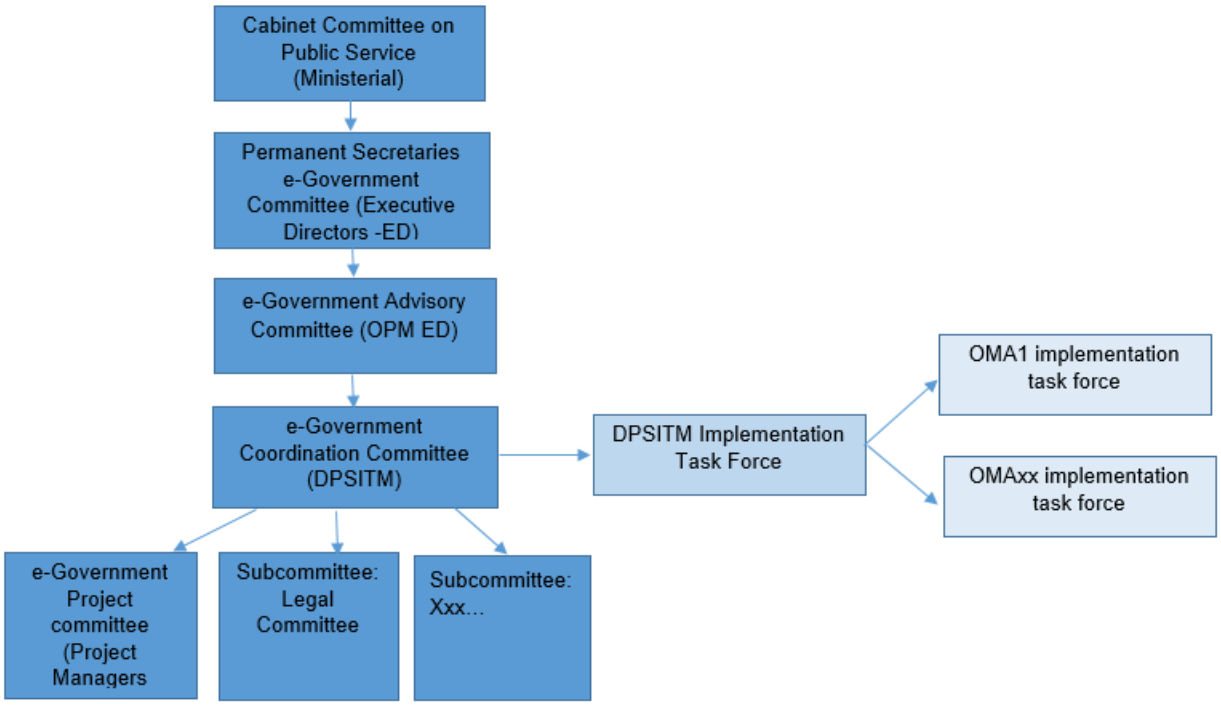
Note. Adapted from *OPM Strategic Action Plan* by OPM, 2014 (https://opm.gov.na/documents).

Whilst the DPSITM performs a lead role in e-government development in Namibia's Public Service, the eGSAP (2014) states that the implementation of e-Government should not be a government's only effort, but a collaboration of the private sector, academia, and all other arms of government such as MICT (GRN, 2016, p.18; OPM, 2014), hence, various structures such as the e-Government Advisory Committee were formed to govern and drive the implementation of e-government (OPM, 2014, p. 59) along with coordination committees from each OMA and other specialised committees.

The institutional structure indicates that e-government implementation has potentially been given high priority and leadership (Hanna et al., 2009); however, the concern is to what extent the current operational arrangements address the implementation issues experienced. Skilled staff are required to execute the mandate, roles, and responsibilities not only of the DPSITM (OPM, 2017) but also of the committees involved. The department's roles and responsibilities are to execute administrative and digital activities

(OPM, 2014), which are vast and complex in nature, pointing to a combination of both administration and technical skills requirements needed to successfully implement e-government. Figure 5 depicts the governance and implementation structures for e-government, and the committee chair is indicated in brackets.

Figure 5: Governance structure and Implementation structure



Note. Adapted from *OPM Strategic Action Plan* by OPM, 2014 (https://opm.gov.na/documents).

4.1.2 e-Readiness

As per the readiness assessment conducted, the Capability category scored the highest. It measured the "availability of skill sets within the GRN to avail information and services electronically, economic capacities to own devices of access, and basic capability of communities and businesses to benefit from e-government services" (OPM, 2014, p. 3). The indicators used were literacy and numeracy levels including basic literacy in English and local languages. However, according to the UN (2005), the e-Government implementation requires more than just literacy and education (UN, 2005, p.139). The results thus revealed a number of interventions such as establishing minimum literacy levels upon recruitment in the public service, specialised training aligned to e-government

project roles, and continuous training in coordination with academic institutions (OPM, 2014).

4.1.3 Challenges with institutional arrangements

Although DPSITM is the technical unit that is empowered to lead the implementation of e-government and has the authority to issue and enforce directives (OPM, 2005, p. 49), such authority is not fully exercised, as a result of external and internal operational factors affecting the execution of its mandate.

The results indicate that the current structure of DPSITM proves a theoretical solid arrangement to lead e-government initiatives for the public service. Several studies (OECD, 2014; Al-Khouri, 2011, p. 22; Hanna, 2010, p.119) argued that the institutions with the highest authority, such as OPM, have been commended, for several reasons, including the fact that they are in the best position to lead e-Government projects. However, Hanna et al. (2009) warned that there is no one size fit all model. Building on Hanna et al. (2009), this study revealed that even with the executive powers extended to DPSITM through OPM, the department is struggling to execute its mandate due to internal and external factors affecting decisions.

External factors such as a lack of prioritising ICT activities, unclear role descriptions (GRN, 2016), lack of commitment from OMAs (OPM, 2017, p. 41; Negumbo, 2018), and inefficient bureaucratic processes (GRN, 2016, p.16; GRN, 2016, p. 33) are factors that result in the status quo and negatively affecting the implementation of e-government initiatives. These are external to DPSITM, while internal factors are within DPSITM.

4.1.3.1 External factors influencing institutional arrangement.

i. Lack of understanding of ICT and top management support

Lack of understanding of the relevance of ICT (GRN, 2016) and insufficient top management support (Negumbo, 2018) are setbacks that were identified in the document sources consulted. Lack of understanding further attributes to inadequate budgetary provision towards ICT activities and "usage of available ICT capacity" (p. 55). Senior management is not held accountable for their lack of commitment towards implementing

digital projects, hence they are "free to choose whether to implement or not implement e-government projects or other ICT activities" (Negumbo, 2018, p. 55).

ii. Unclear role definition

One of the pressing issues is the clarity of roles between MICT and DPSITM (Ngatjiheue, 2015). MICT's mission is to create and maintain an enabling environment for ICT development and access countrywide and, as such, has a national mandate, whilst DPSITM is mandated to coordinate e-government, offer technical support and ICT infrastructure for the public service. These mandates are interpreted in different ways by the relevant departments, and this has caused confusion, particularly as to which department is the right authority to lead the e-government implementation. Although there has been some resolution of this uncertainty, the unintended confusion about role clarity has led to slow progress in initiative implementation (Ngatjiheue, 2015) and resistance in the implementation of projects (OPM, 2017, p. 41; Negumbo, 2018, p. 54) discussed in the next section. Recent efforts to resolve this confusion have been dispelled by the HPP that clearly emphasise the coordination efforts by stating: "the OPM (DPSITM) in conjunction with the MICT as the central government agency tasked with the planning, design and implementation of all Government ICT solutions, will work on a rollout plan" (GRN, 2016, p. 18).

iii. Lack of understanding of ICT and top management support

Lack of commitment among OMAs is hindering the implementation of projects, the progress of e-government and ICT governance in general. DPSITM does not garner commitment and support from OMAs (OPM, 2017, p. 41).

Similarly, Negumbo (2018) raised the same concern by revealing a lack of commitment towards projects headed by DPSITM. Although DPSITM is mandated to serve as the Government's knowledge and action source for governance, coordination, monitoring, and controlling government IT activities, OMAs are procuring expensive and heterogeneous computer equipment from multiple vendors, thereby creating duplications and incompatibility between government systems which is against the IT Policy (OPM, 2017b, p17; van Staden, 2011, p.5). One example of such lack of coordination is that one of the Ministries in 2015 procured website development services to the cost of close

to N$ 10 million, while DPSITM is mandated to develop and host all government websites. It has been reported that this website is not live and remains inactive (Smith, 2020). This indicates that DPSITM's leadership function to oversee and monitor ICT initiatives of OMAs is not fully exercised.

iv. Budget cuts and reprioritisation of funds

The economic downturn led to severe budget cuts, leaving DPSITM limited budget to zero budget for some critical activities. Figures directed towards implementing e-government budgeted at an amount of N$8,000,000.00 are evident in the Financial Distribution Certificate Report of November 2016 (MOF, 2016). However, consequent financial plans, OPM annual plans for 2018, 2019 and 2020, and the Estimate Revenues, Income and Expenditures for 2019-2022 released by the Ministry of Finance do not reflect commitment towards the financing of e-government activities (GRN, 2019 p.17). Recent OPM's Annual Procurement plans only reflect budgeted amounts of operational overheads such as software maintenance agreements (OPM, 2018, p. 14; OPM, 2019, p.13; OPM, 2020, p.2). The absence of a dedicated budget for e-government contradicts DPSITM's mandate. The department's budget should be aligned with its priorities based on the role and functions it performs.

v. Rigid and inefficient processes within the public sector

The inefficiencies in the administration and decision-making within the OPM impacts the department's role and functions. Inefficient administration processes, as noted in the HPP (GRN, 2016, p.16), is not only affecting the overall governance of service delivery, but it is also affecting the effectiveness of the department's day-to-day operations to deliver services. For example, DPSITM is experiencing delays in OMAs submitting requested documents, e.g., website content. Each OMAs is required to provide content following standards for portals as prescribed by DPSITM. Lengthy processes of implementing e-laws have also been noted as factors influencing institutional arrangement (OPM, 2017, p. 41).

4.1.3.2. Internal factors influencing institutional arrangement

Internal factors within the departments are affecting the progress of e-Government implementation include budget cuts, lack of skills, training and development, and high staff turnover, all of which are discussed below.

i. Lack of training , capacity building and skills

The shortage of financial resources has affected training and development. As a result, it impacts critical functions because responsible staff are not well capacitated to handle specialised functions that the department should execute, e.g., developing systems (OPM, 2017, p. 41) and government websites (OPM, 2011). Since the digital environment is ever-changing, DPSITM requires a capable and equipped team to respond to the latest developments.

The ineffectiveness in the implementation of e-governance at DPSITM is due to insufficient training opportunities and high staff turnover (OPM, 2018; Negumbo, 2018). Negumbo (2018) also affirmed that digital projects in OPM are left incomplete or abandoned due to a lack of capacity to develop and or implement systems and manage projects. According to the IT Policy, DPSITM is expected to be staffed with "highly-trained, experienced professionals and dedicated personnel" (OPM, 2017b, p.13), which can potentially add value to e-government implementation. Contrary to this, the research revealed that DPSITM staff are not receiving adequate training (OPM, 2017, p.41), particularly due to budgets cuts, despite the need to prioritise activities within the department. This deprives them of the required skills to advance the e-government agenda as per the Department's mandate. Given that the digital environment is ever-changing (see section 5.4.1), a constant upgrade of digital skills is necessitated among the DPSITM staff.

At the time of writing this research, the training budget was centrally allocated to the Department of Administration, in a pool where all OPM departments are catered for (OPM, 2019, p. 3). The problem with this arrangement is that DPSITM has limited control over the training budget and unable to influence and direct training activities.

However, the bureaucratic process of access to the training budget may be a hindrance to timely training plans. These findings help us to rethink emerging and innovative approaches that allow a responsive training budget, amidst financial constraints, to attend to the immediate and spontaneous training needs.

ii. High staff turnover

Another aspect that is slowing down the implementation of e-Government is the high staff turnover within DPSITM (OPM, 2017). The OPM annual report noted that "skilled staff are leaving for better-paid jobs in the market" (OPM, 2017, p.41). During interviews, Respondent SA2 shared the same sentiments that DPSITM is losing experienced staff to private organisations, thereby leaving a gap that cannot be filled immediately (Respondent, SA2). Due to the lack of a retention policy, projects are left hanging when experienced staff resign, leaving the department understaffed (OPM 2018, p.16; OPM, 2016). Recruitment for new positions is now halted due to lack of budget allocations (OPM, 2017), and as a result, insufficient resources continue to hinder the progress of e-government implementation.

The next section provides a detailed review of the implementation of online services based on a review of relevant documentation available and observations made during the data collection process.

4.2 Progress towards e-government initiatives and legal frameworks

There have been growing calls for accelerating e-Government implementation, notwithstanding the milestones achieved by the Government of Namibia.

This is in view of the slow progress made in respect to implementing the e-Government Strategic Plan, which has now exhausted the timeframe allocated for its implementation. The incumbent Prime Minister, Saara Kuugongelwa-Amadhila, affirmed this call by stating that there is a need to accelerate e-government implementation to achieve greater transparency and accountability. The Prime Minister stated that, "I am expecting the e-governance rollout plan to be implemented, which is aimed at offering online government

services on a 24/7 basis through a 'one-stop shop' for the benefit of citizens, businesses, government institutions and visitors" (Staff Reporter, 2017, para. 2). Similarly, the MICT has noted the slow pace of ICT development with concern and has highlighted this as one of the key challenges to be addressed in its Strategic Plan ending in 2022 (MICT, 2017).

Progress in implementing e-Government has been slow, and this is evident in the results of the review of the presidential economic blueprint, HPP, which was drafted to expedite the development plans (see section 1.4.2 in Chapter 1).

4.2.1 Online services

The eGSAP has set a target to improve online services in 10 identified OMAs by 2018, as outlined in table 5, chapter 1. HPP has noted that out of the identified online services, only the Ministry of Justice's Filing and Case Management (e-Justice); Ministry of Finance's Tax System (iTas); and the Loan Grant Administration for students' loans are fully implemented and operational (GRN, 2016, p.12).

Although eGSAP advocates for the impact and visibility of online services that "directly impact citizens' lives" by the end of 2018 (OPM, 2014, p.10), to date, most of the online services are still in their early stages of development and have not achieved full digital transformation (MICT, 2020). The completed online services are not service delivery driven to address citizens' basic needs but are rather administrative or back-office services, for example, the e-Justice, Student Loan Administration, and the Integrated Tax Administration System (ITAS). Nevertheless, the impact of the completed systems remains low, as they are not citizen centric (Amukugo & Peters, 2016, p. 4; Negumbo, 2018).

Additionally, it is interesting to note that online services developed with external assistance or consultancies outside the Public Service, such as the ITAS, e-Justice, and the Employment Information System, are more successful at achieving full implementation. Considering that past studies noted the shortage of internal capacities (Amukugo & Peters, 2016; Nengomasha, 2014; Negumbo, 2018; OPM, 2017), this may explain why online services developed by external consultants succeed. However, it raised concerns about the government's earnestness in addressing the scarcity of internal

digital skills capacity and commitment. The digital skills agenda to advance the progress of online systems is crucial to making a significant contribution to the impact and visibility of online services but this is not prioritised.

In addition, government presence is also enabled through portals, ministerial websites, and some online services (OPM, 2018), for example, the online feedback system is available, and in use, as it links on Ministerial websites. There has been consistent use of the system, and feedback is received occasionally (OPM, 2018), however, the impact cannot be ascertained.

OPM also implemented the e-Birth (for real-time birth notification and registration) and e-Death notification systems with assistance from UNICEF. The analysis report by the World Bank confirms that since the implementation of electronic birth notifications, birth registrations have drastically improved vital statistics (World Bank, 2016; MHAI, 2019). The implementation of both systems has led to improved civil and identity registration indicators nationally (GRN, 2019, p.17; World Bank, 2016). The linkage between NPRS and the two systems also received positive feedback from the World Bank Group's Identification for Development (ID4D) and have made Namibia an exemplary case for other countries seeking to improve their civil and identity vital statistics processes (World Bank, 2016). ID4D is responsible for a "cross-sectoral effort to support progress toward identification systems using 21st-century solutions" (World Bank, 2016, p.6).

4.2.1.2 Interoperability

The data exchange platform is ready, however, there is slow adoption due to the absence of relevant legislation such as the Electronic Transaction Bill (ET) and Data Protection (DP). At the time of writing this paper, the laws as mentioned above were not yet enacted, but the ET Bill had been tabled before Parliament (MICT, 2019). Although private and parastatal entities have shown interest in piloting the solution more than the public sector (Ndilula, 2015, p.3), OMAs have not yet been accorded the opportunity to join the platform. Since OMAs are governed by their own Acts that require amendments before participating in testing the solution, limited progress has been made in operationalising the platform as entities are still developing memorandums of understanding to share data.

A formal impact assessment to measure the impact and value proposition of the projects and investments achieved thus far cannot be determined. Despite the existing investment in the infrastructure achieved thus far, the correlated overall impact of such investment remains insignificant in terms of usage, because, as revealed earlier in this chapter, they are influenced by administrative and institutional challenges. This indicates that Namibia did not consider the foundational aspects (legal framework) before implementing the solution; hence the project is idling, although it is technologically ready to be used. This raises the possibility of a disconnection between implementing ICT projects and the formulation of relevant policies to support such activities, indicating that the development and implementation of ICT policies and projects are done in isolation.

The availability of appropriate skills to perform a thorough feasibility assessment and evaluation prior to setting up the required infrastructure is key. Effective planning in response to Namibia's priority needs and the readiness of the enabling environment call for coherence in the projects undertaken to achieve a total transformation.

4.2.2 Digital transformation policies in preparation for digital environment

Since policy creates an enabling environment to create an opportunity for reforms (Hanna, 2014), the study reviewed the policy environment. This section presents the state of the implemented policies and their strategic voices.

4.2.2.1 e-Government Policy and eGSAP & HPP

The e-Government policy was implemented in 2005. Considering the period from which it came into effect, the technology landscape has advanced and changed radically, as a result of continuing developments in the digital environment. The eGSAP came to an end in November 2018, and currently, there is no documented strategy of action to guide the development of online services, however, OMAs are advised to carry over unfinished activities in the old eGSAP.

HPP instructs that the identified ten OMAs (as listed in chapter 1, table 4) are expected to operationalise their online services by the end of the financial year 2016/17 and the rest of OMAs by 2020, an extension of two years to the period in eGSAP. Although the introduction of HPP was meant to be a catalyst to expedite e-government (effective

governance and service delivery pillar), judging from HPP progress reports, not much has been achieved (GRN, 2019, p.18), and plans are underway to devise a new HPP.

4.2.2.2 Electronic Transaction Act (ET), Cybercrime Bill and Data Protection Bill

The objective of the ET Act 4 of 2019 is to provide a general framework for the use of electronic transactions, and legal recognition of electronic evidence. The Act was passed in Parliament and gazetted in November 2019 (OPM, 2019); therefore, it is important to acknowledge that, in a broader context, a milestone has been achieved. Although this marks the start of regulating electronic transactions, for e-Government, it is still an impractical milestone without legislations on Cybercrime and Data Protection. At the time of writing this report, the drafting of the Cybercrime bill is in its final stage (MICT, 2019b, p. 3; MICT, 2017, p. 4). The progress of the draft bill was made possible by the Council of Europe in a workshop that took place in February 2020. Like the Cybercrime Bill, the drafting of the Data Protection Bill was reviewed by the Council of Europe and the Commonwealth Secretariat. The draft was earmarked to be finalised in 2020. With the promulgation of the ET Act, citizens and businesses need to be assured that their data is protected when interacting with online services. A study conducted by the Institute for Public Policy Research (IPPR) indicated that 80% of crimes related to cybercrime go unreported due to lack of awareness, hence the need to accelerate the finalisation of the Cybercrime bill (IPPR, 2018).

4.2.2.3 I.T. Policy of the Public Service

DPSITM developed directives in 2018 for OMAs to implement part of rolling out IT Service Management and IT Governance based on ITIL and COBIT Frameworks, respectively. The implementation process is slow due to delays in responses and non-adherence to standards by OMAs, as alluded to earlier in section 4.1.2.1 (Negumbo, 2018; OPM, 2017, p. 41; OPM, 2018, p. 6).

The policy noted that non-adherence to the implementation of the policy is a detriment to achieving common goals as there would be no formal process by which OMAs can align their IT actions with their immediate requirements or with the overall government's strategic objectives (OPM, 2017, p.11). This can lead to OMAs executing IT activities that have no impact on the overall objectives of service delivery (OPM, 2017b, p.17). The

policy further warns that the absence of IT service management can also cause silos, high IT expenditure and lack of accountability (OPM, 2017b), as per examples alluded to earlier, in section 4.1.2.1, (iii). A sound policy environment is crucial for the social and economic development of a country. Applicable laws, policies, and strategies shape the e-government environment in terms of access, infrastructure, and services. However, the importance of appropriate skills to draft and apply such laws is the main driver in this instance and hence must be addressed.

4.3 The state of digital skills agenda in Namibia

The e-Government Policy strongly suggests that the implementation of e-government to succeed requires considerable skills and upgrading IT expertise. The policy further recommended a skills gap assessment to design a "comprehensive skills acquisition strategy" (OPM, 2005, p. 53). However, evidence for a skills strategy is lacking or has not yet been made public. It is noted that from the documents reviewed, Namibia is committed to ensuring the development of digital skills. However, the country is faced with a shortage of skills in the ICT industry and among government leaders and graduates alike, and it is what is hinders the uptake of e-Government projects.

The eGSAP notes that a lack of 'right skills' amongst government leaders results in the slow uptake of e-Government (OPM, 2014, p.29). The importance of digital skills is also emphasised in the IT Policy of the Public Service, advocating that "IT-enabled services can only be effectively delivered if the IT personnel responsible for managing and supporting such IT Services are equipped with the prerequisite skills and competencies to manage and support IT Services effectively" (OPM, 2017b, p.18). In addition, skills mismatch is also a challenge of note that needs to be addressed to advance digital developments. It is highlighted that the skills required are not readily available because universities are not producing the right skills for the market, hence, hindering the achievement of ICT initiatives (MICT, 2017a, p.17).

Besides the need for skills in a broader context, MICT (2017) explicitly emphasised specific skills required such as policy formulation, development of social media platforms, and cybersecurity. According to MICT, the skills required for the development of social media platforms are in short supply, and there is a need to mitigate the untapped skills

deficiency (MICT, 2017, p. 21). MICT also expressed that drafting pieces of legislation is cumbersome, when referencing a particular case; it was stated that progress was achieved only after an intervention of a "very experienced Legal Drafter" (MICT, 2019, p.1). Furthermore, to address the shortage of skills in cybersecurity, the government need to put measures in place to improve cybersecurity skills at every level of education and establish cyber school programme, apprenticeships, and cyber retraining programmes (MICT, 2017b, p. 4)

The need for skills is heavily emphasised and acknowledged at all levels and platforms, but the effort to thoroughly address the state of digital skills agenda or developing a digital skills strategy or related protocol is yet to be realised.

There is a need to strengthen the mechanisms for developing digital skills, In line with the literature, digital skills are required to carry out basic skills, hence it has affected all key areas of life (Hanna, 2014; ITU, 2018; van der Waldt, 2016) and key sectors of the economy, meaning, digital skills have never been more essential than it is the case today. Besides the opportunities that exist to develop digital skills in Namibia, various skills development related challenges have as well been experienced.

The next section presents the primary data collection on digital skills.

4.4 Outlining digital skills

Given the details of Namibia's digital journey and the continual development in the field of e-Government, the need for digital skills to drive the implementation of e-government is of critical importance. This section captures the responses of the respondents about their understanding of what the term digital skills mean. After establishing a common understanding of the term, respondents were asked to formally define digital skills and thereafter list the types of digital skills, and their responses are recorded as such. Respondents did not go into details when citing the types of digital skills besides listing the skills. Furthermore, the section captures the respondents' views and perceptions of how digital skills influence the digital environment in sections 4.5.8 and 4.5.9. The second last part of this section covers the respondents' views about the skills required, particularly for management responsible for e-government implementation, where respondents

expounded on the type of skills. Lastly, respondents discussed the development of digital skills in Namibia and suggested what should be done to sustain development efforts.

4.4.1 Understanding digital skills

All the respondents were requested to share their understanding of digital skills. A common theme that emerged from the interviews is that digital skills is a broad term that cannot be defined easily. For instance, Respondent LC1 stated that "I cannot really pinpoint because digital skills are more descriptive, not straight forward because in every activity we do there is an element of technology". While Respondent MC2 expressed that it is a broad term, Respondent TN2 stated that the word "digital" is the one that made the term complex and broad. The broad orientation of the term is to accommodate the need to define the concept from different points of view, including from information handling perspective to various formats and platforms. The link to computers and technology was also emphasised in the definitions provided.

4.4.2 Defining digital skills

Although respondents aired sentiments about difficulties in defining digital skills, they still attempted to define what the term digital skills entail. The overall response from the respondents defined digital skills in a general context. According to respondents, the definition of digital skills entails the ability to operate and configure digital technologies, the ability to understand, evaluate and manage information, and interestingly, the ability to analyse and evaluate complexities.

The overall perception of the respondents is that digital skills are the same, but what makes a difference, is where the skills are applied, the category of user (beginner or intermediate) and the level of engagement (basic or complex issues).

The next sub-section highlights the elements that constitute respondents' definition of digital skills.

4.4.2.1 Ability to operate and configure digital technologies and use online services.

Most respondents defined digital skills as the ability to operate electronic or digital devices, applications, and online services to achieve any goals set. According to Respondent NT1, digital skills are the skills that one needs to develop, configure, or

operate something. "Digital skills are the skills needed to operate technologies being used, there are skills that you need to develop something or to configure something, and there are skills required to operate something", stated Respondent NT1. In relation, Respondent QA1 defined digital skills as the "ability for an individual to be able to either create or use technological products". This also includes setting up and modifying digital devices, troubleshooting mediums of communication, capturing information on a wide range of digital devices, as stated by Respondent QA1. In this context, "to operate" means technically working with a specific technology either by creating it or using it. Respondent SA2 further elaborates that digital skills are the capability to 'actually' handle the features or functionalities of digital technologies.

In addition to creating and operating digital devices, respondents also brought in the dimension of online services. They indicated that digital skills are also the ability to operate online services or make transactions online (Respondent LC1) or using e-services (Respondent SA2). Respondent SA2 further explained that it is the "techniques and understanding you have of how to actually work with online systems and online devices". The claim about online services is related to the statement made by Respondent TN1 that “digital skills are the ability to ease administration by converting manual processes to digital processes”. This response denotes an action in the sense that it points to the transition to online or digital processes.

4.4.2.2 Ability to understand, evaluate and manage information.

Digital skills were further defined as the ability to understand information from different sources and the ability to use it in different formats. Respondent MC2 said that "it is really the ability to understand and use information from different sources and obviously using computers". With the rise of multiple types of communication devices and platforms, users thus access information across different formats, including text, video, and audio. An integral aspect of the use of information from different sources across various platforms and in different formats, is the ability to evaluate sourced information.

The respondents brought in another dimension, which involves evaluating and managing information in terms of information privacy, creating, and sharing content. Respondent TN1 stated it from an end user's perspective that digital skills means "being safe by knowing what to do when you are online". Users are required to evaluate the information they search for, receive, or send while performing online activities. However, this also applies to management because they are responsible for creating and sharing content.

In a nutshell, the participants' responses refer to evaluating the integrity of information, managing sensitive information, and ensuring that the information is secure and therefore, the understanding of information content is critical in this regard, according to the respondents. Respondent QA2 summarised this view by indicating that digital skills refer to finding, evaluating, and utilising the information using information technology and the internet.

4.4.2.3 Ability to analyse and evaluate complexities.

Respondents emphasised the importance of the ability to analyse and evaluate a range of technological complexities as integral to digital skills. One dimension of this technological complexity is the ability to understand security and privacy complexities to ensure that users are safe while conducting online activities and to protect organisations' data against unauthorised access. Another dimension emphasised by respondents relates to managerial considerations regarding technological complexity, including making decisions related to digital activities and aligning of policies to create enabling digital environments.

In addition to technological complexity, respondent defined digital skills as the ability to evaluate and analyse content. Respondent TN2 noted that the skill is important for analysing content on all online platforms, including websites. This part of the definition seems to be at an abstract level. Complexities can come from different dimensions and they may be presented by different aspects, especially in the dynamic digital environment, but the crux of the matter is to understand the factors that lead to such complexities to address them with skills.

4.4.3 The nature of digital skills

i. Levels, clusters, and user categories of digital skills

Another highlight noted by respondents is the classification of digital skills according to levels, clusters, and categories. Digital skills are informed by the area of specialisation, based on activities involved, the technology used, and devices being operated. According to Respondent AC1, this is because digital skills "vary in the sense that it depends on the skills an individual really wants to key into […]". As such, advanced technologies and activities require advanced digital skills, while basic technologies and activities require basic digital skills. This means that digital skills are applied at different levels of competence and complexity, and their application is informed by the nature of the technological activities undertaken.

ii. Set of skills and interrelation among the skills

Digital skills are sets of skills and they are interrelated. Respondents alluded that these skills are sets of skills to perform transactions, "...so it's really a set of practical skills required" (Respondent SA2). The skills are also interrelated in the sense that some skills are required in multiple areas of expertise, e.g., Network skills and Programming skills are both required in managing communication infrastructure and at the same time required for managing technologies such as IoT and 5G. This means that a single technology may require a range of skills to operate or manage.

4.5 Digital skills required for e-government

Respondents were asked to identify the digital skills, in general, i.e., digital skills in a digital environment and those specific to e-government implementation. The overall sentiment was that the digital skills required for a digital environment are the same as the skills required for e-government implementation. Respondent QA3 stated that, "I believe it is the same with skills as the ones I just mentioned". Other respondents expressed that the skills are the same because e-government activities are not different from other digital activities. "There are no special technologies specifically for e-government use only, therefore, the digital skills required are the same as the skills we spoke earlier" (stated Respondent LC2). Respondents are of the opinion that skills needed may not be related

to e-government per se, but rather skills to aid the administrative procedures in place before focusing on any technology.

In some cases, respondents still identified skills in the context of e-government. It is against this background that the section below presents a combination of both skills (required in the digital environment and required for e-government initiatives), and where respondents cited the skills in the context of e-government, it is reflected as such.

Respondents indicated that digital skills are not only technical skills but also includes non-technical skills for administrative tasks. Technical skills refer to skills to operate devices, develop online systems and applications and computing-related skills, while non-technical skills are required to administer and maintain these peripherals and applications. However, in the case of technical skills related to operating technologies, most respondents did not specify the exact skills required but instead generally referred to them as e.g., skill necessary to operate IoT technologies.

4.5.1 Technical skills

i. Skills related to emerging technologies

Respondents indicated that technical digital skills are based on emerging technologies such as Big Data, Internet of Things, Artificial Intelligence, Cloud Computing, Robotics and Social Media but did not name specific skills required for each technology. However, Respondent LC2 expounded that in the case of emerging technologies, skills include "knowing how these technologies are going to affect the distribution or flow of government information, constitutional rights of citizens, citizens' well-being and other issues related to privacy and security". Respondent QA2 stated that the Internet of Things (IoT) and Big Data are skills needed to handle connectivity and analysing massive complex data. Respondent QA3 further stated that entrenched networking and network convergence skills are required to deal with the latest technologies such as 5G, IoT, wi-fi technologies and the Internet. The importance of networking skills involves understanding the design of networks and the connection of devices.

ii. Skills related to programming and application development

Programming and coding were the skills most cited by the Respondents. Respondent LC2 referred to programming and system development skills as the core skills in digital skills. Respondent SA2 expressed that programming skills are critical and cover the areas of application and system development. The skills were expanded into specific types of coding such as for web services, database development, application, and web site development (Respondents QA1; SA2; LC2; TN1).

Respondents delved a bit deeper into programming skills needed for e-government. According to LC2, programming skills required for e-government consist of a wide range of skills, particularly programming skills for building applications and solutions. Respondent SA2 further indicated that "these skills range from creating administrative systems to managing internal workflow to front office applications which actually connects to administrative systems through different workflows".

iii. Cybersecurity, privacy and network security

Cybersecurity is another frequently cited skill. Respondents emphasised the criticality of the skills. QA2 stressed that "these are very important because you cannot have a digital world without cybersecurity and privacy skills". The skills are needed to build secure systems and protect critical information (Respondent TN1; TN2). Respondent TN1 stated that "when we talk about digital skills, we are also looking at cybersecurity skills where we need to protect all our critical information". They further expressed that specialisation is required to ensure that all components requiring security in the cyber realm are covered (Respondent SA2).

In an e-government environment, cybersecurity skills are important for protecting data from unauthorised use and identifying and authenticating data (Respondent TN2). Respondent TN2 further stated that e-Government management needs to know how to safeguard citizens' transactions in terms of processing personal data while operating in cyberspace. Respondent QA1 added that for e-government, privacy and security skills are required to secure information flowing within the e-government systems.

iv. Skills for online web searching and online systems and transactions

Online searching skills and skills to perform online transactions are regarded as prerequisites that all users must possess. With the advanced technology, whereas most businesses and government entities are trying to digitise their services, respondents believe that skills to navigate websites and operate online services and transactions are becoming compulsory, because as stated by Respondent LC1,"…everything is digitalised, everything is online. Basically, everything is automated".

v. Social media, networking, and collaboration skills

Respondents listed social media and social networking collaboration as types of digital skills to transform service delivery through the provision of information on different social media platforms (Respondent QA1, MC1) and to operate social network activities such as crowdsourcing (Respondent LC1).

In an e-government environment, respondents indicated that co-creation and co-programming skills are useful for creating solutions and learning from peers where skills are lacking. Managers must ensure that they possess such skills to assist with or facilitate the development of e-Government online services. In addition, the skills in social media are for management to use different platforms to distribute e-Government services to reach target beneficiaries of e-Government.

The increase in the use of social media and other online collaborative tools have made a difference in the interaction and engagement between government and the public (MICT, 2017), hence skills in social media and collaboration are digital skills requirements.

vi. Cloud and troubleshooting skills

Cloud computing also emerged as one of the skills that e-government managers should possess. Respondent SA2 stated that cloud is playing a bigger role in delivering services hence the need for skills in cloud-based tools, storage, and applications. Respondents

further stated that cloud computing requires a combination of skills such as programming, database, and networking.

Additionally, Respondent TN2 listed troubleshooting (of electronic devices) as a skills requirement necessary for technicians to fix devices or software applications (Respondent TN2) and troubleshooting any other digital devises mediums (Respondent QA1).

vii. Data analytic, computational and statistical skills

Respondents stated that data analytical skills are emerging to address data management issues (Respondent MC2) and to analyse technology complexities (Respondent LC1). In the e-government context, data analytics skills are crucial for analysing impacts related to service provision and other socio-economic development that e-government aims to address. Respondents stated that computational and statistical skills are required by e-government management in the analysis of computed government data sets (Respondent SA1). Concurring with that, Respondent TN2 indicated that such skills are required for analysing data, especially Big Data applications to evaluate big data that humans cannot read. With vast amounts of data in the digital environment, it is necessary to analyse, evaluate and compute data to create meaningful information that leads to innovation.

viii. Understanding Infrastructure

ICT infrastructure is an essential input into all sectors of the economy, thus leading to full participation in the digital economy (OPM, 2014). Respondents TN1 and TN2 noted the ability to understand infrastructure, its use, and setting up of infrastructure development as a relevant skill in implementing e-Government.

> "And then you have to look at the infrastructure which you are going to use. Which infrastructure are you going to use, and which skill level is required of people able to lead that part for you to have a well implemented or a smooth-running e-government?" (Respondent NT2).

Respondents emphasised that network infrastructure skills are the most critical for e-Government management to ensure access to e-government applications and reliable connectivity to ensure citizens are connected and can access the systems (Respondents

TN1, SA2, TN2). Operations of e-government depends on IT and network infrastructure to function optimally in providing access to services, hence, infrastructure becomes a critical component to consider in skills development.

Overall, the technical skills identified are broad, and often, used interchangeably with emerging technologies. Several respondents had challenges pinpointing the exact types of skills, and this indicates gaps within mechanisms of skills identification and the level of familiarity with the subject of digital skills. Table 8 summarises the list of technical digital skills.

Table 8: *List of technical digital skills*

Technical skills	
Programming/coding related skills	*Skills related to emerging*
Application development Database development Workflow development Web application development	IoT, IA and robotic, 5G, Big Data Statistical and computational skills Data and analytics skills Cloud computing
Skills in privacy and security	*Skills related to web and social media*
Cybersecurity and privacy skills Network security skills	Web services crowdsourcing
Technical support skills	
Hardware repair and maintenance (troubleshooting devices) Technical understanding of infrastructure	

4.5.2 Non-technical

4.5.2.1 Administrative skills

Most respondents are of the opinion that administrative functions such as change management, information management, project management, strategic planning must be included when types of digital skills are mentioned, because digital skills involve not only technical activities but also administrative activities.

i. Change management

Other skills listed by respondents are Change Management (Respondent TN1) and emphasised the need for change management skills as follows:

"We need change management skills because we need to adopt new technologies.

We need to align ourselves so that we adapt to these things otherwise, we will not be able to do much. The other thing is that we need to learn new technologies" (Respondent, LC1).

ii. Business re-engineering

During interviews, it came to light that Business Process Re-engineering (BPR) is a critical skill that is required by management. One manager indicated that creating online services is a collaborative effort requiring skills in business process re-engineering (Respondent SA2). BPR simplifies the process of moving from manual to electronic, which is the foundation of e-government online services, “thus making it easy to adopt new electronic ways of doing business," stated Respondent SA2.

BPR is central to creating e-government technical architecture to align with national priorities and business strategies (GRN, 2017; OPM, 2019). It is a prerequisite that all manual processes must be re-engineered before they are put online.

iii. Planning, strategic and project management skills

Respondents emphasised that managers for e-Government should have sound knowledge in managing e-government projects "especially the 'e' component of it" (Respondent LC1) for better planning, executing, and managing e-government initiatives (Respondent MC2).

Good project management skills are necessary to critically understand other aspects affecting digital projects as one respondent stated:
“e-government projects have lengthy implementation, and considering that technology is moving fast, one must be very aware of technology trends and their application to act wisely and quickly before another technology emerges” (Respondent LC1).

Sharing the same sentiments, Respondent TN1 stated that there is a need to monitor projects and ensure that all deliverables are executed in a timely manner, hence the significance of project management skills as part of digital skills.

An important view that emerged from the interviews regarding the component of planning is in the context of finance and budgeting. Management needs skills in budgeting for e-government, including financing models suitable for individual e-government projects. Respondent LC2 stated that "e-government requires huge investments, hence these people need skills to manage e-government funds or budgets carefully". Because insufficient financial resources are a major challenge hampering the implementation of e-government in Namibia, e-Government managers should possess such skills to properly plan and make informed financial decisions.

iv. *Skills in drafting and developing policies, standards, and laws*

Respondents expressed that skills in standards and policies formulation are essential for creating an environment that accommodates the exponential growth of emerging technologies and possess the ability to examine the impact of innovation, diffusion, and adoption of e-government. Respondent LC1 gave an example of non-technical skills such as policy formulation, which is necessary to create policies to enable the digital environment. The Respondent related to the lack of such skills as the cause of delay and lengthy process of drafting digital transformation-related policies such as Cybercrime bill and Data Protection, which are still being drafted (at the time of writing this study), as impeding technology be fully adapted.

Respondents imply that this lack of skills contributes to delays, which leads to sourcing foreign consultants with appropriate skills, thus increasing costs. Moreover, Respondents MC1 and MC2 suggested a dedicated legal person is needed who can ensure legal compliance in all digital environments.

4.5.2.2 Soft skills

i. Communication, analysis and logical thinking skills

Respondents also listed soft skills such as communication skills, analysis, and logical thinking. Communication is an important aspect in the digital era, especially when using social network platforms because such platforms are used to exchange ideas through

collaboration, which is key to e-government in serving citizens. Respondents expounded more on the communication skills required in e-government, stating that managers need to clearly express matters of technology effectively, in a manner enables politicians to make informed decisions without political interference. "Managers must possess good communication skills to be able to pass clear and convincing messages to our politicians otherwise some decisions will be turned down, and this will affect the progress of e-Government" (Interview LC2).

Additionally, Respondent SA2 indicated that logical and critical thinking skills are also types of digital skills required to stimulate creativity. The respondent stated that "good thinking skills, you need to think logically then you need to be creative". Respondents' contributions demonstrate that administrative and soft skills are required in every environment as they complement technical skills. Table 9 summarises the skills listed by the respondents.

Table 9: *Non-technical skills*

Non-technical skills	
Information management Project management Strategic planning and problem solving Change management	Business re-engineering Monitoring and Evaluation Policy formulation Law, standards and policies
Soft skills	
Communication skills Logical thinking Analysis skills	

4.6 Availability of skills required for e-government

Responses to the availability of e-government skills divided respondents into groups, with some respondents of the view that skills are actually available, while others contemplated on the issue as they did not have a definitive opinion if the skills are available or not. For instance, "*it is a debatable issue*", stated Respondent SA2.

i. Skills not available

Most respondents firmly stated that the skills required for e-government are not available.

Respondent LC1 stated that "in fact, we do not have the skills to implement e-government". Insufficient skills are also noted in the eGSAP and HPP as challenges anticipated during the implementation of e-Government (OPM, 2014; GRN, 2018). Respondents felt that the shortage of digital skills is a country-wide issue with Respondent QA1 commenting that "*there is a lack of skills in the country*". This indicates that there is a need to mitigate the shortage of skills not only for e-Government implementation but in multiple national development initiatives.

ii. Skills are available but not well placed

Respondents alluded that skills are available, but these skills are not utilised where they can offer value, hence there is a skills mismatch. Respondents further affirm that skilled resources are scattered throughout the public sector, and not strategically positioned; hence, there is a need to identify and cluster relevant skills to assist efforts to implement e-government.

Other views confirmed that skills are available in the absence of people not having or been offered an opportunity to showcase their professional talents. Respondent AC1 stated that "We have the skills, I can tell you that yes, we have the skills, but the big problem is what the government is doing to tap into the skills they need and the skills they have here".

Respondents also highlighted that a large skill-base is available but lies in the private sector, leaving a gap in the public sector (Respondent SA2), particularly at DPSITM, which is expected to be a source of highly trained and experienced professionals (OPM, 2017b). Considering this, a dedicated skills assessment exercise is required to determine skills availability.

iii. Skills need to be complemented

Another view from respondents is that skills are available, but the skill-base is not sufficient for the implementation of e-government because it is a complex and vast project, it requires a comprehensive set of skills that cannot be contained by implementers

alone. Respondent LC1 stated that "I think for big and complex projects like e-government we cannot have it all". As such, more hands are required to complement the available skills.

4.7 The influence of emerging technologies on digital skills

To establish the framework for the research sub-question about the influence of emerging technologies on digital skills, Respondents were first asked about their understanding of emerging technologies as a leading question.

Respondents described emerging technologies as new technologies being developed or improved, disruptive and is applicable in all sectors. Respondent LC1 described them as different types of innovative technologies created for different purposes. "These are application devices and solutions that are making their way into the technology environment", stated by Respondent LC1. Another respondent suggested that these emerging technologies are impacting our lives in all sectors such as government, transportation, banking, and education. The emerging technologies underpinning digital skills are listed in Table 10:

Table 10: *Emerging technologies underpinning digital skills*

Emerging technologies underpinning digital skills	
Big data	Artificial intelligence
Cloud computing	Biotechnology
Block chain technology	5G
Social networking	Mobile computing
Virtualization	Open standards
3D printing	

The following subsection captures respondents' views about how emerging technologies are shaping the need for digital skills. The technological trends have a significant influence on the evolution of digital skills. The purpose of the question was to elicit respondents' views about the influence of emerging technologies on the evolution of digital skills required by management to manage a digital environment. It was expected

that the respondents would discuss how each technology identified, is shaping digital skills, but instead, the respondents based their responses on the wave of emerging technologies in general.

i. A constant need to upgrade existing skills and acquisition of new skills

Respondents highlighted that emerging technologies demand upgraded skill sets, and also, these technologies present an opportunity for new skills acquisition. The absence of relevant digital skills hinders opportunities to fully exploit the potential of emerging technologies. According to Respondent AC1, digital skills are influenced by emerging technologies because innovation requires people to learn or acquire the skills that make meaningful impact.

ii. The continuous increasing gap in digital skills

According to Respondent SA2, emerging technologies have created a unique technology product market that is proliferating, such as the advancement in the development of enterprise systems and open-source technologies. Likewise, "databases have grown considerably in size, from relational databases to larger, more complex databases, making provision for big data", stated Respondent SA2. This requires upgrading skills from working with relational databases to performing big data analysis.

The results reflect a strong link between emerging technologies and digital skills. All the developments drive new skills demands, and failure to meet these demands driven by changes in technology increase the digital divide in Namibia.

4.8 The influence of the characteristics of digital environments on digital skills

This question aimed at eliciting views on how the digital environment informs and influences digital skills demand. Most participants struggled to discern how the specific characteristics of digital environments shape or influence the nature of digital skills needs for two reasons. Firstly, respondents could not explicitly identify the unique characteristics driving digital environments, comparing paper-based or manually oriented environments.

Secondly, most respondents found it difficult to link the characteristics of digital environments to the nature of digital skills required. However, the few that managed to identify the pace of change, volatility, and the dynamism of the digital environments as the characteristics that influence digital skills.

i. Characteristics of a digital environment demand new digital skills

One characteristic of the digital environment is the pace of change and associated uncertainty and volatility. Respondents described it as an environment where "things suddenly moving at a fast pace" (Respondent QA2) and "everything happens so fast at the click of a button" (Respondent LC1). As the environment changes, it also triggers a sudden change in digital skills requirements. Respondent AC1 gave the example that introducing any innovation to the environment triggers new skills or re-skilling.

ii. Characteristics of a digital environment demand specialised skills

Respondents described digital environments as complex and data driven. According to Respondent RP1, the environment is data-driven due to the vast amount of data collected and processed through the internet. Respondent LC2 explained that the dynamism of the environment is exacerbated by convergence, interconnectivity, data generation, and data processing. Thus, relevant digital skills are required to address data-driven and dynamism complexities.

According to respondents, managers responsible for e-government should also focus on external forces that affect e-government projects, such as the socio-economic, and political factors. Managers must build their skills capacity to harmonise external forces in the digital environment (Respondent LC1). One of the Legal Committee members stated that political interference also affects the implementation of digital projects, “for political forces, here I am thinking about our own politicians, how they sometimes view technology as a way to expose them (Respondent LC1)".

Social factor issues such as the digital divide and lack of skills among users are areas where e-government managers need to apply critical thinking, and to address economic

issues. Managers are also expected to have the necessary skills to understand project investments, funding, and budgetary issues.

A cursory discussion on this specific topic reflects that there is a need for increased investigations into the characteristics of the digital environment related to awareness and conceptualisation.

4.9 Development of digital skills

Respondents were asked to share their views about the development of digital skills in Namibia. They highlighted issues regarding the improvement of existing efforts to develop digital skills and increased strategies to create the plans to equip people with such skills. Respondents also highlighted current challenges impeding the smooth development and sustainability of digital skills.

i. Changing curriculum and mode of delivery

Most respondents concurred that there is a need to have a flexible curriculum that can be easily adapted to a changing environment. Currently, in general, curriculum in learning institutions in Namibia is more theory-based than practical, thus making it difficult to revise and adjust accordingly, and as a result, it does not fully serve the industry (Respondents AC1, AC2, & SA2). According to respondent SA2, the national universities' current academic focus does not develop practitioners but more theorists, which is not what the industry demands. This indicates a sense of disconnect between the curriculum offerings and the needs of the industry.

ii. Science hubs and laboratories

In addition to on-the-job training, Respondent RP1 suggested that the government should strategically develop mechanisms to increase critical skills required in the digital environment by opening science hubs. In relation, other respondents stated that there is a need to establish an e-government lab focusing primarily on developing real-case concepts that the government plans to implement, as this provides opportunities for practical, hands-on experience (Respondent LC1). The suggestion to develop science hubs may meet the challenge of the theory mode of delivery explained above in (i).

iii. Exchange programmes, seminar and international conferences and collaborative research

The interview results also suggests that an effective way to develop digital skills is to encourage experts to allow students and working professionals on-boarding opportunities. Respondents gave an example that other methods for bringing new skills are to invite experienced lecturers to facilitate trainings and workshops, and organise international and national conferences with the aim to build capacity (Respondents AC1; TN1).

Respondents further indicated that collaboration, research, and development are vital strategies to developing digital skills (Respondents QA1; AC1; MC2; SA1). MICT (2017a) also confirms the absence of sufficient ICT research and development (R&D) in Namibia. Sharing of resources, i.e., lecturers or subject matter experts, and providing financial assistance to students, to increase their subject-matter exposure, are some the recommendations provided by the respondents as strategies to strengthen the development of digital skills.

This speaks to the need for increased collaborative efforts between government, academia, industry, the private sector, and other stakeholders to work in tandem so as to increase digital skills learning opportunities.

4.9.1 Challenges to development of skills

Respondents highlighted challenges impeding the development of digital skills in Namibia, as indicated below.

i. Lack of funds

According to respondents, efforts to develop digital skills are ongoing, but are not sufficiently prioritised because of funding constraints. Respondent SA2 stated that local universities such as NUST and other IT certification bodies have formulated new and specialised courses at certificate level, and the courses are practical and can address the skills gap, but the cost of these courses is high. Regarding high costs and the need for specialised courses, Respondent AC2 suggested that to minimise costs, government

must first conduct a needs assessment to identify most required skills. Based on the needs assessment, different agencies and OMAs can then identify staff to enrol in such specialised training and adopt the train-the-trainer concept. This allows for those that have received formal training to transfer skills to others, thus cutting training costs.

ii. Lack of support for innovation projects

Respondents opined that the government is not prioritising the continuous development of digital skills in the country. Challenges highlighted include the lack of support for innovative projects. Respondents cited that the government and its ICT stakeholders offer little or no support for new and innovative ideas presented and exhibited; for example, those exhibited during the Annual ICT summit or any other related events. Respondent SA1 recalls, "I remember a young student who came up with a solar-powered cell phone but then I have not seen that project elevated". Encouraging innovation is of critical importance, but any barriers such as lack of support close avenues for strengthening the sustainability of digital skills.

Chapter summary

The chapter presented results from data collected and provided a foundation for data analysis. It captured the respondents' views about digital skills through the data collected from interviews and document analysis. Data indicates the challenges experienced with the institutional arrangement such as unclear roles and responsibilities, lack of commitment from OMAs and lack of budgetary provisions for ICT activities and training.

From the interview data, respondents defined digital skills as the ability to operate technologies and perform specific digital-related tasks. The definition stems from different perspectives, that is, in relation to technology, communication, and information perspectives. The subject of digital skills may mean different skills for different users hence, it is necessary to categorise or differentiate the skills required for different purposes. Therefore, digital skills are differentiated based on proficiency (basic, advanced, and expert skills) and different user categories such as end-users, professionals, and the technical workforce.

Furthermore, the interview data indicated that emerging technologies and the characteristics of the digital environment have an influence on digital skills. The influence of emerging technologies may cause a digital skills gap and requires continuous upgrading of skills as technologies emerge. Characteristics of the digital environment, such as speed and volatility require managers to have specialised skills to deal with the ensuing complexities.

Different views emerged on the extent to which digital skills are available. Some views confirmed that digital skills are not available at all. Some confirmed that digital skills are available but they are not well-arranged. The last view confirms that the available skill base is not sufficient, thus the need to complement skills with other resources.

There is a need to re-visit existing efforts to develop digital skills, and the suggested improvements are flexible curricula, science hubs, exchange programmes and research collaboration. However, the development of digital skills is hampered by a lack of funds and lack of support for innovations.

Chapter 5: Digital skills for the management of e-government in Namibia and the way forward

This chapter presents a detailed analysis of the findings. The analysis focuses on how respondents understand digital skills, its role in the digital environment, how emerging technologies influence such skills, how it is influenced by the characteristics of digital environment, and the implications for developing such skills. Further to the analysis of digital skills, the progress made towards the development of online services in Namibia is covered in this chapter.

In view of addressing the research problem, an integrated analysis of the data collected through semi-structured interviews, combined with the literature reviewed in Chapter 2, is provided, notably, the conceptual framework formulated in Chapter 3 guided and structured the analysis.

The analysis aided the researcher in establishing an in-depth understanding of digital skills, including operationalising these in the context of this study. Furthermore, the inclusion of the current state of online services in Namibia, along with the institutional arrangements for e-government in the face of advancing the agenda for digital skills, has further enriched the analysis.

5.1 Digital skills

The study found that it is challenging to define the term 'digital skills' because it is a complex concept that is difficult to define because of the rapid advances in technological developments, resulting in variable conceptions of the term digital skills (Bokova & Gavin, 2017; ITU, 2018; DEU, 2016). Respondent TS2 expressed the definitional challenge by pointing out that it is difficult to define the term 'digital skills' because of its broad orientation and that the key word 'digital' on its own is broad thus this has also contributed to the definitional challenge. This finding has significant implications on how digital skills should be defined in the context of ever-changing technology.

Researchers are faced with the challenge of defining shared frameworks for identifying and classifying digital skills, and even more so, when establishing standardised

processes and procedures for developing digital skills. The challenge is exacerbated by the fact that digital skills were viewed as ICT dominated skills that are now making their way into other disciplines. The fact that skills are now from various disciplines has led to even more diverse opinions about different naming, classifications, and categorisation.

A standard definition of digital skills is important for developing a better understanding of the subject and having commonly shared frameworks for identifying and classifying digital skills. It helps establish standardised processes and procedures for developing digital skills and defining common global objectives for digital skills. However, due to the uniqueness of approaches in different countries, especially in terms of digital transformation efforts, taking into context account country-specific political, social, and economic factors, it is sufficient to state that digital skills should be defined within the applicable context because digital skills mean different things to different individuals in various domains.

5.1.1 Understanding the concept of digital skills

The research findings further suggest that while trying to comprehend the broadness of the scope of digital skills, it is necessary to consider the applicable technology, content creation, information evaluation and resolving complexities as important dimensions. This is because digital skills have become advanced in many aspects such that there ought to be adaptive ways to shape the definition.

5.1.1.1 Technology based

In a quest to define digital skills, findings indicate that digital skills are technology based, thus informed by the ability to create, use, operate, or configure digital technologies. Respondent QA1 stated that "*for me it is the ability for an individual to be able to either create or use technological products*". A possible explanation for this might be that the skills to be applied in performing successful actions or transactions include the capability to work with technology and it influences the outcome of how technology was used. This finding agrees with Bokova and Gavin (2017) who emphasised the use of technologies from basic to advanced functionalities. Interestingly, this was extended by stating that besides the ability to use technology, achieving the benefits of using such technologies is a desired end-result that dictates whether digital skills are successfully applied, an

important aspect that respondents did not hint on. A source of uncertainty is that because the technology component remains on the edge of constant evolution, it needs to be constantly reviewed as it is its changing state that is likely to cause inconsistencies in the definition.

5.1.1.2 Information-based

The study found that digital skills involve understanding, evaluating and managing information. Respondents stated that information needs critical evaluation, analysis, understanding and handling in multiple formats. This could be because the way information is handled and evaluated has changed in terms of delivery formats, collection, processing and storage. Respondent QA2 indicated that "*digital skills enable one to critically evaluate and analyse information*, *understand and use information from different sources and obviously using computers*". The finding supports Hanna's argument about the demand for information in multiple formats, using multiple channels anywhere anytime which is key in delivering digital services (Hanna, 2014, p. 2).

The aspect of information in terms of delivery formats and digital information handling needs to be thoroughly explored to unpack the context of data sharing and privacy. However, the practicality of defining digital skills in the context of 'understand and evaluate' seems to be an illusion. This speaks to the nature by which individuals approach evaluations, as it is often based on one's own opinions, therefore it makes it difficult to articulate, quantify and measure associated skills.

5.1.1.3 Resolving complexities

The study revealed that digital skills provide the ability to resolve complexities. An explanation for this might be because of the fast and ever-changing technologies and that technology has undoubtedly affected all domains thus creating complexities. Respondents LC1 indicated that complexities arise when introducing technologies into governmental structures and systems, i.e., social, political, and economic realms. This concurs with Hanna's (2014) findings that this occurs because of complex interrelated components in the digital ecosystem such as a demanding policy environment, multi-stakeholder collaboration, etc.

The fact that complexity is attributed to interrelated components and external forces denotes that complexities are not specific or straightforward but rather the effects of other causes, thus, could expand the definition further. Further work is required for intensive mechanisms to identify the complexities, or else it would be difficult to account for in skills requirements.

Overall, these results were theoretically articulated, which explains respondents' level of experience with the subject of digital skills. This is also probably because the issue of digital skills is still making strides in Namibia due to the fact that the digital environment is not mature enough to stimulate constant conversations about digital skills.

5.1.1.4 Dimensions informing the composition of digital skills

The study found that the nature of digital skills is informed by user categories that differentiate the level of proficiency. This could be because digital skills are applied at different levels of competence and complexity. Another alternative explanation may be that the distinction in the level of proficiencies has become critical as it defines the boundaries of skills development. Respondents highlighted that digital skills are classified according to levels, clusters, and categories. In line with the literature, past studies and skills frameworks have distinguished between different categories of users (Ananiadou & Carlo, 2009; Bokova & Gavin, 2017; DEU, 2016; Ilomaki et al., 2011; OECD, 2016). Categorising is significant in narrowing the broad groupings of digital skills and framing the skills levels and proficiencies within context. From the skills development perspective, this is likely to unearth the scarcity of digital skills that need immediate attention, an aspect that future work should consider to investigate.

Digital skills are not singled out but a combination of related skills, "...*so it's really a set of practical skills required*" (Respondent SA2). This suggests that online activities are interrelated and performed in combination in order to complete an action. Previous works have referred to digital skills as sets of skills instead of single skills (Ferrari, 2012; DEU, 2016; ITU, 2018, p. 2; OECD, 2016) because it takes several interrelated activities that need to be executed, mostly sequential, to complete a digital transaction. Digital Skills frameworks may explore combining skills to define skills directed to resolve a certain task.

The present results are significant in at least two major aspects; firstly, the dimensions are useful in realizing efforts to define and conceptualise digital skills. Secondly, the application of digital skills is informed by the nature of various aspects that make up the composition of the skills.

5.1.2 Digital skills for e-government implementation

The spectrum of digital skills does not explicitly separate the digital skills required for e-government from general digital skills. Instead, the digital skills required for e-government are general skills that are required in the digital environment at large, provided they relate to enable the implementation of e-government.

Chapter 2 indicated that e-government implementation is a complex blend of technology, management, and policy-related issues (Maihemuti, 2011). Data collection and analysis revealed that managers responsible for implementing e-government require both technical and non-technical skills. But interestingly, there are two types of technical skills, i.e., generic technical skills such as programming for building applications and technology-specific skills related to AI and IoT for managing automation; skills in data management for managing complex data, which includes computational and statistical techniques; cybersecurity skills for safeguarding data and systems, as well as skills in social media and crowdsourcing. Additional skills identified include networking and cloud technologies skills.

The study further identified non-technical digital skills, including administrative and soft skills. Administrative skills relate to policies and the process of delivering public services, such as policy formulation, project management, business process re-engineering, strategic planning skills and analytical skills. Soft skills include skills that enable and support the process of digital transformation, such as change management, information management, and communication, logical and analytical skills. The concept of digital skills in Namibia is still in its early stages. Hence, the findings unfolds awareness of the types of digital skills required in the context of the e-government and how these skills are shaping the acquisition and development of digital skills required.

The concept of digital skills required for e-government in Namibia is still in its early stages. Hence, the findings unfold awareness of the types of digital skills required in the context of the e-government and how these skills are shaping the acquisition and development of the required digital skills.

5.1.3 The influence of emerging technologies on digital skills

The conceptual framework provided broad categories of emerging technologies required in the digital environment, namely: automation, social media, data-based and computational and networked computing, and proprietary and open forms of technology. This study concludes that open forms of technology do not influence the digital skills needed for e-government implementation in Namibia. The study highlights the lack of confidence in open sources technologies and applications, coupled with security concerns as possible inhibiting factors to adopting these technologies in government. Proprietary technologies are preferred in implementing e-government, notwithstanding the scarcity of local developers to develop applications and budgetary constraints (OPM, 2017). Overall, respondents demonstrated awareness of the emerging technologies and they acknowledged their potential influence on the demand for digital skills.

The low adoption of technologies in Namibia inhibits opportunities to develop the latest digital skills by managers responsible for e-government implementation, and consequently, if not addressed, this will hinder the development agenda of digital skills.

5.1.4 Digital skills and the characteristics of a digital environment

This study concludes that the digital environment operates under several unpredictable conditions brought about by the waves and pace of technological change (NAO, 2012). It confirms the increasing importance of business architecture to enable digital transformation, coupled with the growing dependence on digital networks and infrastructure to facilitate access to the Internet and online public services (Brown, 2005; Joseph & Kitlan, 2008; Hanna, 2010; Ndou, 2004). The study also highlighted awareness of unpredictable project costs associated with e-government implementation and

heightened concerns related to privacy and security issues (Ferrari, 2013; Holtsnider & Jaffe, 2012).

The findings are limited to the characteristics identified above but they have contributed to understanding how such characteristics shape the required skills and they have given perspectives on successful implementation of long-term initiatives such as e-government. The study met challenges in identifying the characteristics, as the data is spread across different studies. There is also limited data about the bigger picture of how the characteristics influence the digital environment, as no study was identified that outlined a comprehensive investigation of these characteristics. Hence this study collected and integrated the characteristics to provide a holistic view that brings out the meaning of how these characteristics are shaping digital skills.

Understanding the characteristics of the digital environment shapes the analyses, approaches, and experiences that inform the identification of the digital skills needs, and the sustainability of the digital skills ecosystem.

5.1.5 Progress of e-government and Polices in the digital environment

Major findings crucial to the progress of e-Government implementation include the insufficient budget allocation for e-government initiatives. A possible explanation of uncommitted budget could be because of non-visible efforts in planning for e-Government initiatives either from DPSITM or by OMAs. As a result, custodians of the budget, the Ministry of Finance, or the champions of the e-government project do not prioritise the need to allocate a budget line overtly towards e-government initiatives.

Another finding is the outdated e-Government Policy drafted in 2005, notwithstanding the exponential growth in all areas of technology such as infrastructure, access and technologies. This finding is contrary to previous studies which have suggested that a policy should be a continuous process that needs to respond to a dynamic development strategy that supports evolving goals (Dillon et al., 2015). Linking this to the data, respondents identified the need for skills in policy formulation for management to address

shortcomings in dealing with policy issues, and ensure that key areas that warrant sustainability of projects and the development agenda of digital skills are addressed. The finding has implications on continuous efforts to achieve the objectives to foster e-government, especially currently when the progress is already leapfrogging.

Moreover, the limited information available on the progress of online services shared in HPP progress reports (GRN, 2016; GRN, 2018) indicate stagnant progress. This may be an indication that the targets in the eGSAP were overly ambitious, given the scope of work and the period, which can further be linked to the reason why there is no significant progress in implementation. Taking into consideration the complexities of e-government as noted in literature (Brown, 2005; Hanna, 2010; van der Waldt, 2016) and the shortage of skills in Namibia (Amukugo & Peters, 2016; Negumbo, 2018; Nengomasha & Uutoni, 2014), the possibility of failing to understand the complexity of e-government may have led to an unrealistic scope.

Digital transformation is not only a technical undertaking, but also requires both technical and non-technical skills. However, little attention is given to non-technical skills because e-Government implementation is predominantly under the leadership of technical staff, the DPSITM. The DPSITM comprises of technical managers, understandably so, as per the original mandate of monitoring and coordinating IT activities within the public service (OPM, 2017, p.16). Even with the added responsibility of coordinating e-government implementation (OPM, 2014, p.61), efforts to strengthen skills in project management, policy, and standards formulation, change management, business re-engineering, and other non-technical skills identified during data collection are required. Findings point to minimal support from top management and e-government champions (GRN, 2018; Negumbo, 2018) to supplement non-technical skills. It suffice to state that technical and non-technical digital skills are equally critical for management, as demonstrated by the fact that e-government managers require technical skills to guide the implementation and non-technical skills to lead the projects and make informed decisions to ensure advanced implementation.

5.1.6 The shortage of digital skills in Namibia

The state of digital skills in Namibia cannot be ascertained. This is a challenge that is affecting the progress of e-government implementation. The shortage of skills has led to many glitches that have impeded the progress of e-government. These anomalies include the unrealistic target of online services development, and non-coherence between digital initiatives and other enablers such as the legal framework and lack of adherence to IT service management in OMAs.

For successful e-government implementation, it is necessary to ensure the appointment of highly skilled staff to positions that perform a leading role therein (OPM, 2017b; OPM, 2014). However, this study determined that the absence of a dedicated budget for training and coordination with stakeholders and relevant institutions hindered this realisation.

5.1.7 Development of digital skills

The findings point to a need to strengthen the development of skills and a misalignment in digital skills demand and supply. Respondent AC1 stated that "We have the skills, but the big problem is what the government is doing to tap into the skills they need and the skills they have here". Several reasons may be due to a lack of a dedicated budget, lack of collaboration between the government, industry and learning institutions and lack of opportunities to innovate. Another possible explanation of this finding might be emanating from external and internal factors caused by the institutional arrangement issue that may inhibit the development of skills. These are lack of understanding of ICT resulting in prioritising training and rigid and inefficient processes that may prevent timeous training in response to the changing environment. eGSAP and e-Government Policy documents emphasised that DPSITM should collaborate with academic institutions and industry to develop the required digital skills (OPM, 2014; OPM, 2005, p. 55). The extent as to how this effort is realised could not be claimed. In addition, the study has been unable to demonstrate the effectiveness of internal policy directives that the DPSITM is expected to be staffed with “highly-trained, experienced professionals and dedicated personnel” (OPM, 2017b, p.13). Limited synergy between relevant institutions to develop the skills is resulting in a separation between academic offering and industry demands. Efforts to

develop digital skills are well documented and acknowledged at all levels of authority but it lacks implementation plans, hence the digital skills agenda is not interrogated.

Expanded and applied theoretical and conceptual framework

The analysis revealed that 'digital skills' is a broad term with a broad scope. The complexity of the broadness may be a result of the literal definitions that are kaleidoscopic with regards to the meaning of the concept, hence, its definition should be narrowed down to the context in which it is defined. The analysis indicates interlinkages between the elements in the conceptual framework. Firstly, with regards to the interrelation between the identified skills, a certain skill may span in many areas except that it may be at a different proficiency and user categories level. The researcher found that the skills required in the digital environment are overlapping in the sense that some skills which are required to operate or manage technologies are also the same skills which are required to understand the characteristics of the digital environment. For example, when dealing with emerging technologies, privacy and security skills are needed and consequently, privacy and security are driving forces of the digital environment, hence, to work in a digital environment, one needs security and privacy skills.

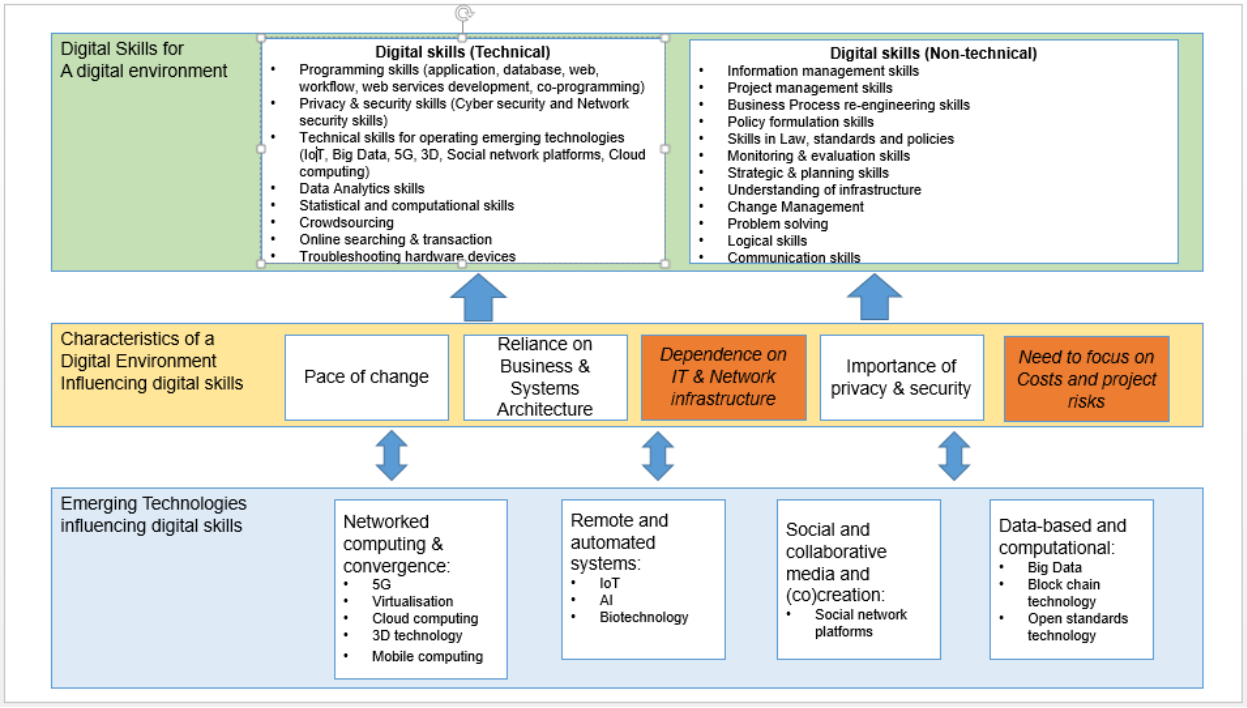
Secondly, it became apparent during the study that there is also a link between emerging technologies and the characteristics of the digital environment. In a broader context, emerging technologies are shaping the skills required, thus they have necessitated the acquisition, or upgrading of skills, conversely, the absence of skills may affect the adoption of digital skills. Similarly, the unique characteristics of the digital environment demand new skills and or specialised skills to address the characteristics effectively. This is because what dominates the environment is the emerging technologies hence the thin line between the two. As a result, such interlinkages may have contributed further to the complexity of digital skills and their definition. Correspondingly, the characteristics of the digital environment influence both technical and non-technical skills whereas technical skills are pointing to emerging technologies. This suggests that ways of measuring and categorising digital skills need to change to accommodate such variations.

Although the researcher initially sought to explore a precise number of characteristics, the respondents only emphasised the pace of change and reliance on business architecture and privacy and security. This means that other characteristics (dependence on network and project cost and risk – shaded in orange in the diagram) are possibly overlooked or indicate that specific attention needs to be paid to the occurrences of the digital environment. To better make sense of the data as collected while at the same time advancing knowledge in the literature, the researcher grouped and expanded the data to develop emerging elements from both respondents and literature. This conceptual framework serves as a guide to DPSITM to systematically develop, assign, and deploy the required skills by considering the characteristics of the digital environment in relation to emerging technologies.

It is important to note that the framework does not seek to impose the skills listed or replace any exiting skills framework but serves to draw attention to the types of skills while revealing the elements in the digital environment that influence digital skills. Hence it is specific to this context that pertain to provide guidance to DPSITM digital skills required for e-government implementation and management as undertaken by the researcher.

Lastly, the analysis revealed several initiatives to be developed so as to create a common approach to skills development and sustain the digital skills pool. With the necessary skills in place, it becomes possible to create appropriate channels for innovation and to devise cost-effective strategies for digital skills development in an ever-changing environment. The development of digital skills must be looked at in the context of the nature of the digital environment. Below is an illustrated version of the framework.

Figure 6: Digital skills conceptual framework applied to e-Government



5.3 Chapter summary

The study revealed a gap in understanding digital skills and the level of knowledge of what is happening in the digital environment. It further revealed that there are many missing links, an aspect that is due to various factors such as Namibia's maturity level in the digital environment, the maturity of development phases of e-government implementation, the slow rate at which digital initiatives are progressing, and the budget constraints towards implementing digital activities.

These findings unpacked why valuable information on the application and operationalisation of the term 'digital skills' remains lacking in the literature, particularly in a way that can strengthen its understanding. Our approach to defining digital skills must evolve based on our understanding of its various elements, such as diverse terms, emerging technologies evolving in nature, and other influencing factors such as converging disciplines and different sectoral digital skills requirements.

These findings laid the groundwork for future research to consider harmonising the components that influence digital skills so as to narrow down the definition and achieve

common ground for consistency in the definition, especially in Namibia, where conceptualisation of digital skills is at its infancy.

The research revealed that the zeal to advance the progress of e-government is evident, but the process is frustrated by institutional arrangement related issues, to the point that DPSITM is inadequately empowered as it is perceived to be in terms of project governance and funding. Moreover, the funding priority given to digital initiatives is low (Negumbo, 2018; OPM, 2017). The budget allocated to DPSITM to run e-government initiatives remains unseen, and there is no dedicated budget for training to keep the staff updated with relevant digital skills (OPM, 2017).

Based on the data emanating from documents reviewed, Namibia's enabling environment is satisfactory in terms of strategic planning, but there is a need for practical implementation and coherence between initiatives under implementation. In terms of policies and legislation, the legal framework is not fully completed as Data Protection and Cybercrime legislation that are crucial to e-government are still in draft forms. The completed projects, such as interoperability and few online services, are aligned with the digital transformation goals, but they have not achieved the desired impact thus far because they are not fully operationalised.

The findings conclude by synthesising emerging voices to the stakeholders involved in developing digital skills, and it informs decisions that minimise obstacles to the acquisition of digital skills and lastly shares innovative approaches to developing the skills required for the digital environment.

Chapter 6: Conclusions and Recommendations

This chapter outlines the conclusion on the types of skills required in a digital environment for e-government implementation, the influence emerging technologies have on the types of digital skills required, and the influence of the digital environment characteristics for those skills. Upon establishing a better understanding of digital skills and various aspects around them, a particular link has been made to their significance for the implementation of e-government. Lastly, the study concludes and recommends approaches to the development of digital skills in Namibia.

Based on the problem statement as well as the research questions outlined in Chapter 1, the discussion below addresses the current state of digital skills for the management of e-government in Namibia and how these skills can be developed or improved.

6.1 Response to the key research questions

The study explored the skills required by management to effectively manage e-government initiatives in Namibia. Digital skills are composed of both technical and non-technical skills. The skills are now becoming multi-disciplinary and they have gone beyond technology to include business, finance and other disciplines.

However, there are divergent viewpoints about the availability of digital skills required to implement e-government. While some feel that the skills are not available, others are of the opinion that the skills are available but there is a need to re-orient the composition of skills to place it in a way that the skills would be recognised and fully utilised where they can add value. Although much progress has been made, the skills readiness to manage the implementation of e-government still needs to be enhanced. The study identified several strategies to ensure the continuous development of skills and sustainable ways of acquiring new skills as well as reskilling and upgrading existing skills.

The section below provides a more detailed description of how the research questions were answered.

1) *What are digital skills?*

The study found challenges with the definition of digital skills. The concept of digital skills has evolved over the years hence making it difficult to conceptualise a universal definition. Respondents had difficulties defining the term digital skills because of its broad orientation and they are abstract in nature. The study defined digital skills as the "ability *to operate and configure digital technologies and online services, understand, evaluate and manage information, analyse and evaluate digital complexities".* The skills are sets of interrelated skills informed by user proficiency and the level of engagement with technology, the area of specialisation based on activities involved, the technology used, and the devices being operated. It can be concluded that the definition of digital skills goes beyond just skills but also the specific level of use and where the skills are applied, hence the application of digital skills is of importance to elucidate its definition.

2) *What are the digital skills required by management for the successful implementation of e-government in Namibia?*

The digital skills required by management for the successful implementation of e-government are a blend of technical and non-technical skills. This finding has support in the literature that digital transformation is not only a technical undertaking, but a complex blend of technology, management, and policy-related issues (Maihemuti, 2011; Alsheri & Drew, 2012).

In line with these findings, management requires skills related to emerging technologies – AI, IoT, Big Data, Cloud technology; skills in Programming and Application development; Cybersecurity, privacy and network security skills; web searching and online systems and transactions skills. Technical skills also include: social media networking, online collaboration skills; data analytics, computational and statistical skills; understanding of infrastructure and troubleshooting skills. Non-technical skills include the following: change management, business re-engineering, strategic planning, and project management skills, drafting and developing policies, standards, and laws related to technology. The other category of non-technical skills are: communication, analysis and logical thinking skills. This is affirmed by a vital and engaging perspective by Glister (1997), that digital skills require a special kind of mindset or thinking.

The list of skills was found to be comprehensive but skills were articulated at abstract level, and in some cases technologies and skills were used interchangeably, e.g. AI or IoT skills, instead of citing specific skills underpinning such technologies. The awareness of the type of skills required exist among the respondents, but one of the concerns which emerged is that the skills were not cited to finer level of details.

3) *How do the characteristics of a digital environment and emerging technologies shape digital skills?*

The study showed how emerging technologies shape the acquisition of digital skills. The conceptual framework in Chapter 2 provided broad categories of emerging technologies required in the digital environment, namely: automation, social media, data-based and computational and networked computing, and proprietary and open forms of technology. The growth in the deployment of these technologies has contributed to the diversity and heterogeneity of digital skills (Bokova & Gavin, 2017) and as a result, digital skills are slowly becoming part of skills in non-technological domains (Lyytinen et al., 2016).

The study did not find open forms of technology such as open licensed applications as one of the technologies shaping digital skills. Notwithstanding the apparent importance of open forms of technology in advancing electronic services, respondents did not fully comprehend the concept of open forms of technology due to lack of confidence and security concerns in open technologies and applications because of its freemium basis offering. Open forms of technologies as represented by the colour orange should be understood in the context of creating and consuming new online services, devices or software because the ability to participate and engage in such requires digital skills to design, collaborate and co-create services.

4) *How do the characteristics of a digital environment shape digital skills?*

In terms of the research about the characteristics of a digital environment, the study revealed the following characteristics: pace of change, reliance on business architecture, dependence on IT and network infrastructure, privacy and security, policy and regulation, and emphasis on project costs and risks, as unpredictable conditions brought about by

the waves of technology which can influence digital skills. The research has shown that the characteristics demand new and specialised digital skills; however, it could not be explained in-depth. The study found that there is limited literature that outlines a comprehensive identification and investigation of these characteristics. It is concluded that a thorough understanding of how the characteristics shape the analyses, approaches, and experiences that inform the identification of the digital skills needs is lacking. In particular, the need to consider project risks and cost, as highlighted in the orange colour, is undermined. This is because unforeseen additional costs emerge as the transformation process unfolds (Gustova, 2017, p. 43). This calls for flexible approaches to e-government funding that make provisions for changing requirements.

5) How can the required digital skills for e-government in Namibia be developed or improved?

The present study set out to identify ways in which digital skills can be developed for the purpose of achieving a continuous and sustainable solutions for developing such skills. The study has found that existing efforts to improve digital skills need to be strengthened, with additional interventions to readdress priority skills in a way that would add value towards the implementation of e-government. This has raised important questions about prioritising the continuous development of digital skills in the country, in view of the mechanisms put in place for the digital skills agenda at national level as well as the level of skills readiness to advance e-government implementation.

The present study confirms existing contributions to the current literature in the context of instituting long-lasting initiatives such as creating platforms to encourage innovations, science hubs, exchange and research, adopting a responsive and flexible curricula and teaching methods and dedicated funding models. Concerted efforts to strengthen the development of digital skills is important to ascertain the effectiveness and readiness of e-government in order to sustain the management of digital initiatives.

6.2 The level of supply side readiness of Namibia

Progress has been made but the supply side is entirely not ready to advance the e-government agenda and needs to be improved. The study indicated a number of factors that has adversely affected the state of skills readiness caused by a lack of institutional arrangements such as a lack of budget provision, unclear roles, lack of top management support for ICT activities, high staff turnover of skilled staff and lack of collaboration efforts to advance skills. These findings have significant implications for understanding the importance of assessing skills readiness as an ongoing exercise to closely monitor inefficiencies and infectiveness in governance aspects and key organisational factors that may hinder plans geared towards skills development. The analysis undertaken here has confirmed that assessing skills readiness has gone beyond traditional indicators of readiness assessment such as literacy and numeracy levels. It now includes assessing organisational aspects that may inhibit the development of digital skills, e.g. the availability of a dedicated budget for the skills developed.

Readiness is a much broader concept where the skills component is only a small part, hence in this study, the aspect of readiness has been dealt with adequately in line with the objectives and focus of the study.

6.3 Contribution of the study

The outcomes of this research have imperative practical implications for advancing the implementation and management of e-Government initiatives in Namibia both for the Public Service and key stakeholders, and also for academia, to inform decisions that minimise obstacles to the acquisition of digital skills and sharing innovative approaches to developing the skills required to implement e-government initiatives. It further sought to contribute to the formulation of relevant policies, best practices, and strategies for digital skills undertakings.

The framework makes clear a distinction between technical skills for operating technologies and non-technical digital skills to stress that digital skills are not only technology-oriented. The distinction is important to design clear digital requirements especially during these times of converged fields of disciplines and shifting roles.

In addition, the study took into account continuous emerging technologies to create awareness and putting emphasis on the impact of the rapid emergence on skills. This will inform the skills requirements for technology-based jobs.

Given the ever-changing environment, the framework presented is useful to restructure and guide the key elements of the digital environment by shaping the acquisition and development of skills. These characteristics would enable managers to remain responsive to the rapid demands of the digital environment.

To the existing body of literature, this research has highlighted the importance of the evolving nature of conceptualisation of digital skills that is driven by the awareness about factors shaping digital skills such as the emerging technologies, and most importantly to build on the subject of the characteristics of the digital environment as so far there has been limited literature that brings out a holistic view of such complexities.

6.4 Limitations and future work

Participants were limited to the parties directly involved in implementing e-government as per the e-government implementation committee structure. Nevertheless, the perspectives of other professionals in the ICT industry or those involved in digital services transformation efforts in the private sector may differ because digital transformation strategies are unique to a particular situation. However, the views of the participants are reliable based on experience as the implementers on the ground.

During the study, it became apparent that information on the conditions of the ever-changing digital environment have not received adequate attention. This study presented an academic foundation that future research could further complement. Addressing the aforesaid will advance the understanding of the types of digital skills required in the digital environment by unearthing more characteristics and the extent of their influence.

The possibility of a degree of subjectivity in the research could not be ruled out as the researcher is an employee of the Office of the Prime Minister, thus it is essential that a neutral party should conduct a similar study to determine if different results may be obtained.

6.5 Conclusion

Despite efforts to implement the eGSAP, there was minimal progress made in the availability of online services or interactive websites through e-government implementation in Namibia. The objectives of the study were to identify the skills required for managing e-government initiatives, to determine if the skills currently exist and to identify how the skills can be developed or improved for the purpose of advancing the progress of e-government.

The maturity level of the digital environment in Namibia and in particular e-government maturity stage, is in its infancy to comprehend the dynamics and complexities to conceptualise the subject of digital skills in relation to technology and related phenomenon. While there has been a general improvement and development in some areas such as policy frameworks for e-government and the interoperability platform, progress in implementation remains slow. Most initiatives which are necessary for building a strong foundation for e-government are still in progress.

The level of supply side readiness is not sufficient and not entirely ready to advance the e-government agenda and this needs to be improved. As such, this study took the supply side of skills to bring an understanding of what skills are required by e-government managers and the driving forces influencing such skills.

Data analysis and findings show that digital skills are a blend of technical and non-technical skills which are shaped by emerging technologies and the characteristics that drive the ever changing digital environment. Awareness of the rate at which new technologies are emerging and the extent of their use and adoption plays a role in acquiring new skills and re-skilling. Equally, the complexities of the digital environment and how they shape digital skills is an important aspect that contributes to the limited time to reskill and making informed decisions.

Furthermore, organisational and governance aspects related to institutional arrangements such as support for digital initiatives in terms of budget and prioritisation of ICT activities are important components for advancing the progress of e-government through enabling approaches to improve and develop digital skills.

Against this background, this chapter unpacked and summarised the research questions that led to the proposition of the state of digital skills in Namibia. Further research in this field of digital skills and e-government and the limitations identified were presented in the next section.

6.6 Recommendations

It is recommended that digital skills should be defined in context and they should be detailed to clearly indicate the dimension or objective for its definition.

Researchers and future work should consider interrogating details to unearth underpinning skills in order to help develop and articulate specific skills. This would further enhance the quality and comprehensiveness of digital skills frameworks and curricula in learning institutions. In addition, further work should be invested in conducting an encompassing study on the characteristics of the digital environment that brings out the bigger picture of how the characteristics influence the digital skills. A national study to determine the level of skills readiness to ascertain the state of digital skills is important to determine the effectiveness and readiness for e-government sustaining the management of digital initiatives.

In addressing the growing concern of lack of digital skills for the management that is responsible for e-government, it is recommended to establish a government targeted programme with a dedicated budget to develop the required technical and non-technical skills to enable e-government implementation. DPSITM should be restructured in such a way that digital skills are sought and aligned accordingly to advance the implementation of e-government.

Lastly, to strengthen digital skills development, the government should develop a broader skills development ecosystem involving institutes of higher learning, industry and civil society. As a matter of priority, a national study to determine the level of skills readiness to ascertain the state of digital skills and how effective and ready it is for e-government implementation is needed and this is of utmost importance.

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Annexure A: Participant Information Sheet

Dear valued participant,

My name is Henda Dias, student number 1473312. I am a Master's student at the LINK centre, University of the Witwatersrand.

In order to complete my studies I am conducting a research on digital skills for e-government in Namibia. I therefore invite you to voluntarily take part in this academic study which will be conducted using the audio-recorded interviews method. I would like to conduct a one-on-one interview which should take a maximum of one hour. Herewith in this invitation is the background and purpose of the study to enable you to make an informed decision to participate.

1.1 Background and purpose of the study

Efforts in implementing e-government to transform public service delivery in Namibia have been ongoing. Amongst the challenges anticipated in this transformation effort is the lack of necessary skills to advance e-government implementation as cited in the e-government Strategic Action Plan [eGSAP] of 2014 - 2018. Technology is changing at a fast pace, emerging technologies are transforming the digital environment in which they operate thus shaping the demand for digital skills. Shortage of digital skills may limit the potential of e-government to deliver to the public value and economic growth. Therefore it is necessary to develop digital skills to accelerate the implementation of e–government.

This study aims to identify the digital skills required by management for the effective implementation of e-government interventions and examine how these skills influence the efforts of digital transformation. The study further investigates how these digital skills are developed. It is against this background that your views are important in identifying digital skills required to improve the progress of e-government implementation and ensure ongoing development of such skills in a changing and dynamic digital environment.

As stakeholder in e-government implement, your permission to be interviewed will have a tremendous impact in the improvement of service delivery using digital means.

1.2 Voluntary participation

Participation is entirely voluntary; there are no risks to participation either directly to you or your organisation. You may decide at any stage to refuse to answer any question you are uncomfortable to answer or withdraw from the interviews with or without giving any reason. In the event you agree to participate, please complete and sign the consent form attached.

I would like to thank you in advance for taking time to participate in this research without any form of payment. I trust that you will find it beneficial for you as an individual and your organisation to defining and identifying digital skills required to managing public sector transformation initiatives that is integral to the achievement of public value and economic growth. Final recommendations based on the research report can be made available to you and your organisation upon request, if necessary.

1.3 Confidentiality and anonymity

This study ensures that personal information about you that are considered confidential shall not be disclosed. Information collected from you during data collection shall not be revealed to any person other than the researcher. Interview transcripts and audio recordings will be kept confidential and will be solely used or shared for the purpose of this academic research only. To maintain anonymity, pseudonyms shall be used to anonymise identifiable data (e.g. name, address, telephone, etc.) stored or published.

1.4 Research Ethics

If you have any queries, concerns or complaints regarding the ethical procedures of this study, you are welcome to contact the University Human Research Ethics Committee (non-medical), telephone + 27(0)11 717 1408, email Shaun.Schoeman@wits.ac.za

Annexure B: Consent Form

Title: Digital skills for a digital environment: A case of e-government in Namibia.

Please initial box

1. I confirm that I have read and understand the information sheet for the above study and have had the opportunity to ask questions. ☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason. ☐
3. I understand that the researcher will not identify me by name in any published reports and will only use information obtained from this interview solely for the purpose of this study. My participation will remain confidential. ☐
4. I agree to the use of anonymised quotes in the published research report. ☐
5. I agree that data gathered from myself in this study may be stored (after it has been anonymised) and may be used for future research. ☐

Name of Participant Date Signature

Name of Researcher Date Signature

Annexure C: Audio Recording Consent Form

Title: Digital skills for a digital environment: A case of e-government in Namibia.

Please initial box

1. I agree to the interview being recorded in an audio format. ☐

2. I understand that direct identifying information from this recordings will not be revealed during recording of data. ☐

3. I agree to the excerpts from this recordings or descriptions of the recordings being used or shared for the purpose of research only. ☐

Name of Participant Date Signature

Name of Researcher Date Signature

Annexure D: Interview Guide

1. General/Introductory questions

a) What are the main technologies impacting digital skills?
b) What unique characteristics drive the digital environment?
c) How are these characteristics of the digital environment impacting digital skills?

2. Digital skills

a) How would you define digital skills?
b) How are these skills influenced by emerging technologies?
c) How do the characteristics of a digital environment shape these skills?

3. Digital skills for management

a) What are the digital skills required by managers in an e-government environment?
b) What are the most required skills required in managing e-government projects?
c) Why are these skills important for effective e-government implementation?
d) To what extent are these skills available for the implementation of e-Government in Namibia?
e) How are digital skills influenced by emerging technologies?
f) How do the characteristics of a digital environment shape digital skills?

4. Development of digital skills

a) How would you assess existing efforts to develop digital skills for the management of an e-government environment?
b) How can these efforts be improved?
c) What do you recommend as the best training method to develop digital skills?
d) What do you recommend as the best way develop digital skills and ensure on-going skills development as technology changes?
e) Overall, what do you think is the state of digital skill in the public sector versus efforts that academic institutions are doing in ensuring continuous re-skilling?

Annexure E: List of Interviewees

Group	Naming Convention
DPSITM	QA1, QA2, QA3, SA1, SA2 SA3, TN1, TN2
Ministry of ICT	MC1, MC2
e-Government Legal Committee	LC1, LC2
Academia	AC1, AC2

Annexure F: Ethics Clearance Form

SCHOOL OF Literature, Language and Media RESEARCH ETHICS COMMITTEE

CLEARANCE CERTIFICATE **PROTOCOL NUMBER: SLLM/M18/LK/04**

PROJECT TITLE Digital skills for a digital environment: A case of e-government in Namibia.

INVESTIGATOR	Mrs Henda Diss
SCHOOL/DEPARTMENT	SLLM/ LINK
DATE CONSIDERED	19 September 2018
DECISION OF THE COMMITTEE	Approved

This ethical clearance is valid for 3 years and may be renewed upon application.

EXPIRY DATE November 2021

ISSUE DATE OF CERTIFICATE November 2018 **CHAIRPERSON**

cc: Supervisor : Mark Burke

DECLARATION OF INVESTIGATOR

To be completed in duplicate and **ONE COPY** returned to the Chairperson of the School/Department ethics committee.

I fully understand the conditions under which I am are authorized to carry out the abovementioned research and I guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee.

Signature **Date** 28, 11, 2018

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES

Annexure G: Approval to conduct research



REPUBLIC OF NAMIBIA

OFFICE OF THE PRIME MINISTER

Tel No: (061) 287 9111
Fax No: (061) 234 296

Private Bag 13338
WINDHOEK

Enquiries: Mr. Richard Hasheela
Tel: 061-2872476

10 October2018

Ms. Pombili Dias
c/o The Director
Department Public Service Information Technology Management
Office of the Prime Minister
Windhoek

Dear Ms. Dias

RE: REQUEST FOR APPROVAL TO CONDUCT ACADEMIC RESEARCH PROJECT WITHIN THE OFFICE OF THE PRIME MINISTER

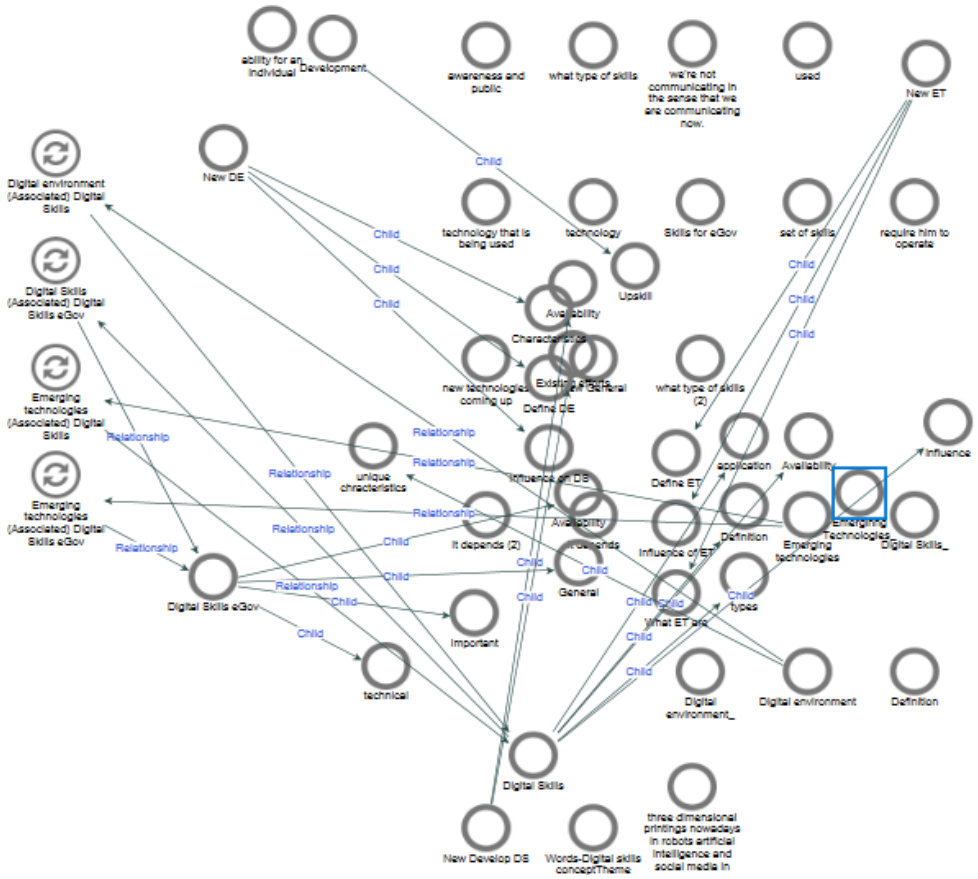
Your application to conduct academic research within the Office of the Prime Minister has been approved. Upon completion of your research you are expected to share the report with the Office of the Prime Minister.

Yours Sincerely

I-BEN NATANGWE NASHANDI
PERMANENT SECRETARY

All officials correspondence must be addressed to the Permanent Secretary

Annexure H: NVIVO coding



Development	10	41
Upskill	7	16
Digital environment	8	12
unique chracteristics	7	18
Digital environment_	1	8
Digital Skills	8	17
application	1	5
Availability	2	4
Definition	10	24
influence	0	0
types	7	24
Digital Skills eGov	6	17
Availability	4	4
General	7	15
Important	2	2
technical	3	9