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Exploring the maturity of inclusive digital transformation: Case of Malawi

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Abstract

Digital transformation has attracted attention of Government of Malawi and development partners in supporting the development of inclusive digital economy and society. However, studies on the landscape of digital transformation to establish the level of maturity of Malawi are still lacking. This paper explored the current state of inclusive digital transformation using the UNDP Digital Transformation Framework. The study analysed secondary data from government departments and international development online databases using content analysis. The findings showed that the country was improving in pillars for digital public infrastructure, regulation of technologies and government role in leading technology developments despite not having a coordinated strategy. There were challenges in dealing with the pillars for economy (e.g. financial services and innovation ecosystem), connectivity (e.g. physical infrastructure) and people (e.g. low usage and adoption due to high cost of devices and low digital skills). The study offer useful insights into areas where implementation agencies, policymakers and development partners may concentrate on to achieve high maturity of digital transformation.

Keywords: Digital transformation, inclusion, digitalization, digital technology, Malawi.

1. Introduction

Digital transformation has attracted attention of Government of Malawi and development partners in supporting the development of inclusive digital economy and society. Digital technologies are being adopted and appropriated to support processes and programs in economic sectors include finance, agriculture, health, education, tourism and government services (Makoza, 2023; Markowitz, 2019). The digital technologies are also supporting innovation, value creation and employment opportunities that can support economic growth (Jiya, 2021; Makoza, 2022). Hence, digital transformation has led to government of Malawi and development partners to consider the catalyzing role of digital technologies in development and implementation strategies for social, economic, political and environmental policies (Makoza, 2022). The core of digital transformation at nation level lies in four components: users, technology, processes and data (Morze & Strutynska, 2021). The four components together can create interactions that can lead to improvements in the digital economy and society (Ndulu, Joseph & Tryphone, 2021; Schallmo & Williams, 2018).

There are few but growing studies that has looked at digital transformation in the context of Malawi. The studies have looked at diverse issues or dimensions of digital technologies: policies (Makoza, 2023), digital economy (Makoza, 2022), digital platforms (Chirwa, 2022; Tauzie, Herman & Whitfield, 2024; Thomas & Jo, 23024; Tauzie, Hermans & Whitfield, 2024), digital users (Chirwa, 2022; Gondwe, Mwakilama & Maseko, 2023), financial services (Jiya, 2021) and data use (Werner, Puta, Chilalika, Walker Hyde, Cooper, Goertz & Kapnick, 2023). However, studies on the landscape of digital transformation in a holistic perspective to establish the maturity level of inclusive digital transformation in the context of Malawi are still lacking. This study is motivated to address this knowledge gap in literature and respond to the call for more studies on digital transformation in Africa (Ndemo & Weiss, 2017; Mutsvairo, Ragnedda & Orgeret, 2021).

Based on the argument above, this paper assessed the state of maturity for inclusive digital transformation using the UNDP Digital Transformation Framework (UNDP, 2023). The study was guided by the research question: What is the current state of inclusive digital transformation that can support development of inclusive digital economy and society of Malawi? The study used a case of Malawi, at the time of the study, the country was in the process of developing its digital economy to support inclusive and sustainable growth (Makoza, 2025). The country presented a case of low-income status in Africa (UNDP, 2025). The government and development agencies believed that digital technologies may support the country to achieve economic growth and move into middle-income status economy by 2030 (MDE, 2021).

2. Background to the study

2.1. Defining digital transformation

Digital transformation has attracted research in many disciplines (e.g. business management, information technology, health sciences, political science, etc.) (Gong, & Ribiere, 2021). Hence, scholars have used the term differently to reflect operationalization of the term in a discipline and context of the study (Gong, & Ribiere, 2021; Markus & Rowe, 2023; Schallmo & Williams,

2018). The study acknowledges the diversity of the use of the term and define digital transformation in relation to national development because the discussion in the study considers macro level issues (Goldfarb, Greenstein & Tucker, 2015; Nambisan, Wright & Feldman, 2019). Digital transformation is “an evolving process which must continuously embed and reconfigure stakeholders expectations through the digitized embodiment of new experiences and creation of value” (Carroll, Mc Lafferty, Conboy & Donnellan, 2021:1). In other words, digital transformation is a process of change where digital technologies are used to support innovation that create value to meet new needs of people, organizations, industrial sectors, economies and society (Ronchi, 2021; Zaoui & Souissi, 2020). The process involves conversion analogue data into digital format. The use of digital data changes the way communication, functions, models, processes, products and services are used and delivered (Morze & Strutyńska, 2021). Figure 1 summarises the stages of digital transformation.

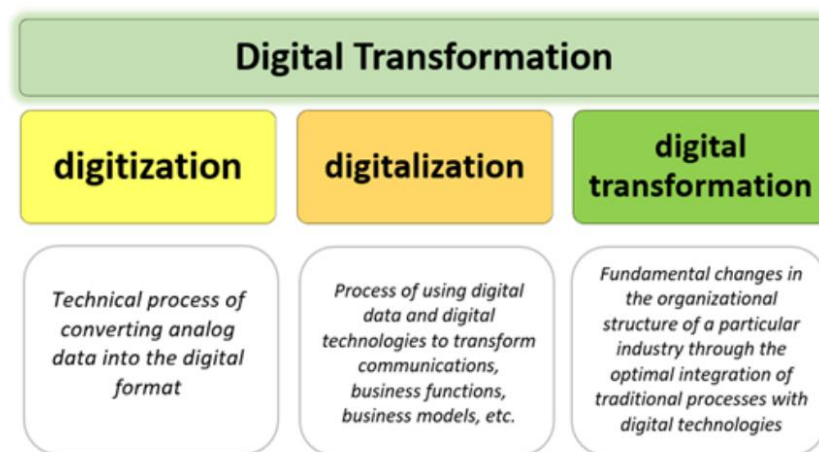


Figure 1: Summary of stages in digital transformation (Morze & Strutyńska, 2021)

The process of digital transformation is centered around people who generate large volumes of data; and use of advanced digital technologies to collect, process, produce outputs from data e.g. artificial intelligence, social media, big data analytics, cloud computing, three-dimension printing, robotics internet of things, blockchain technologies etc. (Hanelt, Bohnsack, Marz & Marante, 2021; Morze & Strutyńska, 2021). The process of automation and mechanization using advanced digital technologies may lead to changes in business models, operational processes, culture, employees responsibilities, customer experiences, industry structures, and society (Gong & Ribiere, 2021). Hence, digital transformation should not focus on technology only but also consider people and society (Nadkarni & Prugl, 2021; Vial, 2021).

2.2.Opportunities and challenges of digital transformation.

There are opportunities associated with digital transformation from the perspectives of organisations, political, economic and society (Hanelt, Bohnsack, Marz & Marante, 2021; Nambisan, Wright & Feldman, 2019). Some of the advantages include efficiency in business processes that can improve customer experience while transacting for products or services. Digital transformation may also lead to better delivery of public services where citizens can access services any time from any location (Ndulu, Joseph & Tryphone, 2021; Goldfarb,

Greenstein & Tucker, 2015). Public organisations may promoting transparency when delivering public services and building trust with citizens (Ronchi, 2021; Zaoui & Souissi, 2020). Further, digital transformation may lead to capacity development of innovation hubs where entrepreneurs come up with solutions and new business models to address challenges in society and create employment opportunities through start-ups (Nambisan, Wright & Feldman, 2019; Ndulu, Joseph & Tryphone, 2021). Digital transformation can improve financial inclusion through digital payment services in social services programs and local trade (Makoza, 2022; Morze & Strutynska, 2021).

Scholars have highlighted challenges of digital transformation that can lead to failure in organisations and society (Aruleba & Jere, 2022). Digital transformation is built on advanced digital technologies including cloud computing, internet of things, blockchain, three dimension printing, virtual reality, digital twin and artificial intelligence (Morze & Strutynska, 2021). These technologies require a substantial national budget for infrastructure investment. Unfortunately, many African countries lack financial resources to invest in infrastructure and advanced digital technologies (Ndemo & Weiss, 2017). Inadequate basic infrastructure such as electricity, roads, internet, broadband to cover rural and urban area have led to digital divide in African countries. In cases where there are infrastructure investments, digital infrastructures investments are concentrated in urban centres only, leaving rural and remote communities excluded (Aruleba & Jere, 2022; Arakpogun, Elsahn, Nyuur & Olan, 2020). Another challenge is that there is too much focus on technology where digital transformation neglect peoples interests, cultures and values (Omol, 2024). When using advanced technologies such as artificial intelligence and machine learning, there potential biases in data where digital technologies have not captured the diverse data on knowledge in the context of African continent with its many languages and vast indigenous knowledge systems (Ade-Ibijola & Okonkwo, 2023; Salami, 2024). Another challenge is power relations between technology companies that provide solutions to African governments and business organisations, where there are hidden motives e.g. prioritizing profits over well-being of communities or policy beneficiaries (Wakunuma, 2019). Further, there is potential for marginalisation of communities that opt not embrace digital transformation and digital technologies due to religious or cultural beliefs (Godswill Agu, & Margaca, 2025; La Cruz & Mora, 2024).

Many African countries have not yet revised their laws and regulation to address the new challenges that have emerged as a result of new digital technologies (Kainja, 2023; Makoza, 2019). The weak legal and regulatory framework because of difficulties in catching up with frequent changes in digital technologies resulting in inability to deal with complex issues e.g. cybersecurity and ethical issues (Ndemo, 2021; Yusuf, Durodola, Ocran, Abubakar, Echere & Paul-Adeleye, 2024). Lack of human capacity to champion digital transformation initiatives and processes where there is reliance of external consultants from western countries who may not fully socio-political and cultural issues in Africa (Mignamissi & Djijo, 2021; Omol, 2024). It is important for policymakers and scholars to be aware of these challenges so that right solutions for digital transformation can be addressed and improve the conditions of citizens.

2.3. Theoretical underpinning of the study

The study used the UNDP Digital Transformation Framework (UNDP, 2023). The framework has five pillars that can be used to understand the level of maturity of digital transformation. The framework may also highlight strengths and weaknesses of the country to support policymakers in prioritise areas where strategies and policy programs can concentrate. The key assumptions of the framework are based on digital inclusive change in fostering human rights, universal access and trust when developing and using digital technologies. The five pillars of Digital Transformation Framework are people, connectivity, government, regulation, economy and digital public information (UNDP, 2023). Figure 2 summaries the five pillars of UNDP Digital Transformation Framework.



Figure 2: UNDP Digital Transformation Framework (UNDP, 2023)

People (as individuals and collectives) are at the centre of digital transformation and their relation to technology and behaviors may affect the way they adopt, appropriate and use digital technologies. Under this pillar, the framework attempts to establish the level of

technology usage and adoption, digital skills and literacy the level of how people's voices and engagement are considered during civic engagement. Culture norms consider people's attitudes, values and practices when using digital technologies (UNDP, 2023).

Connectivity is the availability of digital infrastructure to support access to digital technologies. Physical digital infrastructure include devices, storage facilities, electricity, networks, internet and transport networks that makes data processing, storage and communications possible. Access enablers are factors that supports universal access to digital services regardless of infrastructure, culture, income status, disabilities and level of digital skills. Access enablers can be measured by establishing the level of availability, affordability and inclusion in relation to digital services (UNDP, 2023).

The pillar of government is related the roles of the state in supporting public functions, processes and regulations of digital technologies. The government plays an important role in making available capabilities, resources and strategies that meet the needs of citizens and organization to reap the benefits of digital technologies. Leadership and strategy are necessary where government provide commitment and support for the development of digital technologies. Government coordinate strategies, programs and processes that are executed through institutions. The government is also responsible funding and developing capacity to implement technical systems (hardware and software). The technical systems include platforms that support access to public services that are delivered online. One aspect is open government where government services are access and responsive to the need of citizens to promote transparency and accountability (UNDP, 2023).

Regulation is the creation of an environment where digital systems are designed and implemented to protect consumers (e.g. organisations and citizens). The laws and regulations may support the prevention of issues related to cybercrimes. The laws address data protection and promotion of human rights when using digital technologies. Furthermore, the laws and regulations ensure that the conditions of the markets are fair to allow organisations to compete and deliver services and products that add value to the customers (UNDP, 2023).

Economy related to processes and interactions where digital technologies are used to create opportunities and value. The interactions involve business organizations and customers in exchange of products and services using digital technologies. For instance, financial services are available to allow consumers to make payments, saving and investing. Economy also requires a vibrant innovation ecosystem where opportunities and new services are created or improve the existing processes to support institutions and customers (UNDP, 2023).

3. Research methodology

The study used qualitative research approach (Sarker, Xiao & Beaulieu, 2013). The aim of the study was to understand the state of digital infrastructure and services that can support development of digital economy and society of Malawi. Case study was used because it supported rich understanding of the context of the study and the ability to establish historical sequence of events leading to the development of digital inclusive economy (Klein & Myers, 1999; Ponelis, 2015).

3.1. Case description: Digital landscape of Malawi

Malawi is located in Southern Africa with a population of 21.8 million people (World Bank, 2025). About 80% of the population live in rural areas and agriculture is the main economic activity. The country is categorised under low-income economy (ranked at 172 of 193 economies) with a GINI coefficient of 38.5 (UNDP, 2025). There is a strong belief among development stakeholders that digital technologies can support to address the challenges of productivity, access to services, income generation, innovation, food security and employment (Makoza, 2025). Hence, the government and development partners prioritise investment in digital technologies against pressing needs of clean water, public medical services and education (Werner, Puta, Chilalika, Walker Hyde, Cooper, Goertz & Kapnick, 2023).

The digital economy of Malawi is in the early stages of development (Makoza, 2023). The government, with support from the World Bank, has developed infrastructure to support access to digital technology. Some of the investments include virtual landing point, national fibre backbone, internet connectivity to over 150 public institutions (Makoza, 2024; Pietrosevoli, Rainone, Zennaro & Mikeka, 2022). The government also enacted laws to support the regulation of the ICT and telecommunication sector. The laws include the Communications Act of 2016, Electronic Transactions Management and Cyber security Act of 2016 and Data Protection Act 2024 (Kainja, 2023; Makoza, 2025b). The government also formulated the National ICT and Digitalization policy to guide the development of the ICT and telecommunications sector. The ICT sector is still in development phase where teledensity values are low compared to other countries in the Southern Africa region. The country has two mobile network operators (Airtel Malawi Limited and Telecom Networks Malawi Limited) and two fixed network operators (Malawi Telecom Limited and Access Limited). Adoption of digital technologies is high in cities and urban areas centres. Rural and remote areas still lag behind because of lack of network infrastructure and limited demand for the services (Luhanga, 2024; Makoza, 2024). Table 2 summarises the teledensity of Malawi.

Table 1: Summary of teledensity values of Malawi (ITU, 2024)

Fixed Broadband teledensity	Internet teledensity	Mobile phone teledensity	Mobile network operators	Fixed mobile network operators
0.079%	18%	60.1%	2	2
Source: ITU, 2024				

As can be seen in Table 2, internet access remains low at 18%. Some of the reasons for low internet adoption are lack of digital skills, high cost of devices and bandwidth. Absence of electricity in rural areas create barriers for adoption and use of digital technology devices (Bichler 2008; Makoza, 2023). The government implemented telecentres to support universal access to ICTs but the program has been discontinued due to sustainability and low usage (Kapondera & Mtambo, 2024). The government of Malawi is now prioritising public free Wi-

Fi and connect a school project to support universal access (Makoza, 2024). The effort in a way supports part of the population to access digital infrastructure and services.

3.2. Data collection

Data for the study was sourced from websites of the government departments and international development organisation. The data was purposefully selected where data that was relevant to the study was selected. The researcher ensured that there was diversity of the sample and avoid biased in the selection of data that was used in the analysis (Cheong, Lyons, Houghton & Majumdar, 2023). Table 2 summarises the documents and sources that were selected for the study.

Table 2: Summary of data collected and sources used for the study

Title of document	Source	ID
Digital Government Strategy 2019	Department of E-Government	D#1
Malawi's Digital Economy Strategy 2021 - 2026	Ministry of Information & Digitalization	D#2
Inclusive Digital Economy Report 2023	United Nations Capital Development Fund	D#3
Digital Economy Strategy 2023 -2028	Ministry of Information & Digitalization	D#4
Digital Readiness Assessment Malawi 2025	United Nation Development Program	D#5
UNDP Digital Campus - Malawi	https://digitaldevelopmentcompass.undp.org	W#1

3.3. Data analysis

The collected data was stored in electronic format. For ease of access and moving between documents, the data was stored in one repository and qualitative data analysis software (QDA Miner Lite) was used for coding. Content analysis (Elo, Kaariainen, Kanste, Polkki, Utriainen & Kyngas, 2014) was followed to analyse the data. The process began with reading and rereading the documents to understand the key ideas in the corpus and to be familiar with the documents. The documents were read again, and codes were assigned to words, phrases, sentences and paragraphs. The codes were later grouped together according to the key themes corresponding to the UNDP Digital Transformation Framework (UNDP, 2023). Key themes were developed, and a report was developed to answer the key research guiding the study. The process was repeated to improve the data analysis and the storyline of the findings.

4. Summary of research findings

4.1. Inclusive digital transformation status

The inclusive digital transformation status of Malawi was in the early stages of maturity of digital transformation. Among the five pillars of digital transformation, the strength of the country was digital public infrastructure with an overall score of 3.5. This was followed by regulation with an overall score of 2.60. The areas that were weak include people (1.28), connectivity (1.63) and economy (0.82). Table 2 summarises the five pillars and the score of the components of each pillar.

Table 3: Summary of digital transformation of Malawi (UNDP, 2023)

Pillar	Overall Score	Components	Score
People	1.28	Skills and literacy	2.17
		Usage and adoption	0.72
		Culture and norms	1.11
		Civic engagement	1.13
Connectivity	1.63	Physical infrastructure	1.52
		Access enablers	1.75
Government	2.4	Leadership and strategy	3.44
		Implementation capacity and systems	3
		Digital public services and platforms	0.98
		Open government	2.17
Regulation	2.69	Data and privacy	0.84
		Emerging technologies	1.43
		Fair market competition	2.52
		Cybersecurity	3.34
		Consumer protection	4.51
		Human rights	3.5
Economy	0.82	Business	2.02
		Financial services	0.62
		Innovation ecosystem	0.63
Digital public infrastructure	3.25	Payments	3.34
		Identification	3.55
		Data exchange	2.86
Key:			
Stage of readiness	Value	Overall country digital transformation	
Basic	0 - 1	Basic foundations are lacking hindering process for further stages	
Opportunistic	1 - 2	Advancing in selected areas but without coordinated strategy	2
Systematic	2 - 3	Systematic advancing in key areas based on priority areas	
Differentiating	3 - 4	Clear strength in digital transformation and presence of foundation elements	
Transformational	4 - 5	Advancing in all areas of nation digital transformation with integrated strategy	
Source: UNDP (2023)			

4.2. Pillar 1: people

The overall score of people was 1.28. This was opportunistic where there was limited digital skills among the population and the use of digital technologies was for basic function. There were limited initiatives that provide digital skills development in the country. For example, public free Wi-Fi initiatives were concentrated in urban centres only because of availability of electricity supply to support the use of digital technology devices. The target group were the youth who had interest in using digital technologies. Similarly, connect a school project targeted students in schools. This meant that other segments of the population were excluded in digital development training programs e.g. women, the elderly and people with disabilities and special needs. Hence, the adoption and usage score was 0.72. The findings were similar to previous years' UNCDF report (2023) indicated that:

“Malawi has an overall Digital Economy Score of 43 percent. This score indicates that the country is at the higher end of the start-up phase and is close to reaching the threshold for transitioning into the expansion phase” (D#3).

Further, results on digital divide among various groups were: women (40%), youth (33%), elderly (67%), migrants (75%), refugees (61%), people with disabilities (67%) and small businesses (34%) (D#3). The disparities may be attributed to a number of factors e.g. social norms, income status, digital literacy and trust. Some culture norms also affected the adoption of digital technology. For instance, public wi-fi was available in places that were not accessible to women e.g. markets, schools, hospitals etc. Women spent most of their times in homes because of their roles for childcare, looking after the elderly or the sick. The rise of cyber security issues (e.g. mobile money fraud) affected trust in the adoption and use of digital technologies. Hence, some users felt that they may be at risk when using digital technologies.

4.3. Pillar 2: connectivity

The connectivity score was 1.63 and interpreted as opportunistic where there was presence of basic infrastructure to support digital technologies but with limited access. Physical infrastructure was a major challenge because most of the telecommunication providers only invest in areas where they had a steady market to have a return on investment. Although the government was implementing initiatives such as free public wi-fi, connect a school project and one stop shops (to replace telecentres), the investment did not cover the whole country. The score on physical infrastructure was 1.52. The initiatives concentrated in urban centres and places that had access to electricity to support the infrastructure and use of the digital devices. This problem is echoed in the digitalization policy:

“... there is great disparity in ICT infrastructure investment across the country. A greater portion of rural areas still have limited access to digital technology and services. This is due to the lack of private sector incentives towards ICT infrastructure investment in marginalized areas ... (D#4)

In cases where there was access to digital services, the cost of the services was high because many of the users did not have disposable income to acquire the services due to unemployment and lack of business opportunities to start small businesses as source of

income. Hence, some of the factors affecting connectivity pillar was also linked to economy pillar.

4.4. Pillar 3: government

The government score was 2.4 categorised as systematic where there was a shared vision to invest in digital technologies. There was leadership commitment to improve government services. This was evident in the development of the Digital Government Strategy of 2019. The main objective of the strategy was *“To support provision of seamless public services that are convenient and accessible through institutional strengthening, capacity building and leveraging integrated digital systems and platforms”* (D#1). Later, the government developed the Digital economy strategy for the period 2021 to 2026. The timelines of strategy were recently revised from 2023 to 2028. The strategy extends the role of government in supporting the development of a digital economy ecosystem that promoted economic growth and improving welfare of citizens (D#4). The score of open government was 2.17. This meant that there was improvement in access to public information. However, there were issues of unavailability of funds and limited priority on the implementation of strategies. The digital public services and platforms remained low at 0.98. Part of the reasons for low use of digital public services may be attributed to limited integration of some of the public digital systems. Some systems operated in silos. Further, some public systems were not yet digitised and not available online.

4.5. Pillar 4: Regulation

The regulation score for the country was 2.69 and classified as differentiating meaning that laws and regulations were present. For instance, the government through parliament had acted laws that affected the regulation on use of digital technologies e.g. Electronic Transactions Management and Cyber Security Act of 2016, Communication Act of 2016 and Data Protection Act of 2024. Furthermore, there were some regulations and compliance in the ICT sector of the country. These were related to fair market competition with a score of 2.52, cybersecurity with a score of 3.34 and promotion of human rights 3.5. Although consumer protection had a high score of 4.51, there were reported cases of mobile money fraud that could be attributed to lack of awareness of digital safety among the consumers. This was evident in the low score of data and privacy that a low score of 0.8. This meant that there was a need to enhance safety when transacting using digital technologies. Further, there was a low score of emerging technologies with a score of 1.43. The government required to review the laws to address emerging issues from the use of new digital technologies including artificial intelligence, drones, three-dimension printing, big data analytics, blockchain technologies etc. The existing laws and regulations did not adequately address the emerging technologies.

4.6. Pillar 4: economy

The economy was the lowest value of the pillars with a score of 0.82. This meant that the economy was in the early stages of digital maturity. The score for Business was 2.02 which meant that some of the digital technologies were present but there was limited awareness to use the digital technologies in businesses. Further, there was limited integration in the traditional financial systems and very low technology businesses to support the development

of financial services. Despite the increase in mobile money payments, there is still a need to integrate other financial services with manual systems that were being used in business organisations and government departments. This resulted in a low score of innovation ecosystem of 0.63. To improve innovation, there was need to enhance collaboration between government, industry and academia in development of new digital technologies that could support delivery of new products and services that meet the needs of consumers and citizens. In addition, academia required a review of the curriculum of information technology programs so that higher learning institution programs covered development of knowledge and skills for developing and use of new digital technologies. International collaborations were also important to ensure that there was knowledge transfer and access to investment.

4.7. Pillar 5: digital public infrastructure

The digital public infrastructure score was the highest score among the pillars with a value of 3.25. The pillar can be considered to be transformational where some digital infrastructure was present e.g. digital ID, payment systems in the banking sector and some degree of availability of open data. The score of payments was 3.34, which meant that there were digital payment systems available to consumers despite the limited digital infrastructure in the country (e.g. especially in rural areas). Some of the digital payments systems were online banking, bank cards, mobile money and prepaid services. To some extent, digital identification also supported some of the digital payments systems. The identification score was 3.55. The government of Malawi introduced national ID system in 2017 and began using the system to deliver some of the public services using national ID e.g. social cash transfers. Further, national ID was used in banks and mobile payments for identification of citizens. Data exchange remained low with a score of 2.8. This confirms that some of the public systems are still not using digital technologies and there is limitation integration of the digital systems within the government departments and some of the private sector organisations.

5. Discussion of findings and conclusion

The study set out to establish the state of maturity of inclusive digital transformation that can support the development of digital economy and society of Malawi using the UNDP Digital Transformation Framework (UNDP, 2023). The findings showed that the country was advancing towards selected areas of digital transformation e.g. digital public infrastructure (with a score of 3.25), regulations (with a score of 2.69), and government (with a score of 2.64). The findings were consistent with findings from similar studies that demonstrated challenges of digital transformation in the context of Malawi (Chidzumeni, 2024; Jiya, 2021; Werner, Puta, Chilalika, Walker Hyde, Cooper, Goertz & Kapnick, 2023) and elsewhere (Brunetti, Matt, Bonfanti, De Longhi, Pedrini & Orzes, 2020; Manda & Backhouse, 2017; Ndemo & Weiss, 2017; Svarc, Laznjak & Dabic, 2021; Ndulu, Joseph & Tryphone, 2021). From the findings highlighted in the study, lack of integration of the existing digital systems affected the maturity of the digital transformation. The country needs to address three areas where it has low score e.g. people (with a score of 1.28), connectivity (with a score of 1.63) and economy (with a score of 0.82). The discussion addresses these three areas that require attention to improve the maturity of inclusive digital transformation.

Regarding people, the findings showed that there were efforts from both the government and international development partners to support digital skills development in the country. The focus was on basic digital skills, in companies and schools. The study showed the gap for training in advanced digital skills and quality of engineering and technology education. The digital skills gap had implications for innovation capabilities in the digital ecosystem to support development of local digital solutions and dependency on external experts (Makoza, 2019). Hence, policies require to address skills development of other members of the public e.g. women, the elderly and people with disabilities to promote rights for all people (Chidzumeni, 2024; Kainja, 2023; Wakunuma, 2019). Further, training in advanced digital skills may include graduates in higher education for STEM subjects.

For connectivity, the findings showed that government prioritised digital infrastructure investments. Over time, the digital infrastructure was unreliable and outdated. The findings showed issues of quality of access e.g. poor download speeds of broadband. This was consistent with findings on quality of internet access (Luhanga, 2024). In addition, the findings highlighted the barriers of access to digital technology to some groups in society including people with disabilities, the high cost of devices and smartphones. These findings extend the knowledge of barriers access to digital technologies that other studies have highlighted e.g. relevant local content, sustainable models for public internet (Kapondera & Mtambo, 2024; Makoza, 2024),

For economy, integration of digital technologies in business processes was important in digital transformation. The findings showed limited awareness on how to integrate digital technologies in businesses because of limited digital skills and knowledge. However, access to digital financial services was improving. Jiya (2021) confirmed the increase in access to digital financial services using mobile phones and digital transformation in the financial sector. Nonetheless, the innovation ecosystem of the country was still not competitive and required collaborations of academia, government and business organisations. This was consistent with an earlier study that noted challenges of knowledge transfer between industry and universities and lack of capacity for research and development in universities (Chamdimba & Chivunga, 2021). This calls for policies to look into ways of enhancing knowledge transfer, funding, and collaborations in the innovation ecosystem of the country.

For the theoretical perspective, the study confirms the complexity of inclusive digital transformation in the context of developing countries (Dabrowska, Almpantopoulou, Brem, Chesbrough et al., 2022). The process requires consideration of many factors to guarantee transition of one level of maturity to another (Markus & Rowe, 2023; Teichert, 2019). For the country like Malawi that was in the early phases of digital transformation maturity, it was significant to consider people pillar as a starting point in the UNDP digital transformation framework (UNDP, 2023). A more inclusive view of people may include women, men, youth, the elderly, refugees, immigrants, people with disabilities and small business owners (Chidzumeni, 2024). Figure 3 summarises dimensions of people that was missing in the UNDP inclusive digital transformation.

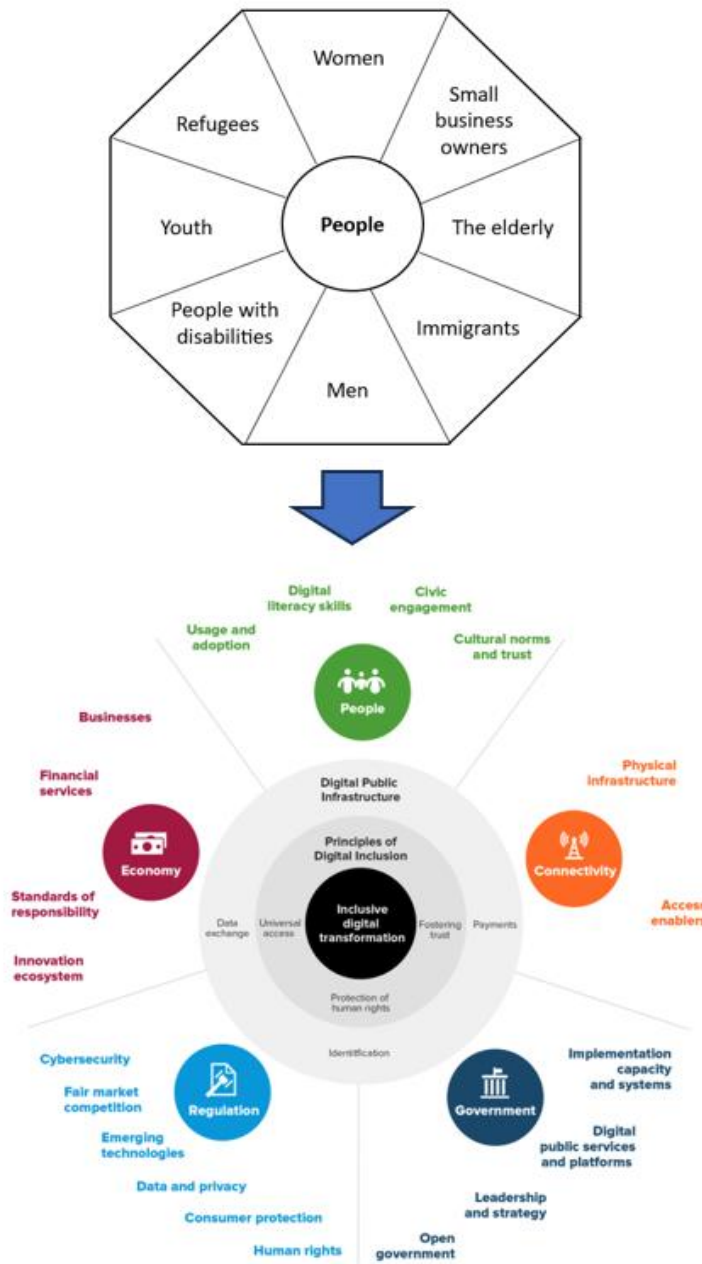


Figure 3: UNDP Digital Transformation Framework with people groups (UNDP, 2023)

As can be seen in Figure 3 above, the eight groups have unique needs and preferences that can influence the way they may adopt and appropriate digital technologies. The inclusion of diverse groups in the UNDP inclusive digital transformation framework may assist researchers and practitioners to include people from different segments of society and note their differences and needs in relation to digital skills, knowledge and required support (Frankiewicz & Chamorro-Premuzic, 2020). The focus may be to empower the people to adopt and use digital technologies through policy programs and initiatives. The process requires consideration of the cultural norms to minimize exclusion and improve trust in digital

technologies (Brunetti, Matt, Bonfanti, De Longhi, Pedrini & Orzes, 2020; La Cruz & Mora, 2024).

Other areas that require attention are connectivity and economy pillars. For connectivity, physical digital infrastructure investments require other functional resources to generate value to businesses and communities. The resources include roads, networks, storage facilities and electricity as part of access enablers (UNDP, 2023). The findings showed low scores on infrastructure because of low access to electricity to support the use of digital technology in rural areas. The UNDP Digital transformation framework concentrates on physical infrastructure and access enablers, there is need to include emerging technologies that support use of digital technologies e.g. 5G networks and artificial intelligence as part of infrastructure investment. The old technologies such as 2G networks will be phased out soon and policymakers may consider how new technologies will be adopted, appropriated, and regulated in the economic sectors (George, 2024). The economy pillar addresses the role of processes and interventions when using technology to create value. The findings showed two areas that require attention: payments and innovation system. Payment systems may address issues of consumer awareness and safety to build trust in digital financial services (Chokhotho, & Mpundu, 2024; Jiya, 2021). Further, the government may support the development of innovation ecosystem through enhancing collaboration and partnerships, infrastructure investment, promoting education and skills development, supporting innovation hubs, and providing access to funding for emerging innovators (Middleton, Lynch, Isaacs, Essop & Fluks, 2021).

The study was without limitations. The study used secondary data only, further studies may use interviews with policy stakeholders to gather more details on the contextual issues and subjective meanings assigned to events, processes, and experiences for digital transformation. For the pillar of people, further studies may explore the effectiveness of digital inclusion programs (e.g. free public Wi-Fi and connect a school program) in supporting inclusive digital transformation. Other studies may explore the inclusion of people with special needs, immigrants, and refugees in digital inclusion programs in supporting digital transformation. Future studies may analyse the readiness of the country to develop a standalone policy for digital transformation. The study makes the following recommendations for policymakers and policy implementation agencies:

- a) **People pillar:** policy implementation agencies may enhance regular methods collecting information and needs of diverse groups (e.g. men, women, the youth, the elderly, people with disabilities, immigrants, refugees, small businesses) to inform policy decisions on digital inclusion programs that target excluded communities.
- b) **Connectivity pillar:** the telecommunication regulator (e.g. Malawi Communication Regulatory Authority) may support creating an enabling environment for partnerships in the investment of digital infrastructure in rural areas through universal access fund to minimize urban-rural digital divide. The regulator may also develop frameworks for supporting infrastructure sharing in rural areas among telecommunication operators.
- c) **Economy:** telecommunications operators and regulatory organisations to enhance public awareness on cybersecurity and safety; and resolve consumer complaints in a short-time.

This may encourage more people to have trust in digital financial services and increase adoption of digital technologies and fast track digital transformation.

In conclusion, analysed the state of inclusive digital transformation maturity of Malawi. The findings showed that the country was in the preliminary stages of inclusive digital transformation. The country performed well in the pillar of government, regulations, and digital public infrastructure. There was urgent need for addressing the pillars for people, connectivity, and economy. Thus, the level of digital transformation maturity was opportunistic where selected areas made some progress without a coordinated strategy. The study offers useful insights into areas that policymakers and policy implementation may concentrate on to achieve digital transformation. The study contributes to literature on digital transformation in the context of developing countries and identify areas for further research.

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