

Factors Influencing Adoption and Diffusion of Digitalisation in the Mobile Telecommunications Industry

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Abstract

The objective of the paper is to identify and give clarity concerning the factors that influence the adoption and diffusion of digitalisation in the mobile telecommunications industry during the fourth industrial revolution (4IR). Further, telecommunication stakeholders are provided with a tool to assist with strategic decision-making. A quantitative research approach was followed. A self-administered questionnaire was distributed to professionals in the South African telecommunications industry and data analysed by regression and factor analysis. The results indicated that the confirmed factors under digitalisation benefits, organisational context, external environment, leadership, and digitalisation strategy have a positive influence on the adoption and diffusion of digitalisation, whereas digitalisation barriers have a negative influence. A chief digital officer's role plays a mitigating part in digitalisation barriers and the digitalisation strategy has a positive influence on digitalisation benefits. The research contributes to the gap found in the literature by addressing the adoption and diffusion of digitalisation specifically in the mobile telecommunications industry in South Africa. The findings also led to recommendations assembled to help stakeholders/managers to make informed decisions when embarking on a digitalisation journey.

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1. Introduction

1.1. Background

The mobile telecommunications industry (MTI) has seen a gradual decline in revenue from their traditional voice and messaging service offerings due to the emergence of over-the-top services such as WhatsApp, Skype, and WeChat together with social media networks like Facebook, Twitter, and LinkedIn (Minerva & Bell, 2010; Sujata et al., 2015). The rapid growth in data traffic and decrease in traditional voice traffic within the industry (Ericsson, 2019), has led mobile telecommunication companies to consider different ways of creating value for their data-centric customers through digitalisation (Valdez-de-Leon, 2016). The MTI is going through the standardisation process for the 5G, which addresses important issues that the telecommunications industry faced during the fourth industrial revolution (4IR). This includes being able to provide enhanced mobile broadband, massive machine-type communication, and Ultra-Reliable Low Latency Communications given the rapid increase in data-centric activities and the projected adoption of mobile broadband. According to Fitzgerald et al. (2014) digital transformation within an organisation has major benefits such as customer experience improvements, operational improvements, and business model change. Digitalisation for telecommunication companies as service providers could result in customer experience improvement essentially increasing net promoter scores, operational improvements which touch on process automation and productivity enhancement of workers, business model change in telecommunications could lead to new business creation, expanding on customer reach in the markets and giving the adopter of digitalisation a competitive advantage over competitors. Pflaum & Gölzer (2018) classified digital transformation as a race against time and global trends as highlighted by World Bank Group (2016) shows that businesses with high digital adoption index have the highest digital economy contribution and as such can benefit from digitalisation. This makes the journey of digitalisation very important and according to Westerman et al. (2012), one that is tied to strong digital leadership to enforce a sense of direction with regard to the creation and implementation of the digital strategy, but also one that is time sensitive, especially in a disruptive environment that the telecommunications industry exist within.

1.2. Problem Statement

Most of the literature that addresses digitalisation and digital transformation, like Westerman et al. (2012); Fitzgerald et al. (2014); Grebe et al. (2018), and literature that reports on factors that influence the adoption and diffusion (AD) of digital technologies like Zhu et al. (2006); Low, Chen & Wu (2011); Sun et al. (2016); Van den Berg and Van der Lingen (2019) take a more general view; one that applies to many industries.

A gap exists in the literature that addresses factors influencing the adoption and diffusion of digitalisation within specific sectors such as the MTI, especially within the South African context.

1.3. Research objectives

- To identify and provide clarity with regard to the factors that influence the adoption and diffusion of digitalisation in the mobile telecommunications industry during the 4IR.
- Further, to provide telecommunications stakeholders with a tool related to the adoption and diffusion of digitalisation that could assist them with strategic decisions.

After a review of the literature including background to the main concepts of the study, the remainder of this article presents the conceptual framework, research methodology, results and discussion of the findings, followed by the conclusions (including managerial implications), limitations, and future work.

2. Literature Review

The literature review section is divided into four subsections to provide the main theoretical concepts.

2.1 Digitalisation and digital transformation defined

Digitalisation is defined as the utilisation of digital technologies such as mobile access, social media, or embedded devices to change existing business processes and tasks (Pagani & Pardo, 2017; Verhoef et al., 2021). Digitalisation encompasses not only cost-cutting measures but also involves refining processes that can elevate customer experience (Verhoef et al., 2021). According to Katz, Koutroumpis & Callorda (2014) digitalisation builds on the evolution of software engineering, semiconductor technologies, and network access (mobile and fixed broadband) technologies. The spill-over effect resulting from the usage of these technologies has given rise to common platforms for application development, e-health, e-government services, e-commerce, social networks, and access to online information. The adoption of digitalisation by socio-institutional and techno-economic environments has resulted in an increase in data traffic as well as the number of connected devices. Ericsson (2019) predicts that by 2024, the total number of connected devices will be approximately 34 billion, and 66% of the connected devices will come from the Internet of Things (IoT) connections.

Digital transformation results from digitalisation by enabling major business improvements such as customer experience enhancements, streamlining operations, or new business model creation. (Fitzgerald et al., 2014). The whole company is affected by digital transformation as it can change the organizational structure to introduce new business models, such as product-as-a-service, digital platforms, and pure data-driven business models (Verhoef et al., 2021). Digital transformation extends further than digitalisation which alters organisational tasks and processes. Companies can improve their market share and competitive advantage by becoming

more digitally mature. Grebe et al. (2018) conducted a study across 81 leading telecommunications companies from 40 countries to compare the benefits of being digital champions and laggards. The study showed an increase in market share by 7% for the digital champions and an 11% decrease in market share for laggards for the period between 2012 and 2017.

2.2 Digitalisation barriers and strategy

According to Matt, Hess & Benlian (2015) the ability of a company to finance a digital transformation can act as both a driver when there is funding and a barrier towards digitalisation due to lack of funding. Research by Fitzgerald et al. (2014) and Sun et al. (2016) also found a lack of funding, limitations of the IT systems, and cost of adoption as barriers to digitalisation. Strategy plays an important role with regard to digitally transforming a business. According to Kane et al. (2015) “digital strategy drives digital maturity” where digital maturity is defined as the digital activities that have transformed talent engagement, business models, and processes in an organisation. The two approaches to achieving digitalisation in a company are a technology push or bottom-up approach and the secondly a strategy-driven top-down approach which could address some of the difficulties and barriers associated with the first approach (Pflaum & Gölzer, 2018).

2.3 Level of digitalisation in South Africa

Africa (Cote d’Ivoire, Egypt, Kenya, and South Africa) has the lowest development index of a digital ecosystem of 30.8 compared to other regions (Katz & Callorda, 2018), and the continent can thus be classified as emerging (Katz et al., 2014). Countries in the emerging phase have mostly addressed the affordability challenge with significant achievements in providing affordable widespread access, however, service reliability and capacity remain a challenge, and e-commerce usability remains low (Galperin et al., 2013). The Euler Hermes’s Enabling Digitalisation Index Report ranks South Africa first in Africa and 46th out of 115 countries with conditions that enable digital companies to thrive (Euler Hermes, 2018).

2.4 Models applied in studies on the adoption and diffusion of digitalisation

This section reviews similar studies that make use of AD models to establish a base for major factors that could influence the adoption of digitalisation. Zhu et al. (2006) created an integrative framework that provides an understanding of the determinants of post-adoption stages in e-business diffusion. The eight factors that affect the adoption of cloud computing by firms that belong to the high-tech industries in Taiwan were examined by Low et al. (2011). An extensive study, based on the Diffusions of Innovation (DOI) theory, institutional theory, and the Technology-organisation-environment (TOE) framework, explored 26 factors that affect organisational big data adoption (Sun et al., 2016). Van den Berg and Van der Lingen (2019) proposed an integrated conceptual framework for technology adoption at a firm level. The finding of the study revealed significant predictors of the adoption intent of mobile

enterprise application technology in organisations within South Africa. The study by Van den Berg and Van der Lingen (2019) includes also a good overview of different adoption models presented in literature.

3. Conceptual Framework

The conceptual framework shown schematically in Figure 1 was derived from literature and further description is provided hereunder regarding the derived hypotheses that were investigated.

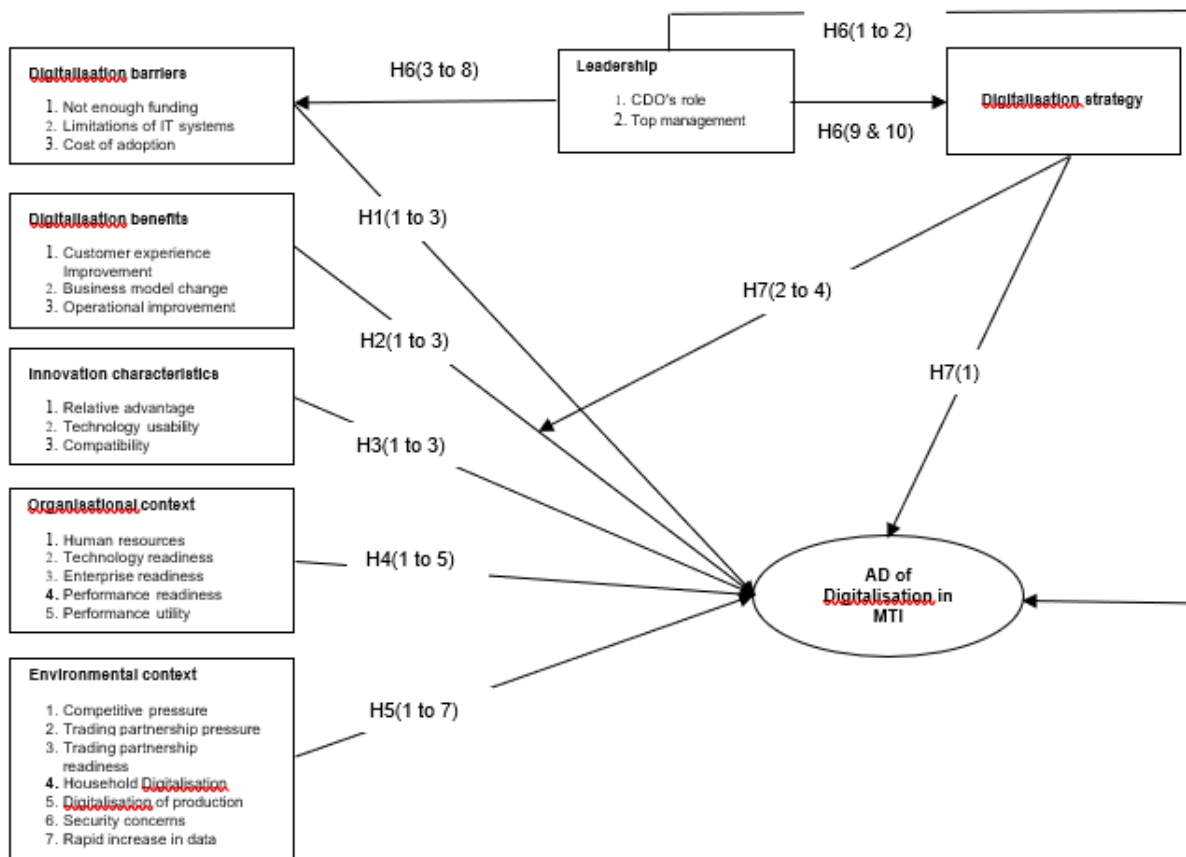


Figure 1: Conceptual framework for the AD of digitalization in MTI

Source: Authors' own construction

Innovation can be hindered by digitalisation barriers, which include factors such as not having enough funding, limitations in IT systems, and cost of adoption (Fitzgerald et al., 2014; Sun et al., 2016). The following hypotheses related to barriers that can pose obstacles to adopting digitalisation were tested.

- H₁: Not having enough funding for digitation projects (H₁₋₁); limitations of IT systems (H₁₋₂); cost of adoption (H₁₋₃) will have a *negative* influence on the AD of digitalisation in the MTI.

With the loss of traditional messaging and voice revenue as well as the rapid increase in data traffic, mobile telecommunication companies are forced to look at new ways of creating value for the customer

whilst continuing to generate revenue for that segment. The concept of digitalisation complements the telecommunications industry with three basic benefits identified by Fitzgerald et al. (2014) these include customer experience improvement, business model change, and operational improvements. Lin & Lin (2008) highlighted that firms are more likely to adopt an innovation if the expected benefits are known. Therefore, the following hypotheses were included in the study:

- H₂: Customer experience improvement (H₂₋₁); Business model change (H₂₋₂); operational improvements (H₂₋₃) will have a *positive* influence on the AD of digitalisation in the MTI.

Relative advantage is referred to as the level at which an innovation is perceived to benefit an organisation, and characterised by factors related to productivity, value creation, competitiveness, and social status. Relative advantage has a positive influence on the AD of e-business and big data (Zhu et al., 2006; Low et al., 2011; Sun et al., 2016). Technology usability refers to the level of belief that an organisation has that technology is learnable and that it can be integrated with a degree of effectiveness and efficiency. Van den Berg & Van der Lingen (2019) confirm that the ease of use of technology has a positive influence on the intention of adoption. Compatibility refers to the degree of congruency that innovation is supposed to have with the current processes and systems when integrated within the organization, and is also classified as a driver of e-business AD (Zhu et al., 2006). Therefore, the following hypotheses are made:

- H₃: Relative advantage (H₃₋₁); technology usability (H₃₋₂); compatibility (H₃₋₃) will have a *positive* influence on the AD of digitalisation in the MTI.

Five hypotheses were derived related to the organisational context. Adequate human resources in the context of digitalisation refer to the employees with the necessary digital skills and knowledge to assist with digitally transforming a company (Sun et al., 2016). Examples of such skills would include the Chief Digital Officer (CDO), data scientist, engineers, etc., and resulted in hypothesis H₄₋₁. Technology readiness also referred to as technology competence, in the context of digitalisation and relates to the degree an organisation has adequate technological expertise and infrastructure for the adoption of digitalisation (Sun et al., 2016; Zhu et al., 2006) - hypothesis H₄₋₂. Enterprise readiness refers to the level of belief that an organisation has with regard to its abilities to adopt, diffuse and assimilate technology in its structures, it is also characterised by technology infrastructure, employee readiness, decision-maker knowledge, organizational support process, availability of resources, leadership and support (Van den Berg and Van der Lingen, 2019). This takes a much broader view in assessing whether the firm is capable of embarking on the digitalisation journey and hypothesis H₄₋₃ was derived. Van den Berg and Van der Lingen, (2019) refer to performance utility, in the context of digitalisation, as the level of belief that an organisation has that adopting digitalisation will lead to organisational performance improvement – hypothesis H₄₋₄. Organisation size is among the most frequently studied factors that can influence innovation adoption (Sun et al., 2016; Zhu et al., 2006). Pflaum & Gölzer

(2018) classify digital transformation as a race against time making adoption rate an important factor. Larger firms tend to be less agile and flexible compared to smaller firms thus taking longer to digitally transform (Zhu & Kraemer, 2005) – hypothesis H_{4.5}.

- H₄₍₁₋₄₎. Adequate human resources (H_{4.1}); technology readiness (H_{4.2}); enterprise readiness (H_{4.3}); performance utility (H_{4.4}) will have a *positive* influence on the AD of digitalisation in the MTI.
- H_{4.5}. A larger organisation size will have a *negative* influence on the rate of AD of digitalisation in the MTI.

Hypotheses H_{5.1} to H_{5.7} relate to the external environment. Competitive pressure refers to the level of pressure experienced by a firm from competitors within the telecommunications industry. Lin & Lin (2008) also define it as the pressure that results from the threat of losing a competitive advantage. The literature on e-business diffusion shows that competitive pressure has a significant influence on the usage of e-business (Zhu & Kraemer, 2005; Lin & Lin, 2008; Zhu et al., 2006); resulting in hypothesis H_{5.1}. Trading partnerships refer to the level of pressure exerted by trading partners on the firm which could lead to the digitalisation of the value chain in order to maintain an internal balance with trading partners (Sun et al., 2016; Low et al., 2011) – hypothesis H_{5.2}. Trading partnership readiness relates to the level at which the trading partners are making use of internet-based systems within their value chain so as to interact with the digital world (Zhu et al., 2006). A company's adoption of the digitalisation of the value chain may be influenced by the trade partner readiness in the trading community and research shows that trade partnership readiness has a positive influence on e-business usage (Zhu et al., 2006; Zhu, Kraemer & Xu, 2003) – hypothesis H_{5.3}. Household digitalisation refers to the adoption of digital products and services and is characterised by over-the-top adoption, e-Commerce usage, and internet usage. Digitalisation of production refers to the adoption and assimilation of digital services by enterprises characterised by enterprise digital structure, digitalisation of supply chain, operations, processes, and distribution channels (Katz & Callorda, 2018). The increase in household digitalisation and digitalisation of production contributes to the rise in data traffic and requires digital services from telecommunications providers – hypothesis H_{5.4} to H_{5.7}.

- H_{5.1}: Competitive pressure (H_{5.1}); trading partnership pressure (H_{5.2}); trading partnership readiness (H_{5.3}); household digitalisation (H_{5.4}); digitalisation of production (H_{5.5}); rapid increase in data traffic (H_{5.6}) will have a *positive* influence on the AD of digitalisation in the MTI.
- H_{5.7}: Security concerns will have a *negative* influence on the AD of digitalisation in the MTI.

CDOs taking a leadership role play an important role when it comes to strategically transforming companies into digitally transformed companies. In order for CDOs to fulfill the role of a digital leader and guide the company into a digitally transformed entity, top-level management support is required to

enable CDOs to address challenges caused by internal resistance within the company. Some of these challenges such as digitalisation barriers require CDOs to play the role of a digital evangelist and a coordinator most of the time as well as that of an entrepreneur (Singh and Hess, 2017). From this, the following hypotheses:

- H₆₋₁: The Chief Digital Officer's role will have a positive influence on the AD of digitalisation in the MTI.
- H₆₋₂: Top management support will have a positive influence on the AD of digitalisation in the MTI.
- H₆₋₃: The CDO's role will have a positive influence with regard to acquiring enough funding for digitalisation projects.
- H₆₋₄: The CDO's role will have a positive influence with regard to minimising the limitations of IT.
- H₆₋₅: The CDO's role will have a positive influence with regard to driving down the cost of adoption.
- H₆₋₆: Top management support will have a positive influence with regard to acquiring sufficient funding for the AD of digitalisation in the MTI.
- H₆₋₇: Top management support will have a positive influence with regard to minimising the limitations of IT systems.
- H₆₋₈: Top management support will have a positive influence with regard to driving down the cost of adoption.
- H₆₋₉: The CDO's role will have a positive influence on the AD of the digitalisation strategy.
- H₆₋₁₀: Top management will have a positive influence on the implementation and formulation of the AD digitalisation strategy.
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Digitalisation strategy refers to a plan of action designed to coordinate, prioritise and implement digital transformation within an organisation, according to Kane et al. (2015) "digital strategy drives digital maturity" where digital maturity is defined as the digital activities that have transformed talent engagement, business models and processes in an organisation. Fitzgerald et al. (2014) highlight the business model change from the three digitalisation barriers as a dream for most CEOs because it is much harder to imitate thus making it a suitable source of competitive advantage. From this, the following hypotheses:

- H₇₋₁: Digitalisation strategy will have a positive influence on the AD of digitalisation in the MTI.
- H₇₋₂: Digitalisation strategy will determine customer experience improvements in the MTI.

- H_{7.3}: Digitalisation strategy will determine business model changes in the mobile telecommunications industry.
- H_{7.4}: Digitalisation strategy will determine operational improvements in the MTI.

4. Research Methodology

In this study, a quantitative research strategy has been used. A non-probabilistic sampling approach was followed where individuals were chosen based on their level of expertise in the telecommunications space complimented by a snowball technique (Martínez-Mesa et al., 2016). The selected experts had to have a minimum of four years of experience in the sector and the following mobile network operators formed part of the study: MTN, Vodacom, Cell C, Telkom Mobile, and Rain.

The total number of responses amounted to 69, but filtering resulted in 45 useful responses eligible for data analysis. About 84.44% of the professional respondents had at least 8 years of experience in the MTI. The job titles in the study are grouped into six broad job categories used in the telecommunications industry, namely managing executive, executive head of department, manager, principal specialist, senior specialist, and specialist.

The data analysis included descriptive statistics analysis, reliability - and factor analysis, and lastly regression analysis and hypothesis testing. The factor analysis was performed with SPSS software, which ultimately reduced the number of variables from 35 to 24 variables. Horn's parallel analysis was used to determine the number of factors required for the data and the actual Eigenvalues were compared to the simulated Eigenvalues (Çokluk & Koçak, 2016). Cronbach's method was used for reliability measurements and is considered one of the most widely used methods in this regard (Bonett & Wright, 2015; Taber, 2018). Ethics

Research ethics clearance was obtained from the principal investigator's university's research ethics committee (protocol number: EBIT/48/2020).

5. Results and Findings

Table 1 shows the results from the reliability and factor analysis. The lowest Cronbach's alpha measurements in this study were 0.684 for digitalisation barriers and 0.699 for digitalisation strategy; both constructs were retained for the study. The Chi-Square (p-value) was compared to the statistical significance level (α) of 0.05, 0.01, and 0.001 to help reject or accept the null hypothesis i.e., if the p-value is less than α the null hypothesis is rejected and the research hypothesis is accepted and vice versa (Bernard, 2006).

Table 1: Factor analysis results

Construct	Sub constructs	*Variables	Factor Loading	Eigenvalues		Reliability
				Total	% of Variance	Cronbach's Alpha
Digitalisation barriers	--	NEF	0.871	1.911	63.697	0.713
		LITS	0.843			
		CoA	0.665			
Digitalisation benefits	--	BMC	0.794	1.840	61.336	0.684
		OI	0.781			
		CEI	0.775			
Innovation characteristics	--	ER	0.903	1.632	81.578	0.769
		TR	0.903			
External environment	--	TPP	0.799	1.958	65.268	0.724
		TPR	0.889			
		HD	0.727			
Leadership	Chief digital officer's role	CDOR*DS	0.770	3.309	55.156	0.756
		CDOR*LITS	0.760			
		CDOR*NEF	0.747			
		CDOR	0.631			
	Top management support	TMS*CoA	0.809	2.880	48.006	0.770
		TMS	0.761			
		TMS*LITS	0.737			
		TMS*DS	0.681			
		CDOR*CoA	0.614			
		TMS*NEF	0.514			
Digitalisation strategy	--	DS*OI	0.885	1.899	63.299	0.699
		DS*CEI	0.822			
		DS	0.664			

Note: *NEF (Not enough funding); LITS (Limited IT system); CoA (Cost of adoption); BMC (Business model canvas); OI (Operational improvements); CEI (Customer experience improvement); ER (Enterprise readiness); TR (Technology readiness); TPP (Trading partnership pressure); TPR (Trading partnership readiness); HD (Household digitalisation); CDOR (CDO's role); TMS (Top management support); DS (Digitalisation strategy).

A summary of all accepted and rejected hypotheses is shown in Table 2 and discussion per construct follows thereafter.

Table 2: Chi-Square test and ordinal logistic regression results

Variable	Hypothesis	Chi-Square	Significance	Hypothesis result
NEF	H1-1	48.444	0.000***	Accepted
LITS	H1-2	72.733	0.000***	Accepted
CoA	H1-3	36.689	0.000***	Accepted
CEI	H2-1	36.933	0.000***	Accepted
BMC	H2-2	14.533	0.001***	Accepted
OI	H2-3	28.933	0.000***	Accepted
TR	H4-2	16.533	0.000***	Accepted
ER	H4-3	6.533	0.038*	Accepted
TPP	H5-2	27.778	0.000***	Accepted
TPR	H5-3	9.844	0.020*	Accepted
HD	H5-4	13.578	0.004**	Accepted
CDOR	H6-1	22.467	0.000***	Accepted
TMS	H6-2	30.644	0.000***	Accepted
DS	H7-1	30.400	0.000***	Accepted
CDOR*NEF	H6-3	12.814	0.002**	Accepted
CDOR*LITS	H6-4	4.244	0.236	Rejected
CDOR*CoA	H6-5	6.075	0.194	Rejected
TMS*NEF	H6-6	1.326	0.515	Rejected
TMS*LITS	H6-7	4.912	0.178	Rejected
TMS*CoA	H6-8	3.849	0.427	Rejected
CDOR*DS	H6-9	1.484	0.476	Rejected
TMS*DS	H6-10	2.530	0.470	Rejected
DS*CEI	H7-2	13.294	0.001***	Accepted
DS*OI	H7-4	6.270	0.012*	Accepted

Note: * $p \leq 0.05$; ** $p \leq 0.01$; *** $P \leq 0.001$; see Table 1 for additional abbreviations

5.1 Digitalisation barriers

Hypothesis H₁₋₁ to H₁₋₃, were all confirmed to be statistically significant. This confirms findings in the literature that digitalisation barriers can hinder innovation at an intra/inter-organisational level (Sun et al., 2016; Fitzgerald et al., 2014). In addition to the literature, this provides a more direct insight into the influence of digitalisation barriers on the adoption of digitalisation in the MTI in South Africa.

5.2 Digitalisation benefits

Hypothesis H₂₋₁ to H₂₋₃, were all confirmed to be statistically significant. This confirms the findings by Lin & Lin (2008) who highlighted that firms are more likely to adopt an innovation if the expected benefits are known. In addition to the literature, this provides a more direct insight into the influence of digitalisation benefits on the adoption of digitalisation in the MTI in South Africa.

5.3 Innovation characteristics

The innovation characteristic construct could not be calculated because the variables did not meet the minimum requirements for Cronbach's Alpha reliability test, as such hypothesis H₃₋₁ to H₃₋₃ remains unconfirmed.

5.4 Organisational context

Hypothesis H₄₋₂ and H₄₋₃ were both confirmed to be statistically significant. Literature findings by Zhu et al. (2006) and Sun et al. (2016) confirm that technology readiness has a positive influence on the adoption of e-business and that technology readiness in terms of IT capabilities is a driver of digital transformation. Van den Berg and Van der Lingen (2019) also found that enterprise readiness has a positive influence on the adoption of mobile enterprise application technologies. This study confirms the influence of both the enterprise and technology readiness on the adoption of digital transformation whilst providing a mobile telecommunication context.

Hypotheses H₄₋₁, H₄₋₄, and H₄₋₅ remain unconfirmed because the variables did not meet the minimum requirements for Cronbach's Alpha reliability test. A reason why organisation size remains unconfirmed is due to a higher standard of deviation obtained from the collected data; this reveals no clear consensus amongst the respondents. This could be related to the point of view each respondent holds, such as the resource point of view where bigger companies have the resources to support digital transformation therefore positively influencing the rate of AD of digitalisation in the MTI. The structural inertia point of view, suggests that structural inertia slows down the digital transformation therefore negatively influencing the rate of AD of digitalisation in the MTI. From the resource and structural inertia point of view, respondents in this category could easily find themselves on either side of the Likert scale or remain neutral. This highlights an important observation that; organisation size should be treated as a construct or a sub-construct with different variables to explore the different dimensions.

5.5 External environment

Hypotheses H₅₋₁, and H₅₋₅ to H₅₋₇ were eliminated during factor analysis; the variables did not meet the minimum requirements for Cronbach's Alpha reliability test, therefore remain unconfirmed. Hypothesis H₅₋₂, H₅₋₃, and H₅₋₄ were all confirmed to be statistically significant. Literature confirms that an organisational adoption of digitalisation of the value chain may be influenced by the trade partnership readiness in the trading community it also confirms the positive influence of trade partnership on the adoption of e-business and cloud computing by organisations (Zhu et al., 2006; Zhu, Kraemer & Xu, 2003; Low et al., 2011). Household digitalisation is one of the factors that have not been fully explored in literature as a factor in the context of digitalisation in the MTI. Katz & Callorda (2018) refer to household digitalisation as the adoption of digital products and services such as over-the-top adoption, e-commerce usage, and internet usage. This study confirms the influence of both trade partnership

pressure and readiness whilst providing insight into the influence of household digitalisation on digital transformation in a mobile telecommunication context.

5.6 Leadership

Hypothesis H₆₋₁ and H₆₋₂ were both confirmed to be statistically significant. The study by Low et al. (2011) confirms that top management support has a positive effect on the adoption of cloud computing. Matsepe & Van der Lingen (2022) also indicated the importance of leadership in the adoption of 4IR technologies in the banking sector. This study supports the findings of Low et al. (2011), and Matsepe & Van der Lingen (2022) from a digitalisation adoption context in the MTI. Hypotheses H₆₋₃ to H₆₋₁₀ relate to the influence of leadership on digitalisation barriers and digitalisation strategy. Hypothesis H₆₋₃ was confirmed to be statistically significant, therefore highlighting the importance of having a CDO that will provide leadership to telecommunication companies embarking on a digitalisation journey. This study also highlights the mitigating influence of a CDO's role on not having enough funding for digitalisation projects as a digitalisation barrier thus contributing to literature concerning the need of hiring a CDO in a company undergoing a digital transformation as highlighted by Singh & Hess (2017). The hypotheses H₆₋₄ to H₆₋₁₀ were rejected during the hypothesis analysis. Perhaps one of the reasons why hypotheses H₆₋₅ and H₆₋₈ were rejected is because the respondents believe that top management including CDOs have little to no influence over the cost of adoption since the reduction of the cost of adoption is dependent on external factors such as mass adoption hence the rejection.

5.7 Digitalisation strategy

Hypotheses H₇₋₁, H₇₋₂, and H₇₋₄ were confirmed to be statistically significant. Hypotheses H₇₋₂ to H₇₋₄ were hypothesised to show the influence of digital strategy on digitalisation benefits. According to Kane et al. (2015) "digital strategy drives digital maturity", this is confirmed in this study from a mobile telecommunications perspective where the digitalisation strategy has a direct positive influence on the AD of digitalisation as well as a positive influence on both customer experience and operational improvements. This highlighting that telecommunications companies that undergo digitalisation should include the digitalisation strategy as part of the overall company strategy in order to accumulate optimal results. Hypothesis H₇₋₃ remains unconfirmed because the variable did not meet the minimum statistical significance.

6. Conclusions and Managerial Implications

Most of the literature that addresses digitalisation takes a more general view that includes many industries and not often converging on one industry. What makes the MTI an important industry to focus on stems from the research and industry trends. The latter indicates that mobile broadband plays an imperative role in the digital environment, thus making the MTI an enabler of a digital nation. This study proposed a conceptual framework to help identify and provide clarity concerning the factors that

influence the AD of digitalisation in the MTI during the 4IR, as well as providing telecommunications stakeholders/managers with a tool that will help decision-makers to make informed strategic decisions when embarking on the digitalisation journey.

Seven constructs were analysed, including 35 hypotheses of which 11 remain unconfirmed. Some of the interesting findings from this study resulted from the rejected and unconfirmed hypotheses based on observations made on organisational size and cost of adoption. Organisation size remains unconfirmed, it is argued that the standard deviation of the data comes from the different points of view that the respondents have, such as the structural point of view, resource point of view or both causing confusion amongst the respondents when answering the question. This highlights an important observation that; organisation size should be treated as a construct or a sub-construct with different variables to explore the different dimensions. The cost of adoption was rejected during hypothesis testing; it is argued that the reason for this could be due to respondents believing that top management and CDOs do not have much influence when it comes to reducing the cost of adoption since the cost itself is dependent on other external factors such as mass adoption. From these findings the following recommendations are made to telecommunications stakeholders and managers: telecommunications companies embarking on a digitalisation journey should have a C-level representative; a CDO that will help guide the company and help mitigate some of the digitalisation barriers along the way. Top-level management should support the CDO in implementing and executing the digital strategy. Digitalisation strategy should be aligned with the overall company strategy to ensure optimal digitalisation benefits. Telecommunications managers and stakeholders could review their compatibility with trade partners so as to ensure inclusive growth during the 4IR. Keeping track of the rate of digitalisation outside the organisation will allow for attractive digital value propositions to the customer. Lastly, ensuring that the organisation has adequate digital expertise and infrastructure could allow for better AD of digitalisation.

7. Limitations and Future Research

The sample was limited to credible respondents with experience of at least four years in the industry. This could have resulted in a relatively small sample within this industry. However, good statistical reliability was obtained with the sample size. Future work could include qualitative analysis by conducting in-depth interviews with experts in the field to obtain more enriched data and reasons for the quantitative results.

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