Absorptive, Adopted and Agile

A Study of the Digital Transformation of Africa Carriers

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Abstract

My thesis explores the cultural, social and management context of digital transformation for African carriers, and discusses the elements of social-cultural barriers, obstacles of digital adoption, innovation, organisation change, ecosystem and their influences. Existing studies are mainly based on the presumed conditions in developed markets, including the free market, rule by law, human capital without considering the social and historical obstacles, absorptive capacities of organisations and the influences of foreign ICT enablers.

Using a qualitative research paradigm privileges the insiders' perspective. I have examined the different backgrounds of digital transformation in Africa. Path dependence is a significant negative consequence of post-colonial social net and western knowledge dominant environment. Vested interest plus corruption slowed down the process of digital adoption while arbitrary administration causes unnecessary concerns for participants.

Traditionalism of Africa is a trade-off between customs of tribes and influence of colonial power. The priority for carriers is reshaping the organisation to take advantage of existing strategic assets, while the improvement of value creation efficiency is carried out by activating the ability of individuals. The new value net breaks the previous development model of low interdependence, maximising the use of external resources based on complementary advantages and sharing.

The value net inherits the advantages of flexibility, innovation, quick response, and risk reduction advantages of organisations. Meanwhile, it has 4 following unique characteristics in Africa: Extremely Various Needs of Customers, Cross-industry, Locally Adopted Business Model and High Sensitivity in Costs. Four aspects are examined in value proposition, core competence, incubation and co-value creation to enable value net synergies.

My research contributes to the theory of the digital transformation in undeveloped countries, in particular how social relationships and cultural norms are inextricably linked with insiders' understandings of digital transformation. It also contributes to emerging debate about digital maturity research paradigms and methodologies.

Key words: digital transformation, social-cultural, digital adoption, innovation, organisation, value net, absorptive capacities, qualitative

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Glossary

Term	Definition
2G	The second generation of mobile phone mobile communication technology standards
4G	The fourth generation of mobile phone mobile communication technology standards
5G	The fifth generation of mobile phone mobile communication technology standards

Abbreviations

Term	Definition
ARPU	Average Revenue per User
AT&T	AT&T Inc is an American multinational conglomerate holding company
BES	Business Enabling System
CAPEX	Capital Expenditures
COTS	Commercial Off the Shelf
CRBT	Caller Ring Back Tone
CSP	Communications Service Provider
DIY	Do It Yourself
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
ICT	Information and Communication Technologies
IDI	Individual Depth Interviews
IT	Information Technologies
M2M	Machine-to-machine (M2M) communications
M-PESA	M-Pesa is a branchless banking service
MTN	MTN Group Limited
NCC	Nigerian Communications Commission
NGN	the currency code for the Nigerian naira
OPEX	Operation Expenditure
OTT	Over-the-top media services

Chapter 1: Research Introduction

1.1 Background

Africa is the world's second-largest and second-most populous continent. The telecom market in Africa is usually considered as one of the largest emerging markets. My research would focus on the carriers in the Sub-Saharan Africa with the most populous African countries, including Nigeria, South Africa, Kenya and Ghana.

The increased revenues in data cannot balance the fall in voice for most carriers. “End device and OTT (Over the Top) players are invading the realms originally ruled by the telecommunications companies such as text messaging and voice services in ever greater numbers” (Aumann et al., 2014,p 10) . An obvious trend can be seen from the example of Vodafone UK, which had raised total data revenues to £314 million during the 2009–2010 periods, balancing the fall in voice revenues of £262 million. Meanwhile, as the data service contributes to the largest revenue, the request for huge investment to better network from 3G to 4G and even 5G is demanding, which leads to increased CAPEX (Capital Expenditures) of telecom operators and lower profits. As the labour cost increases globally, an increased OPEX (Operation Expenditure) becomes unavoidable for most carriers. Looking for new revenue contributor except data to ensure better profit makes the attempts of business transformation never end for almost every carrier.

Carriers play vital roles in national digitalisation. Carriers are expected to provide people with affordable, and efficient information services. They spread fibre optic cables and base stations to the most remote villages and delivered information services to villagers who had never travelled far away in their lives. Through the Internet, people make remittances to family members, villagers sell agricultural products to other parts of the country, purchase household appliances, clothing and other daily necessities. They also learn new technologies of planting and breeding. With the help of mobile internet, some Africans have obtained opportunities to achieve integration with modern society. Moreover, the Internet is increasingly used in Africa and has become powerful for education, business, information and entertainment (Penard et al., 2015) . The infrastructural base of the mobile network laid the foundation for the development of digital media and entertainment service, creating opportunities for the transformation for regional telecom operators.

Digital strategy is a directional strategy for future enterprises in new economy. Tremendous changes are occurring within the organisation, emphasising changing existing models and enhancing customer experience. Efficient, reliable and stable capital markets are providing access to funding for growth, and ICT makes such markets viable. "Future digital technology will help Africa move from the edge of the global economy to the core"(Wang, 2016) . Compared with the traditional, digital business is more effective due to the cost structure, customer-centred service and the efficiency of providing new services.

It remains largely unknown for Africa in the exploration of digital transformation for global academics. In Oct 2016, I had a summit with some executives from carriers in Lagos, Nigeria, where Telco consultants from UK companies gave them presentations on digital transformation strategies. One question raised by the participant was what the best practices for reference can be found in Africa instead of Asia and EU to help them understand the right path of business transformation in their own market. The answers from many European consultants were quite unsatisfying. In addition, this question is a real-world question for me and the continent, where "the emphasis on professional and work-based practise is intended to bring critical and creative thinking to `real world' problems in the form of work-based inquiry". (Dikerdem, 2015)

I am undertaking this project primarily to review and reflect on my recent practice as an enabler of digital transformation for carriers in Sub-Saharan Africa from 2016 till now, with 14 years' continuous work in ICT field. There is always a lack of investment in new business due to the low income from end users of the Africa carriers. The end users' Monthly ARPU (Average Revenue Per User) of the larger carrier in Africa, MTN, representing the average level of telecom consumption, is only less than $5 for most African countries compared to about $50 in North America. How we make the unknown path known is what I try to propose. Therefore, I undertook an in-depth analysis into the digital transformation for Africa carriers and the value network behind the process in the research.

ARPU
(US dollar)

Country	4Q15	3Q15	2Q15	1Q15
South Africa	6,40	7,22	7,46	7,45
Nigeria	4,87	4,99	5,25	5,68
Large opco cluster				
Ghana	3,09	3,29	3,15	3,57
Cameroon	3,60	3,68	3,43	3,83
Ivory Coast	4,69	4,59	4,70	5,07
Uganda	2,29	2,13	2,34	2,79
Syria	3,91	2,95	3,04	3,31
Sudan	2,61	2,62	2,59	2,47

Table 1 End Users' Monthly ARPU (Average Revenue Per User) from MTN

Source: MTN Group Limited results for the year ended 31 December 2015 (MTN Group, 2016)

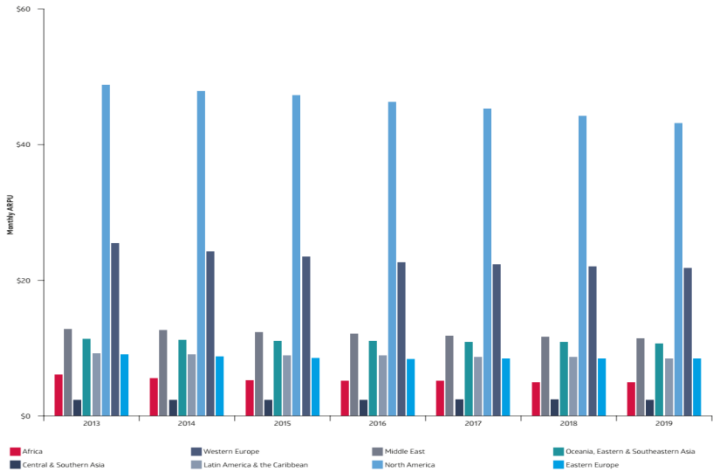

Figure 1 End Users' Monthly ARPU in the Globe

Source: OVUM telecoms, media & entertainment outlook 2015-Ovum(PwC., 2015)

1.2 Context for the Research

Much of my practice has been drawn from the experience in marketing, business development, operation, ecosystem establishment and consulting work as a digital business ecosystem practitioner. This study may be valuable in terms of providing actionable knowledge that may guide practitioners to achieve business transformation in the context of emerging economies.

Improved economy and increased Internet user penetration create a prerequisite of the digital transformation of carriers. The development of telecom industry is highly dependent on the consumption ability of the population as well as the investment in ICT fields. During the last decade, living standards have been improved due to raised international trade and increased foreign direct investment, producing a new class of African consumers. Sub-Saharan Africa's GDP growth prospects are still relatively high–projected at 4–5 percent' annual growth between 2015 and 2018. (*ERICSSON.* 2015) Investment in information and communication technology (ICT) in Sub-Saharan Africa continues to grow. "In 2016, the rate of Internet use in Africa is estimated at 28% compared with 53% in the rest of the world. The popularity of cheaper prepaid services account for up to 98% of all mobile subscribers, as well as a steady fall in tariffs has meant that an increasing proportion of the population can both access and afford a mobile phone". (internetworldstats, 2016) Simultaneously, the total spending by telecom operators, service providers, utilities and other players on equipment and services expected to grow faster than the regional economy. (*ERICSSON.* 2015)

INTERNET USERS AND POPULATION STATISTICS FOR AFRICA						
AFRICA REGION	Population (2016 Est.)	Pop. % of World	Internet Users, The latest	Penetration (% Population)	Internet % Users	Facebook 15-Nov-15
Total for Africa	1,185,529,578	16.20%	333,521,659	28.10%	9.40%	124,568,500
Rest of World	6,154,546,402	83.80%	3,232,799,356	52.50%	90.60%	1,390,635,650
WORLD TOTAL	7,340,093,980	100.00%	3,566,321,015	48.60%	100.00%	1,515,204,150

Table 2 Internet Users and Population Statistics for Africa

Source: (internetworldstats, 2016)

Entertainment is one of the greatest industries in Africa. African people have a tradition of playing music and dancing when the music is diverse and rich with unique culture characteristics in different regions and nations. “African traditional music is frequently functional”.(Parson, 2006) It is quite difficult to find someone not being influenced by music in Africa. In Lagos, I wake up with songs of neighbours every morning and almost all local drivers listen to loud and energetic music when they are in the car. Moreover, entertainment is one of the greatest industries in Nigeria. The programmes of Nollywood have won great popularity among older people and teenagers in the country. The high-end users (top 1% ARPU users) in Nigeria spend 40% of the time of using cell phones to watch Netflix and YouTube, costing more than 2G data every month. Africa is not a land of barren entertainment, but a land of great demands of entertainment with affluent and diverse cultural traditions.

Some leading carriers in US, EU and Asia, have achieved success in digital transformation. Telecom operators are entering new fields they were not familiar with when the business cooperation and even merger and acquisition (M&A) tend to be active in more regions. In North America, AT&T, the No. 2 U.S. wireless carrier completed its acquisition of DIRECTV in 2015. AT&T brings to end user versatile services including multi-screen video entertainment with the newly combined company. AT&T is banking on its acquisition of DirecTV to help beef up its bundles of cellular, broadband, TV and fixed-line phone services (Reuters, 2016) . “Verizon acquired Hughes Telematics for 612 million USD to bolster its M2M business and Terremark for 1.4 billion USD to further expand into cloud computing”.(Aumann et al., 2014, p 134) In Asia, “SingTel branched out into mobile advertising, through the acquisition of Amobee for 321 million USD. In EU, Telefonica group acquired Jajah, innovative voice service provider, in 2010 for 270 million USD in order to leverage the technology and service throughout its global footprint”. (Aumann et al., 2014, p 134) China Mobile, the world largest carrier, invested 2 billion USD in establishing it digital service bases in 5 provinces across the country. Carriers have observed that the growth in data would have a ceiling in the future, and new revenue generators need to be prepared.

The role of cultural factors in the digital transformation is elusive in Africa. Africa and China didn't generate science in modern times with similar culture in understanding the world. Knowledge is imparted by people, especially those who study and work in advanced regions and return to their motherland after they absorbed the knowledge and technologies. Migration trends of Africans contribute immensely to the organisational challenges that are accompanied by digital adoption. The innovation motivation of the individual Africa operator's business model is not proactive and initiatory, which is different from EU and Asia. Enterprise ecosystem is easily built among domestic familiar partners rather than cross country strangers. However, cooperation between Africa enterprises becomes extremely difficult when cooperation is the key to winning competitive advantage in digital economy.

Reliance on external resources for investment and technology for carriers is a key feature in Africa. The least developed countries have made slow progress in the structural transformation, which is

reflected in the continuing current account deficit. These deficits need to be covered by foreign capital inflows, where the main sources of external funds have traditionally been foreign direct investment, remittances, foreign debt, and security investments. Recently, hybrid financing and public-private partnerships from emerging industries have become alternative sources of funding. The gap between the knowledge of the current state and the topic is mainly in the context of constraints including a late mover, high transaction costs and limited organisational capacity with restricted absorptive capacities. To cope with those challenges, I cooperated with insiders focusing more on the unique conditions in undeveloped markets. I covered the socio-economic background of digitalisation of undeveloped countries, elaborated more questions on the most African relevant areas within framework of digital maturity.

1.3 Significance and Objectives

1.3.1 Why I Conduct the Research

The unexplored literature encourages me to go deep into the study and explore more. When I tried to further explore African carriers and their practices, very limited literature was found. Perhaps the concerns on Malaria or Terrorism kept some western academics away from the opportunities of coming into more areas in Africa.

The risk of business transformation is high due to the political and economic restrictions in Africa. Nigeria, the biggest economy and oil producer in Africa, is facing the challenges of recession as the fuel prices have fallen to its lowest level at the time of this writing. “Weak macro-economic conditions, increased market competition, heightened regulatory pressures, notably in Nigeria, and operational challenges in some of our markets resulted in a lower-than-expected performance”. (MTN Group, 2016) Meanwhile, unstable regulatory restrictions caused “a result of the Nigerian regulatory fine provision ($670 million)” to MTN in 2015. (MTN Group, 2016)

"Institution" affects transaction costs and the performance of companies in Africa. Digitalisation can reduce production costs, but the "division of labour", "transfer of interests", but political games caused in digital progress increased transaction costs in Africa. "Institution" affects transaction costs and the outcome of digital transformation. When analysing the problems in Africa, it is wrong to purely estimate the reduction of production costs caused by digital technologies. I prefer to assess the "total cost" composed of transaction and production costs in the research. This situation in Africa can also be explained with the idea from North, if the political rules conform to the Coase theorem, that is, the low transaction cost of the political market may produce effective property rights. If the opposite is true, invalid property rights may appear. (Richter, 2005) The Institution and the technology used together determine transaction and production costs, which in turn affect economic performance.

Acquiring customer from competing carrier is a zero-sum game and new business model is required. Given unique cultural and historical influences, Africa carriers lack distinctive competitive advantages and fall into a homogeneous price competition. Customer loyalty is reduced as the traditional

business model is impacted by the Internet business one, making carriers in Africa passively innovate, and even rebuild the business model completely to obtain excess profits. I keep in mind a continuous puzzle regarding the new business model and its correlated and adaptive organisation, services and cooperation resources to entice subscribers to make greater use of their mobile device through availing of content and services.

1.3.2 Aims

Although African countries developed fast in recent years, the space between developed zones like EU and US and Africa is giant and almost no leading technology company stems from Africa. Another noteworthy phenomenon is that the loss of local talents to western countries in Sub-Saharan region. Regarding the two obstacles, digital transformation and the related ecosystem are more demanding in Africa as it creates the hope of bridging the gap in capital and talents. It leads to a new business model of digital business, as "a business model may be conceptual, textual, and/or graphical, of all core interrelated architectural, co-operational, and financial arrangements designed and developed by an organisation presently and in the future, as well all core products and/or services the organisation offers, or will offer". (Al-Debi, El-Haddadeh and Avison, 2008)

To have a relatively comprehensive understanding of those elements, this project set several broad aims:

1. to critically evaluate challenges concerning the adoption of digital services for carriers in Africa.
2. to critically identify the most significant elements and the key factors in the African corporate landscape that may explain the slow adoption of digital transformation.
3. to describe the characterises of digital transformation in Africa.
4. to make implications for carriers on solving the organisational challenges, which impede the business transformation to digital services.
5. to identify main characteristics of a digital ecosystem in Africa.
6. to elaborate what are the key factors of the digital value network in Africa.
7. to go into the capacities needed in the establishment and management of the digital transformation in Africa.

To make the input more reliable, my interviews are divided into 2 parts, the first-round interviews were done with 8 interviewees from 2017–2019 in Nigeria and South Africa and the second-round interviews are done in 2021 to elaborate some key issues which are not fully developed in previous discussions. The reason why I conduct different interviews in 2021 is that there is limited input to elaborate the value net and strategy questions from the first 8 interviews due to some restrictions of interviewees, most of whom are middle level management without executive experience in pan Africa countries. Meanwhile, the answers from round 1 is too broad and open, even out of my control. I modified the questions with more background information pre-set context in round 2 to provoke the interviewees focus on core questions to express their ideas and discuss with me. Compared with the round 1 interviews, round 2 is semi-structured, both of which clearly illustrated in

3.3 Research Design part. Semi-structured interviews introduce more detail and richness due to their more open-ended nature. Participants can be asked to clarify, elaborate, or rephrase their answers if need be (George, 2022). In the year of 2021, after the first draft of the paper, 4 in-depth interviews were taken to further elaborate the research with former executives from carriers and ICT enterprises.

The aims were studied and discussed in the following chapters in the writing.

Aim	Research Method	Sections
Evaluate challenges concerning the adoption of digital services for carriers in Africa	Qualitative	5.2 Social-Cultural Barriers 5.2.1 Cultural Hindrance 5.2.2 Inhibited Knowledge Creation 5.2.3 Reactive Innovation 5.3 Obstacles of Digital Adoption 5.3.1 Lack of Indigenous Skills 5.3.2 Resource Dependence 5.3.3 Institutional Weakness 5.3.4 Absence of Infrastructure
Identify the most significant elements and the key factors in the African corporate landscape that may explain the slow adoption of digital transformation	Qualitative	5.4 Organisational Challenges 5.4.1 Bureaucracy and Legacy System 5.4.2 Innovation Negativity Bias 5.4.3 Obedience Culture
Describe the characterises of digital transformation in Africa	Qualitative	6.2 Characterises of Digital Transformation in Africa 6.2.1 Depressed Demand 6.2.2 Confluence of Business and Policy
Make an attempt to make implications for carriers on solving the organisational challenges, which impede the business transformation to digital services.	Qualitative	6.3 From Knowledge to Innovation 6.3.1 Make Digital Spill-Over happen in Africa 6.3.2 Technology, Not Prerequisite 6.3.3 Education and Trust 6.3.4 Absorptive Capability 6.3.5 Costs of Africa Institution 6.4 Reshape the Organisation 6.4.1 Responsiveness Agility 6.4.2 Facilitating Collaboration 6.4.3 Empower the Individuals 6.4.4 Openness Culture
Identify main characteristics of a digital ecosystem in Africa	Qualitative	7.2 Background of Telecom Ecosystem in Africa 7.2.2 Ecosystem Cases 7.2.3 Characters of Africa Value Net
Elaborate what are the key factors of the digital value network and go into the capacities needed in the establishment and management of the digital ecosystem	Qualitative	7.3 Enable Value Net Synergies 7.3.1 Extend Value Proposition 7.3.2 Focus on Core Competences 7.3.3 Incubate with Clear Goals 7.3.4 Facilitate Co-Value Creation

Table 3 Matching Table Of Aims And Sections.

1.3.3 Expected Outcomes

I expect to expand the current state of knowledge in the digital transformation for Africa carriers.

1. Suggestions for carriers on solving the organisational challenges, which impede business transformation to digital services.
2. Proposals for carriers on establishment of digital ecosystem locally to set up distinctive competence.
3. A contribution to the theory of a culturally distinctive digital transformation in undeveloped countries, in particular how social relationships and cultural norms are inextricably linked with insiders' understandings of digital transformation.
4. New opportunities for carriers and participants in digital evolution.
5. Paths and core capabilities and models of digital maturity for carriers in Africa
6. Exploratory findings that may yield new insights in a digital ecosystem in Emerging Markets
7. Potential impact on policy making for African governments.
8. A sustainable business model for key players in the digital ecosystem in Africa.

1.4 My Positionality as a Researcher

Is the understanding of digital transformation a single objective reality experienced in the same way by everyone or a reality with a unique interpretation in the unique context? Before putting myself into the research, I must decide whether the subjects and objects are located in intersubjective communities. Transform means change, which are defined and practised by a group of people in their organisations. "If people construct and act within a context which structures and constrains that activity, then we can say the qualitative method fits the situation". (Hathaway, 1995)

"Comprehension" is not the subject's understanding of the object, but the "fusion of horizons" between different subjects. (Gadamer and Dutt, 2001) This further indicates that meaning does not exist objectively in the researched object, but in the relationship between the researcher, the researchee and the time when the research happens. I am a Chinese male practitioner in Africa, with both carrier and multinational ICT enabler background in the past 14 years. Admittedly, Gender is not an influencing element in the research. Moreover, I am from a relatively objective country China that pursues multilateralism and keeps a relatively neutral position in African affairs, although my job is more related to the ICT solution to carriers as a vender. However, the backgrounds from carrier balanced a little bit from my vender background in making assessments on the real causes and effects of ICT technologies which vendors are selling and carriers are using. Therefore, what I must do is not to enter the mind of the researchee from either the positionality of a carrier or an enabler, but to "objectively" examine and comprehend the "subjective" of each other to catch the views and ideas in their minds by the common language we share.

I am an insider in the telecom industry which allows me to access the first-hand information. As an insider, the researcher can collect valuable insights that an outsider might not obtain access to, but it also means that the insider researcher must work especially hard to see the taken-for-granted aspects of the group's practice (Pedersen and Nikulina, 2021). Meanwhile, the insider-centred research does not solely rely on the feedback of the participants. "Constructivism advocates student-centred, discovery learning where students use information, they already know to acquire more knowledge". (Alesandrini and Larson, 2002) My project is purely insider-centred, and I used the existing knowledge to acquire new knowledge by comparing from practices of African carriers. Some public information and personal judgments help verify the finding from the cases. "The case study, also referred to as the case history, is a powerful research methodology that combines individual and (sometimes) group interviews with record analysis and observation. Researchers extract information from company brochures, annual reports, sales receipts, and newspaper and magazine articles, along with direct observation (usually done in the participant's "natural" setting), and combine it with interview data from participants" (Cooper and Schindler, 2014). My interest in the digital transformation of carriers started from my work in China Mobile from 2007. I spent most of my time working in digital department, managing and leading some new business in value-added services, entertainment, smart cities, local life and mobile payment services. During 9 years' experience in carrier myself, I witnessed dramatic social and tech change of China as well as the carrier services changes and correlated business model upgrade, organisation reforms. I have been working with Africa carriers since 2016. I came to work in Huawei, a multinational ICT tech company, in Nigeria in 2016 and has been in Nigeria, Kenya, Ghana and South Africa since then. As an insider and a practitioner in Africa, I have my own discretion in the discussion of digital transformations, therefore I did not come into this inquiry with a hypothesis of any frame work of digital maturity, but rather a spirit of open inquiry that allows the data to speak and reveal the meaning formed by the lived experience of the practitioners with whom I interact daily in Nigeria, Ghana, Kenya and South Africa. The description and verification of empirical evidence is a job for journalists and investigative firms. Too much emphasis on "validation" stifles the creativity of sociology researchers, causing them to abandon theoretical pursuits early in their research careers (Wu and Li, 2020). The choice of qualitative methods leads to evaluate the suitability of research paradigms. In the positivism tradition of natural sciences, the best way is to conduct observable and verifiable empirical analysis of the phenomena while in the hermeneutics of social phenomena, I focused on the interpretive understanding of the object. The above two tendencies reflect different philosophical ontology and epistemology. Ontology answers the question of "form and nature of reality", while epistemology focuses on the "relationship between the researcher and the subject"; as a result, there are different qualitative research methodology to be considered.

I am an outsider regarding the Africa cultural context. As an outsider of Africa, the researcher has the benefit of observing phenomena with fewer preconceptions, and therefore can potentially see the landscape with 'fresh eyes.' However, the outsider will always lack the lived experience of an insider,

and therefore may not be able to emerge with the same depth of understanding or capacity to instigate change. (Pedersen and Nikulina, 2021) Firstly, as a Chinese I was born and grow in an eastern cultural environment. To overcome the limitations of an outsider of Africa culture, I keep cherishing old knowledge while continually acquire new as a constructionist, a process for professional learners to construct personal, professional and sociological ideas to better understand the cases in the project with continuous reflection and renewal of the existing knowledge. The detailed practices are elaborated in the research method and design parts. Secondly, as a candidate with an engineering background, I am influenced by empirical methods (such as experiments, verification, etc.) in the natural sciences when exposed to quantitative research. Quantitative research puts things in certainty and freezes up for a moment, and then performs quantitative calculations; while qualitative research uses language and images as a means of expression to track the changing process of events in the flow of time. “Quantitative research starts from the researcher’s pre-set assumptions, collect data to verify it; and qualitative research attaches great importance to the researcher's influence on the research process and results” (Chen, 2000). This influence is reflected in epistemology, since classical positivism advocates social phenomena must be perceived by experience, while the research process should emphasise the objectivity of the research object. Researchers are onlookers instead of actors who seem to be able to uphold the principle of "value neutrality" and prevent personal thoughts or preferences from affecting the research process. When reading a large amount of Chinese literature in strategies and management, these methods of experimentation have also been widely applied to the positivism case study paradigm. It is another difference in the teaching methods between Chinese business schools and the Western. To cope with the two challenges, I realise that unlike a natural science researcher that reveals the inherent laws through interpretation, I changed myself into the new role of a sociological researcher to explore the behavioural theories of through understanding. In my research, the acquisition of first-hand information such as interviews and observations has become particularly important in qualitative research. I am changed myself into an Africa actor instead of an onlooker in this process, so that I can enter the experience in the real context with fresh Chinese eyes. At this time, the purpose of the research is not to predict or control the objective reality, but to build a bridge of understanding between the person and self, between the individual and the environment. Since then, the value of understanding and experience in interviews and case studies has become increasingly prominent, and the corresponding relationship has become the epistemological basis of hermeneutic case studies. In Africa, interviews and case studies are more important in explaining local management phenomena and solving major social problems. Due to the differences in systems and cultural environments, many management problems of African companies cannot be explained completely by existing theories, such as the framework of popular digital transformation mentioned in Chapter 2.

To sum up, the ICT experience and education background make me the bridge of understanding the open and flexible design in digesting responses from interviews. The complicity of Africa in economics and socio-cultures as well as a unique context in digital transformation shifted myself from a positivist

to a more relativistic view. Digital transformation is a broad concept combining sociological, management and technology issues, and the studies concerning that are more subjective, which rely on engagement activities with practitioners. During the 6 years' stay in Africa and continuous engagement with carriers, I am equipped to understand African socio-cultural issues related to digital transformation although I am from a different continent. Meanwhile, there are so many successful stories of technology absorption and carriers' digital transformations in China. Those also facilities me a local foreigner, to see it in a more comprehensive way.

Chapter 2: Literature Review

The study of digital transformation is not new for many organisations. A literature review blow explains and justifies how my investigation might help answer some questions in this area of research. Exploring the available literature on digital transformation of carriers, I found some multi-disciplinary studies including economics, management, sociology and information science, as well as many public reports of ICT companies like Huawei, ZTE and Ericsson, policymakers from both government and industry. Despite having some common ideas, the different inputs of literature do not connect with each.

I first explore the main findings on the concept of digital transformations including digitalisation, transformation, optimisation and discussed two cases of Safaricom and MTN. Next, I trace the evolution of the business theory about digital, examine the theories of innovation, knowledge, absorptive capacity and digital maturity frameworks.

I then consider the socio-economic background of digitalisation. The review draws on research conducted over theorists and studies relevant, encompassing transaction cost, Late-mover Curse or the Advantage, social structure and economic foundation. After that, I study the motives of digitalisation of Africa carrier. Finally, I briefly go into some steps into the future encompassing digital ecosystem, value net, social net, productivity and competence.

2.1 Definition

Defining digitalisation can ensure researchers be on the same page.

Digital means “characterised by electronic and especially computerised technology”, and “isation” is “an act or process of making” or “action, process, or result of making” according to Merriam Webster Dictionary. Literally digitalisation is the action, process and result of a technology-driven transformation.

Digitalisation is realised in the form of transformation, which encompasses rich meanings in business change, ecosystem, organisation architecture, involvement of stakeholders and breaking the ceilings the current industry operates within.

2.1.1 Transformation Vs. Optimisation

Meanwhile, scholars gave more explanations among the concepts among digitisation, digitalisation, and digital transformation from different perspectives.

Figure 2 Concepts of Digital Transformation

A friendly introduction is, “Digital transformation: Taking advantage of digitalisation to create completely new business concepts”. (Irniger, 2017) “At a high level, digital transformation represents a thorough reflection on how technology can fundamentally change performance”. (Westerman, 2011) Huawei keeps eyes on the business ecosystem as a whole, “The digital transformation lies in a business ecosystem as an economic community made up of stakeholders that are involved with each other in the production of goods, or delivery of services. Stakeholders engage together in a way as to assure the sustainability of their individual and collective goals or objectives”.(Amamoo-Otchere, 2018) In The Digital Economy, the author explains “the new economy, the new enterprise, and the new technology, and how they link to one another—how they enable one another”. (Tapscott, 2014) Another comprehensive definition I prefer is that “digital transformation is application of digital capabilities to processes, products, and assets to improve efficiency, enhance customer value, manage risk and uncover new monetisation opportunities". (Schmarzo, 2017)

There are also implications of digital transformation and ways to determine whether an organisation is on the right track. However, the digital transformation described by many scholars is actually not the real digital transformation. Mobile applications, AI and other digital services are often used to enhance existing services. During this process, there would be a digital business conversion including creating new digital business units or making digital acquisitions. But not all attempts could be called transformation. All companies use new technologies to enhance existing services, but a few ones have proven themselves adept at “inventing new markets, quickly entering emerging markets, and dramatically shifting patterns of customer choice in established markets”, which Prahalad defined. “The critical task for management is to create an organisation capable of infusing products with irresistible functionality or, better yet, creating products that customers need but have not yet imagined”. (Prahalad and Hamel, 2003) Therefore, digital transformation is different from pure use of

digital tools to "improve" productivity to facilitate the generation of existing revenue streams and enhance customer experience. Digital transformation requires “cross-cutting organisational change along with the implementation of digital technologies”. (Bumann and Peter, 2019, p 31) It is comprehensive system to assure the sustainability of people and collective goals or objectives of an organisation.

2.1.2 Agenda 2063 and Digital Africa 2030

Limited ICT investment makes telecom network grows below international standards in Africa. Only 0.33% of African GDP was invested in this area in 1970 against 0.29% in 1990 (Wenjing *et al.,* 2012). The degree of marketisation in Africa is far from enough to support the industrial economy. Until the eve of independence, 80% of basic necessities in many parts of Africa remained self-sufficient(Gann, Duignan and Turner, 1969). Industrial economy cannot drive the overall development of social economy. The situation did not fundamentally change in the period of exploiting colonial economic resources after World War II. During the colonial development investment peak period from 1951 to 1959, Britain's average long-term investment in Sub-Saharan Africa (excluding South Africa) spread greater than 2000 square kilometres of tropical Africa, with a per capita investment of only about 10 pounds (Zheng, 2000). Furthermore, the capital market of Africa is far from mature. Capital circulation channels are centred on financial markets in Western countries (Carmody, Pádraig, 2010) . Africans are looking forward to catching up with the world. Electricity is the important constraint in the process. One of the greatest priorities for the continent is universal electrification to allow digital technology to play its role in transforming lives (Cann, 2016). The 2030 agenda for sustainable development by the Sustainable Development Goals Center for Africa set 17 sustainable development goals and 169 specific goals in 2017, including economic, social and environmental dimensions, covering specific areas such as poverty and hunger, health and well-being, education and gender equality, water and energy, climate, ecology and sustainable economic development. By 2030, the goal is to ensure universal access to affordable, reliable, and modern energy services (Pieterse,2018). In January 2015, the African Union held a summit in Addis Ababa, the capital of Ethiopia, and adopted the "Agenda 2063" as the African Vision and Action Plan. The subtitle of the document "Agenda 2063" is "The Africa We Want", which has seven visions and a grand blueprint for Africa in 2063 to build a prosperous Africa based on inclusive growth and sustainable development. Technology is mentioned 18 times in the document, and people aspire “well educated and skilled citizens, underpinned by science, technology and innovation for a knowledge society is the norm and no child misses school due to poverty or any form of discrimination” (AU, 2017). Simultaneously, it is noted that there is “a shift to multi-nodal urban governance and the significance of the synthesis of social, economic and ecological values in a normative vision of what an African metropolis might aspire to by 2030” (Pieterse,2018). In February 2020, the African Union adopted the strategy for digital transformation in Africa (2020-2030), which takes digital transformation as the top priority of the economic and

social development of the African continent and is committed to truly benefiting from the fourth industrial revolution (Piao, 2022).

African countries have increased their investment in digital infrastructure. In 2016, the committed investment of the African continent in ICT infrastructure was US $1.7 billion, which soared to US $7.1 billion by 2018 (Piao, 2022). Through the flagship project of agenda 2063, the African Union is promoting 114 ICT infrastructure projects aimed at upgrading key Internet switching points, building new broadband optical fibre infrastructure and upgrading existing terrestrial optical fibre backbone networks (AU, 2017). At present, the African continent has entered the deployment and commercialization stage of the 5G network. In June 2021, five countries in Sub-Saharan Africa, including South Africa, Kenya, Togo, Madagascar and Seychelles, have established seven 5G commercial networks, covering major urban areas in relevant countries. Nigeria, Ethiopia, Mali, Mauritius and other countries also plan to launch 5G commercial networks (Piao, 2022). There is no doubt that digital infrastructure is a prerequisite for industrial digital transformation. According to the plan, African countries speed up the construction of digital infrastructure, improve the popularity of digital infrastructure, promote the innovative development of digital infrastructure, and provide a solid foundation for promoting the digital transformation of industry.

The development of digital technology can provide support for the upgrading of Africa industries. From global practice, well developed ICT infrastructure usually promotes macroeconomic growth, reduces the time for traditional enterprises to go public, controls costs, stimulates revenue, promotes investment and integrates various resources. How new technology and business strategies are transforming not only business processes but also the way products and services are created and marketed, the structure and goals of the enterprise, the dynamics of competition, and all the rules for business success(Tapscott, 2014). With the continuous innovation of digital technology and the exponential growth of digital information, the digital process of the global economy is being accelerated. Digital technology innovation is reconstructing the global industrial development mode, and industrial digitalisation has become an important engine for the development of digital economy. Industrial digital transformation refers to the use of digital technology to carry out all-round and full chain transformation of traditional industries, improve production quantity and production efficiency, and promote the digital upgrading process of traditional industries (Piao, 2022). By deepening the application of digital technology in production, operation, management and marketing, and realising the digital, networked and intelligent development of traditional industries, industrial digital transformation is becoming a new driving force to accelerate the reform of economic structure. “By 2063, the necessary infrastructure will be in place to support Africa’s accelerated integration and growth, technological transformation, trade and development. This will include high-speed railway networks, roads, shipping lines, sea and air transport, as well as well-developed ICT and the digital economy” (AU, 2017). The emergence of the digital age is one that has spread across in Africa at an accelerated, irrevocable pace. Digital technology is seen to be making its way into every aspect of life of traditional voice users of carriers. The mobile communication industry evolves into a mobile

communication industry ecosystem led by new keystone players (i.e., Apple and Google) and reflects the expansion of overall industrial competitiveness in size through conversion with other businesses (Huh, Song and Lee, 2014). Globally, the traditional industry is in the throes of a digital transformation catalysed by the rapid growth of smart technologies, there is no exception to this situation for carriers, which are confronted with unclear business model, technologies with mature and immature solutions in ICT field, various value propositions, virtual organisation from both internal and external, capabilities missing for growth, and complementary efforts of different stakeholders. The construction of ICT requires sustainable investment of carriers from wireless network (4G, 5G), national backbone network (fibre and undersea cable), data centre and cloud computing clusters. Digital strategies are generally driven by the government, offered by the combined efforts of carriers and technical partners. Infrastructure is critical to the flexibility, scalability and compatibility of future digital technologies. In China, digital adoption is a powerful tool for poverty eradication. Using advanced information network communication technology to eliminate poverty, improve people's livelihood and narrow the information gap is the social responsibility of state-owned carriers (the 3 key carriers of China Mobile, China Telecom and China Unicom are all state-owned companies). There are two significant results of the increased digital adoption: one is the more balance of economic growth, the other is the sharing benefits of economic growth. The digital economy drove balanced and shared growth, promoted regional coordination with urban-rural integration, and equalisation of public services, thereby facilitated common prosperity to eliminate poverty. On the one hand, Africa carriers faced different situations as the stakeholders are mainly from a few countries like EU (Safaricom, Vodacom, Orange), South Africa (MTN), India (Airtel) etc. Investors in Africa are conservative because ICT facilities are “external” where the social benefits cannot be 100% turned into corporate benefits. In Europe of high-welfare and China with dominating state-owned enterprises, the government's responsibility is to provide public goods including ICT infrastructure. On the other hand, rapid youth population growth provides impetus for developing digital economy in Africa. “The spirit of pan-Africanism, cultural pride and political determination called upon by the AU served as a touchstone for African preparations for the 2030 SDG discussions” (Pieterse,2018). New "Silicon Valley Network" launched on the African continent has achieved initial success. At present, there are nearly 200 technological innovation centres in Africa, 3500 enterprises related to the application of new technologies and 1 billion US dollars of Pan-African Venture Fund. Pure adoption does not indicate any broader change or transformation but rather indicates a potentiality for change — a latent power to catalyse broader societal change processes (Ndemo and Weiss, 2017). For instance, with the expansion of communication networks in Kenya, the Internet has quickly entered ordinary people's homes and constantly changed people's lives. Young people will become the main force in this field in the future.

Huawei, my employer, keeps improving ICT infrastructure, upgrading the digitalisation of every industry, and promoting the knowledge-sharing and skill transfer in Africa since 1998. Since entering Africa in 1998, Huawei has provided communication technology and intelligent terminals to more

than 50 African countries. Huawei also launched its LEAP digital skills development programme, which is an acronym for Leadership, Employability, Advancement and Possibility, aimed at fostering strong digital leadership and a skilled ICT workforce, building a digital talent pool, and promoting digital literacy among citizens. Over the past two decades, Huawei has helped advance the ICT skills of more than 80,000 people across the region (ODENDAAL, 2022). In doing so, it has helped increase youth employability, and bridge the gender gap in the ICT industry. I have been working with Africa carriers in Huawei since 2016. We helped carriers set up digital platforms to enable their business and the ecosystem in music, games etc. in Nigeria, Kenya, Ghana and South Africa. My team also launched the Huawei Developer Programme in 2019, Shining-Star, in South Africa. This programme is part of a $1 billion global investment that HUAWEI is committing to, to encourage global developer innovation and support. We are committed to working on empowering local app developers by offering them some much-needed infrastructure, guidance, skills and support to grow local talent.

2.1.3 Significance on Transformation of Carriers

As voice revenue reached the revenue ceilings in 2010, operators in Africa have begun accelerating the process of transformation, and in the past 5 years, the price of data has dropped by 80% in Africa, while the price of future data will further decline. It is not enough to rely solely on data revenue for carriers and carriers are looking for sustainable business growth and better customer experience. Digital services are seen as the sources of the potential for growth. It is not enough to rely solely on data, so operators in developed markets have begun to move comprehensively and strategically to new areas. Mobile Internet is a major trend. The enterprise market, Internet of Things market and vertical industry market have created more opportunities. Africa also follows this trend. “With growth in voice traffic levelling off mobile service providers like O2, T-Mobile, Orange, TIM, France Telecom, Telefonica and Vodafone must look for other means to increase the volume of traffic through their networks to grow revenues”. (Peppard and Rylander, 2006) In Africa, increasing customer numbers are almost impossible as mobile penetration rates reach saturation. Africa practitioners realise that attracting users from competing operators is a zero-sum game. Digital services are seen as sources of the revenue growth.

The current revenue structure of Africa carriers is unreasonable. Most Africa carriers are Mobile Network Operator without revenue from fixed networks and 2B market compared with EU and Asia ones. “Around 74% of mobile users are in emerging markets, such as India and Africa, reflecting the typical combination of large populations and the lack of fixed line infrastructure. Revenue from fixed broadband or internet usage on the PC is growing with an increase of nearly 30% over the last three years for the globe”. (Vodafone Group, 2015) However Africa carriers do not have the growth across all forms of broadband, as there is a very small scale of fix network in Nigeria, Kenya, Ghana and other undeveloped African countries. Therefore, Africa carriers have more motives increasing the usage of mobile devices and increase the ARPU of the mobile users.

The disruptive nature of digital propels carriers to invest in customer experience and embark on the path towards transformation. The competition makes the development of technological performance faster than what user needs. (Christensen, 2017) OTT companies with services like WhatsApp are taking the carrier's message market recently. Once the continuous innovation pushes the average performance of the product to exceed the average expectations of the user, the market will leave the stage based on product performance and enter the "excess performance" and "consumer over satisfaction" stages. The competitive basis of the market will shift to other aspects that were neglected in the previous stage, such as response speed, convenience, degree of personalisation, or price. Disruptive products or services are initially inferior in performance to existing products, but have other advantages that fit the new competitive foundation. Because the disruptive innovation often starts from the low-end market of the incumbent, the incumbent does not pay too much attention to the growth of disruptive innovation. After a long time, as the destructive technology continues to improve at a faster rate than the user's natural development, when it gradually catches up with the user's average expectations in performance, large-scale erosion of the incumbent begins. A customer-centred approach relies on the value-creating system. To cope with these powerful forces, incumbent operators have had to strategically renew their companies and develop new competencies, particularly to compete with mobile services (Peppard and Rylander, 2006) . Carriers don't do validated learning when tackling a new project that is in direct contrast to OTT, which does by engaging users with prototypes to have a better understanding of what is needed in the market. This sets African carriers apart from OTT players, giving the latter a competitive advantage over the former. It is therefore crucial for carriers to shift to a customer-centred approach that seamlessly integrates sales, customer relationship management, customer service and social marketing applications. "Through value network reflecting the mobile communication ecosystem, the value network model reflecting open mobile communication ecosystem was devolved, as shown below" (Huh, Song and Lee, 2014) A customer-centred approach relies on new value creating process instead of distributing system in old thoughts in the value chain. Without creating new value, it is a zero-sum game in fighting for limited existing value in the market. Different economic actors must work together to co-produce value.

2.1.4 Case of Safaricom

Market share and operational efficiency are key concerns of incumbent carriers in Africa. Safaricom is a leading communications provider in Kenya with the widest coverage and the case of M-PESA is well recognised globally as a typical success for digital transformation. Launched in 2007, M-PESA has been used by more than 23 million people in Kenya ever since.

The innovation comes from a more localised, user-centred context and related technological changes, which facilitates a local ecosystem. Mobile money is a tool that allows individuals to make financial transactions using mobile phone technology. (Jack and Suri, 2011). M-PESA began as a pure personal money transfer service and today offers a wide range of financial services to individuals, businesses

and governments. The threshold for using M-PESA is very low and the minimum transfer limit of has been reduced from 50 Kenyan shillings to 10 shillings, which is equivalent to 12 cents. Simultaneously, Safaricom has also reduced the handling fee for small-amount transfer transactions so that M-PESA can be accepted by more people. Another important characteristic of Safaricom is M-PESA agent network everywhere in the country and its homogeneity, where agents register customers, educate them and facilitate cash-in/cash-out transactions. “Various marketing mix and techniques were employed that include auditory marketing, new product creation, animation, pricing, place, content localization, brand alliances, use of celebrities and constant promotions”. (Oloko *et al.,* 2014). M-PESA boosted the development of e-commerce and facilitated operations for thousands of small businesses, online and offline. (Jelassi and Martínez-López,2020).

The richness of services creates unique user experience and retain users in the price war. Collymore, CEO of Safaricom believes that "there are 2 reasons for the decline in ARPU. One is the decline in prices. The other one is that market expansion, the number of low-income users increases causing the ARPU value to fall”. (Fan, 2012). However, Safaricom did not reduce the price aggressively in order to maintain the overall ARPU value, as they believe that the most important way to retain users is to ensure that users use various products. M-PESA has a rich business scope: individual users can pay tuition, utility bills, and pay in supermarkets through M-PESA. Enterprise users can use M-PESA to pay their employees. Now, 15 million of the 19 million Safaricom users use it. M-PESA. Additionally, Safaricom also encourages users to use data services and provide them with some interesting applications. Rich services increase the stickiness as well as the loyalty of customers. “Among the innovation strategies included in the study, product innovation strategy had the most influence on performance of Safaricom”. (Njeri, 2017). Facts have proved that the decline in our ARPU value in the voice business has been compensated by the revenue from M-PESA and data services.

The business landscape is extended into comprehensive finance with complementary relationship with local banks. Kenya has a population of 40 million and 42 banks. Safaricom has different cooperation models with different banks to provide services to users. For example, users can make transfers between bank and M-PESA accounts. When the M-PESA agency is not in business, users can directly withdraw money from about 300 ATMs that support the service in Kenya. Safaricom is currently exploring some applications including micro-insurance, micro-financing, micro-lending, and micro-savings. Through cooperation with Equity Bank (a financial group in East Africa), business called M-KESHO was developed where users can loan, deposit and earn interest.

Business driven IT capabilities escalation to the next-generation ensures long-term customer experience. "Customers' expectations usually go far beyond your actual capabilities".(Westerman , 2011). This overall change usually includes the pursuit of new business models, and then new revenue sources, which are usually driven by customer expectations. Safaricom has about 2 billion Kenyan advances every day, requiring agile and scalable IT capacities. This process not only drives the capacity of the platform upgrade but also escalate the IT architecture to the next-generation. It makes the system more robust to improve the platform’s relay capabilities and improve the platform’s

access reliability. “M-PESA’s success cannot be boiled down to any one specific factor. In fact, it is consistency among the elements of the customer proposition and Safaricom’s attentive monitoring of the entire system that best explain its success”.(Lal and Sachdev, 2015).

2.1.5 Case of MTN

MTN Group is the largest telecommunications operator in Nigeria and the largest multinational Teleco in Africa. It currently operates in 21 countries in Africa and the Middle East. As a mobile only operator in the emerging markets, MTN aspires to transform from a communication service provider to a digital service provider.

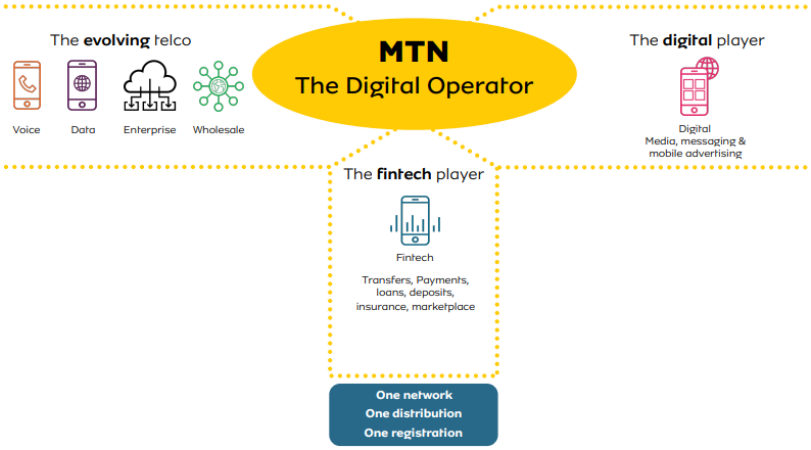

Figure 3 Three Pronged Business Model of MTN

Source: MTN Group Strategy market sizing (MTN, 2019)

Leadership team and continuous investment are the core elements driving transformation. The MTN leadership team can envision the use of advanced digital tools in a variety of strategic and tactical initiatives, who responded positively to the downturn of performance by appointing a new Chief Digital Officer in 2016. “Hired from outside the firm, the appointment reflected the increasing demand for candidates who have a cross-industry perspective along with a robust experience in defining and deploying digital strategies”. (Moore *et al.,* 2017). MTN invested approximately US$2 billion in capital expenditures (CAPEX) in IT and networking in 2019, covering a high proportion of the population in many markets. For example, it covers 95% of 4G users in South Africa, 40% in Nigeria, and 58% in Ghana. MTN has compelling leadership, they provide good guidance to the business, have a very clear direction and a clear strategy (Nisar, 2020). In Africa, the effect of massive investment in the past three years has begun taking effect.

The emergence of digital service innovation serves a path to a business transformation. As a digital operator, MTN has adopted a three pronged business models that encompasses (1) the evolving Telco focused on traditional telecom services, (2) the digital operator geared towards emerging digital platforms, and (3) the Fintech player advancing mobile financial services” (MTN, 2019). Meanwhile, proactive planning of "Oxygen" strategy promotes the leading structure during the transformation

process of MTN. The acronym "Oxygen" began with agile operations (Operation) and digital experience (Experience), which fully illustrate the importance of artificial intelligence and digital technology to MTN (Nisar, 2020). "Oxygen" is a fusion of a series of internal plans, aiming to create an open, future-oriented and predictable architecture. The architecture is also a channel-level, IT-level, enterprise and business capability-level, network and operation-level architecture. MTN implements it in various operating markets. The move proved to be efficient, as MTN experienced stable growth in earnings since 2017, performing especially well in digital services in Fintech.

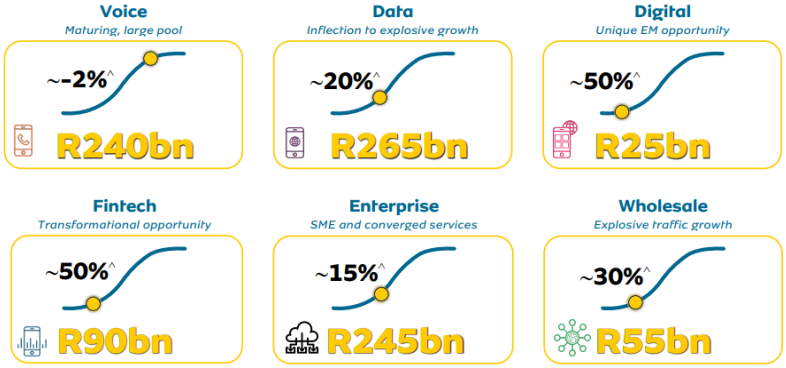

Figure 4 Six Value Pools and 3 Year Organic CAGR (1 R=0.06 USD).

Source: MTN Group Strategy market sizing (MTN, 2019)

Cooperate culture, content services and IT-based platforms ensure digital activities in an interface with customer demand. MTN is a digital-first and cloud-first enterprise, which puts the digital transformation in three layers. The first layer is commercial, involving new sources of income, processes and channels. The second layer is the digital capability, including platforms, systems, technologies and networks. As a capability layer, it helps achieve the goals of the first layer. The bottom layer is the basic layer, which is the cultural layer, which refers to an agile way of working. For digital transformation, the first thing is a business process and business diversification. Then is the functions and systems of the middle level. At the lowest level, there are culture and talents to support and achieve the goals of the two upper levels. “Particularly, process and content are very evident at the functional level and explicitly includes digital activities in an interface with or fully in the customer's side”(Nisar, 2020). MTN positively embrace cloud and virtualisation. The "MUNIC" plan is a unified cloud plan. There are two types of workloads in our business: traditional network workloads on the core network and traditional IT workloads. The traditional platform based on special equipment on the core network is turning to the general COTS platform. Therefore, most platforms are becoming IT-based. The "MUNIC" strategy unifies the telecom cloud and IT cloud. Eventually, MTN will be able to orchestrate workloads between traditional telecom clouds and IT clouds and use common resources to manage IT and telecom workloads. Charles Molapisi, CTIO at the MTN Group indicated “With cloud-native Digital BSS, we accelerate business growth with faster time-to-market, while continuing to deliver an immersive customer experience, and superior digital operations” (Tecnotree, 2021).

2.2 The Evolution of Business Theory About Digital

Some original theories have failed now, we need new theories and concepts. But which of them can be unified? There is a theoretical dilemma we are facing at present (Liang, 2015). In this section, I attempt to put a relevant review to the evolution of business theory about digital from the perspective of a late comer to imitate, learn, absorb, innovate and change.

2.2.1 Innovation

Innovation is a key concept in the research. “The process of innovation must be viewed as a series of changes in a complete system not only of hardware, but also of market environment, production facilities and knowledge, and the social context of the innovation organisation” (Kline and Rosenberg, 2010, p 173). Two kinds of innovation are distinguished by Christensen: sustainable and disruptive, which is different from the traditional radical and incremental innovation. Christensen does not focus on technological change itself, but on what people use (Christensen, 2013). Another classification indicates when creating an innovation strategy, companies have choice about how much to focus on technological innovation and how much to invest in business model innovation (Pisano, 2015) . The chart below shows how potential innovation fits with a company's existing business model and technical capabilities.

In Economics, innovation is the introduction of technology into organisations to form new economic capabilities. "Innovation" is not a technical concept, but an economic concept: it is strictly different from technological invention, but the introduction of ready-made technological innovation into economic organisations to form new economic capabilities (Haberler, 1950) .

In management, innovation is an ability to adapt to the environment as the dominant way of survival. Schumpeter has identified innovation as the critical dimension of economic change. He argued that technological innovation often creates temporary monopolies, allowing abnormal profits that would soon be competed away by rivals and imitators. It simply means the innovation is not a destination but a journey, it is a continuous process. (Upadhyay and Rawal, 2018). Modern evolutionary economists have critically inherited Schumpeter's basic ideas and extended the scope of their research to many areas neglected by Schumpeter himself. One of them is to propose that enterprises have evolutionary ideas similar to biological evolution. People believe that the mechanism of enterprise development can be revealed using mathematical tools and empirical models, and then uncertainty becomes certainty. However, over time, the great variety of internal management factors, the dynamic market environment, and the high degree of instability have played a decisive role. To a certain extent, the ability to adapt to the environment has become the driving force that governs the existence and development of enterprises.

In Africa, industrial structures shift from integration to modularity. The profitability of Africa telecom operators has deteriorated recently, while the overall profit of smart terminal manufacturers in Africa has increased significantly, mainly due to the benefits of Apple and Samsung, Huawei and other brands. In the early stage, companies that adopt internal production strategies or deeply integrate all

aspects of the value chain can provide leading user experiences, making vertical integration a mainstream model. Operators are the beneficiaries of the network-service integration structure at the beginning. With the transfer of the coupling interface, new profits flow from the network to the terminal. Apple first became the beneficiary of the terminal-service integration structure. Subsequently, with the rise of Android and the modularization of the terminal hardware, the internal profits of the terminal began to shift to high-performance module providers like Qualcomm in USA in short supply. The transfer of industrial structure from vertical integration to modularity is universal and inevitable. Africa carriers and carriers in Asia and EU, suffer from value and profit transferring to device manufacturers and OTT players. In reality, the vertical integration structure does not disappear overnight, but is gradually modularised in each level of the market with global trends. The modularisation process of the mobile industry in Africa and other regions occurs both at the telecom service and content service levels. Due to major changes in mobile demand, a new structure has emerged in the local application era in Asia, especially China. In my observation, Tencent, Alibaba and Huawei become beneficiaries in the process and carriers in China grow with the OTTs as co-beneficiaries in the digital economy in China. Meanwhile the process of industrial evolution in telecom industry is often disturbed by external factors in Africa. As internal innovation is weak within the continent and there are no culture or language barriers within Africa for global competitors, foreign giants incl. Google, Facebook, Apple, Netflix, Microsoft, AWS and Huawei occupied different segment markets in the digital services in the modularisation process.

2.2.2 Knowledge

Knowledge is treated as public goods in economics. Once produced, producers can't decide where it goes and who gets it because knowledge cannot exclude those who do not pay for the product from copying this knowledge. The knowledge cost then is close to zero, but the potential profit is high in digitalisation. In the absence of certain constraints, the utility of knowledge can be shared by most people. “Need knowledge and solution knowledge are two types of knowledge crucial for innovation. Need knowledge refers to unmet needs arising in the use of a given product or service, while solution knowledge refers to solving technical problems and providing functionality. If both knowledge types are available in an organisation, and if there is sufficient fit between the two knowledge sets, they can be combined to produce innovation” (Schweisfurth and Raasch, 2018) .

Nonaka puts forward the "SECI model of knowledge dimensions” that is a model of knowledge creation that explains how tacit and explicit knowledge are converted into organisational knowledge. The process of knowledge innovation consists of four interactions between two types of knowledge between individuals and organisations (Krogh, Ichijo and Nonaka, 2000) . Through the four kinds of interactions of knowledge, different individual knowledge in the enterprise can create new knowledge during the imitation process, exchange and combination, and disseminate it in the group, so that it is finally reflected in the capabilities of products, services and systems.

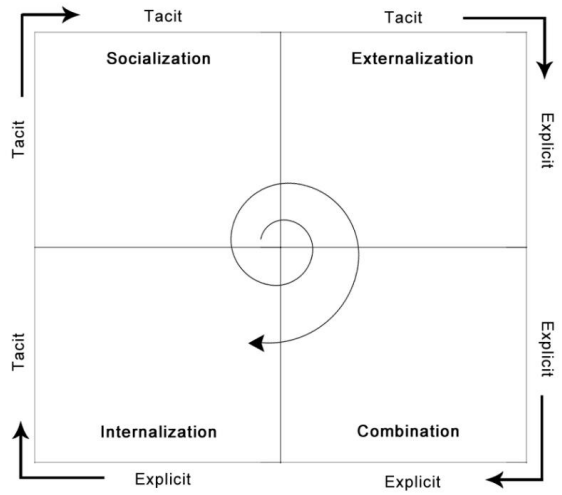

Figure 5 SECI model of knowledge dimensions
Source: (Krogh, Ichijo and Nonaka, 2000)

Imitation and frequent flow of technical personnel drive innovative knowledge to spread rapidly. “The smooth operation of innovation systems depends on the fluidity of knowledge flows – among enterprises, universities and research institutions. The mechanisms for knowledge flows include joint industry research, public/private sector partnerships, technology diffusion and movement of personnel” (OECD, 1997) (Note: The fluidity of knowledge flows provides me more clues in the research, as I look into the flow of talents in Africa, localization of African enterprises and level of education and research). Romer used externality to construct an endogenous technological change model and draws influential conclusions (Romer, 1986) . In Romer's model, in addition to the two production factors of capital and labour, there are two other factors: human capital and technical level. The labour included in the model refers to unskilled labour, while human capital refers to skilled labour. Human capital is represented by the length of education time such as formal education and on-the-job training. Therefore, the role of knowledge or education level in economic growth is taken into account (Romer, 1986). A case of externality is Silicon Valley's chip manufacturing industry. Through espionage, imitation and frequent flow of technical personnel, innovative knowledge spreads rapidly among neighbouring enterprises. Externality theory emphasises the role of regional monopoly on regional innovation and economic growth, and the power of monopoly can make knowledge producers have exclusive value of innovation. However, regional monopoly restricts the flow of knowledge, so only by internalising this externality (knowledge sharing) can innovation and economic growth be realised from synchronous development. Knowledge and talents flow more easily during the globalisation process, some countries like China, India both benefit from synchronous development.

2.2.3 Absorptive Capacity

Absorptive capacity is another key element in the digital transformation for undeveloped countries. As defined by Cohen and Levinthal, 1989, Cohen and Levinthal, 1990, Cohen and Levinthal, 1994, it is

a firm's ability “to recognize the value of new, external information, assimilate it, and apply it to commercial ends” (Schweisfurth and Raasch, 2018) .

Human capital is the indispensable path linking the transfer of technology to local productivity. An experiment by Borensztein utilising data on FDI flows into 69 developing countries suggested that FDI is a vehicle for the transfer of technology, but higher productivity holds only when the host country has a minimum threshold stock of human capital. Therefore, sufficient absorptive capability of advanced technologies is available in the host economy is the prerequisite. (Borensztein, De Gregorio and Lee, 1998) .

Recent ideas show that transformation is not a step after assimilation, but represents an alternative process. Consequently, it suggested that the neat distinction between potential absorptive capacity and realised absorptive capacity does not hold anymore (Todorova and Durisin, 2007) .

Furthermore, firms with high levels of absorptive capacity (1) recognize the value of new external knowledge, (2) acquire, (3) assimilate or transform, and (4) exploit new external knowledge (Todorova and Durisin, 2007). Therefore, dynamic capabilities of transformation require adaptation, absorptive, renewal, and reconstruction capabilities. The prerequisite for carriers to implement digital transformation and achieve success in a dynamically changing environment is to have dynamic capabilities that match the changes in the environment.

2.2.4 Digital Maturity Frameworks

The most popular models to assess the effectiveness and navigate digital changes are the different Digital Maturity Frameworks. “In the cross-industry Forrester digital maturity model 4.0, it assesses the overall digital readiness across the four dimensions of culture, technology, the organisation, and insights” (Bumann and Peter, 2019,p 19) . These frameworks provide a great structure of digital challenges, but they tend to be too general and have too much coverage. The reason for this is perhaps everything is designed to be inherently common for all industries. I identified 3 popular digital maturity models for in this section.

Telecommunications is an industry that digital transformation affects most. Valdez proposes the digital maturity model for telecommunication service providers, offering a structured view of digital transformation specific to the context and challenges of the telecommunications industry to benchmark themselves against peers or them as they advance their transformation. (Valdez-de-Leon, 2016)

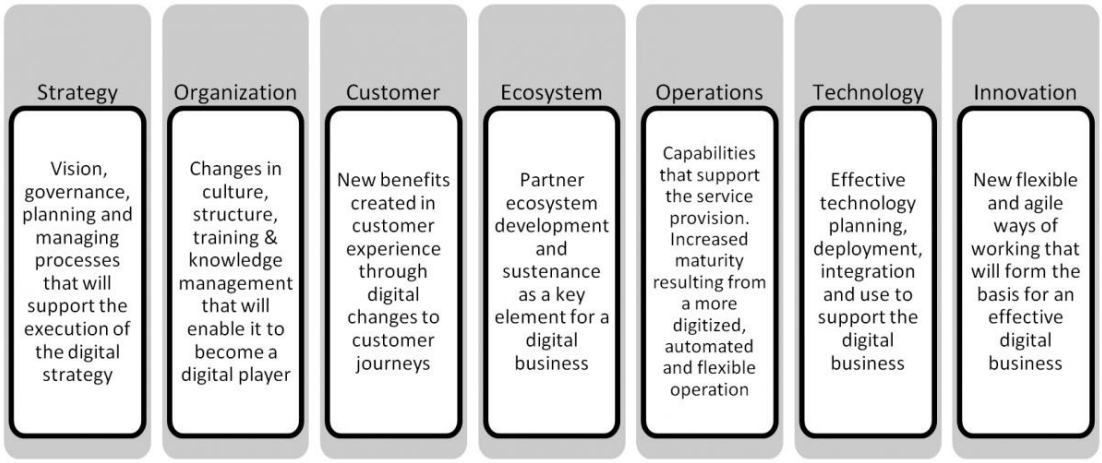

Figure 6 The Seven Dimensions of the Digital Maturity Model for Carriers
Source: (Valdez-de-Leon, 2016)

Kun in Huawei believes that user experience is the goal and touchstone of digital transformation and summarises the best digital customer experience into a ROADS model (Real-time, On-demand, All-online, DIY, and Social). Using ROADS as experience criteria, Huawei believes that a digital maturity model for a CSP comprises three layers of assessments: strategic, qualitative, and quantitative. (Kun and Xin, 2015)

Figure 7 Huawei Digital Maturity Model
Source (Kun and Xin, Strategy Planning Dept., Carrier Software BU, Huawei, 2015)

Wavelet from Ericsson indicates that a thorough programme management structure and philosophy are critical. After all, information has been gathered, each work package listed above must be mapped into the transformation path. The transformation path will pack all information into three drivers for cost efficiency, customer experience, and business innovation (See figure 8) (Wavelet *et al.,* 2016) .

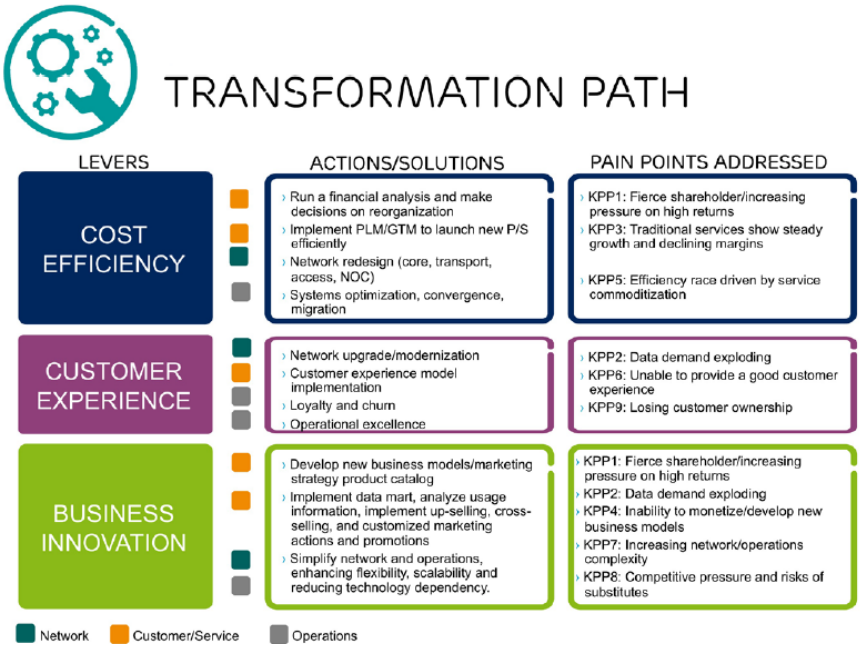

Figure 8 Transformation Path, Ericson
Source: (Wavelet , 2016)

“Researchers assert that digital strategies of successfully transformed organisations are not only well documented, but also communicated in the organisation and internalised by employees of all levels” (Bumann and Peter, 2019, p 26). Considering strategy, transformation goals and organisational structure, carriers can develop appropriate strategies to evaluate current businesses and develop a clear vision of digital. Africa operators have different starting points and goals, measurement standards need to be designed for evaluation. For example, Djoliba, the first pan-African backbone from Orange may focus on network reliability and cost, while the goal of digital service providers like MTN is to build a digital ecosystem that can provide customers with services and content. It is necessary for each organisation to define the level of maturity in line with its business ambitions, context, resources, and timeline (Valdez-de-Leon, 2016) .

2.3 The Socio-Economic Background

Specialisation, Transaction Cost are the basic Socio-Economic concept in my MBA learnings. Specialisation and division of labour have improved efficiency, promoting international division of labour and encouraging free trade. New institutional economics attempt to extend economics by focusing on the institutions that underlie economic activity (Coase, 1984). New Institutional Economics has become a vibrant branch of Economics, four institutional economists have won the Nobel Memorial Prize in Economic Sciences: Ronald Coase (1991), Douglass North (1993), Elinor Ostrom (2009) and Oliver Williamson (2009) (Richter, 2005). Coase Theorem suggests as long as the property right is clear and the transaction cost is zero or small, no matter who gives the property right at the beginning, the final result of market equilibrium is efficient and Pareto optimum of resource allocation is realised. (Richter, 2005) Pareto optimality (also referred to as Pareto efficiency) describes a situation where no further improvements to society's well-being can be made through a

reallocation of resources that makes at least one person better off without making someone else worse off (Smith and Swallow, 2013). Specialisation and Transaction Cost serve for foundation for global specialisation (Pareto optimum by international trade), internet services (reduce cost of agents by internet to eliminate unbalanced information) and many new industries. Based on Pareto optimum by international trade, Africa should benefit from the global specialisation with abundant labour with lowest costs and rich endowment in mineral resources and oil reserves. But the reality is opposite.

2.3.1 Late-mover Curse

Most economists believe in the theory of the "late-mover advantage", even if backward countries do not reform their political system and rely solely on learning advanced science and technology, they can achieve modernisation. North defined institutions in 1990: “the humanly devised constraints that structure human interaction, which are made up of formal constraints (e.g., rules, laws, constitutions), informal constraints (e.g., norms of behaviour, self-imposed codes and conduct), and their enforcement characteristics”. (North and Institutions, 1990) Yang puts aside the view "Curse to The Late Comer" to re-analyse the transformation history of the backward countries, which is predictive of Africa and China after 1990. Why is it called "curse"? Because there is a lot of room for late-mover countries to imitate advanced countries, they often choose technologies that are easier to imitate first, but institutional reform is very difficult because it violates vested interests. This approach may bring about rapid economic growth in the short term, but it will inevitably bury significant hidden dangers(Yang and Ng, 2015) .

In the Welfare Economics of Pigou that investment has negative externalities, the separation of private and social costs will cause the market to fail. To reduce social costs, the government should be tax investors ("Pigovian tax"). (Buchanan and Stubblebine,1962) Coase did not agree with the view of Pigou. He believes that as long as transaction costs are zero and ownership is clearly defined, the market will automatically reduce social costs without the need for government taxation. (Richter, 2005) Coase’s idea proved not effective and it is difficult to achieve the situation that transaction costs are zero in Africa. Long-term power rent-seeking, government corruption and protracted conflict confined the late comer advantage of Africa. “All subsequent regimes, military and civilian, have been pervaded by corruption. Aided and enhanced by oil revenues, this has created a deepening crisis of kleptocracy, shown in is most extreme form since 1984. It results in a combination of scandalous wealth among the ruling class growing poverty, misery and degradation among the mass of Nigerians” (Osoba, 1996) . Amazingly, in oil-rich Nigeria, most people still do not have access to electricity. This economic model, which relies heavily on oil rent, is obviously not conducive to the sustained and healthy development of the national economy and has a high risk. In many Africa countries, political allocation of rich endowment in mineral resources and oil reserves has long led to power rent-seeking, government corruption and protracted conflict. “Nigeria has become a typical "distributive country" rather than a "productive country". Through a series of power rent-seeking

activities, multinational oil companies have made Nigeria's government regulation a prisoner of the will of multinational oil companies". (Piao, 2017)

"Africa's current comparative advantage as a primary commodity exporter is reinforced". Although a growing body of literature reflect Africa's rise, we must critically examine "whether or not some of the recent upturns in economic fortunes on the continent constitute a definitive break from long-term relationships of dependency and the recurrent crises afflicting many of Africa's states". (Beresford, 2016) The rise of Africa is based on an "intensification of resource extraction whilst dependency deepens, inequality increases and de-industrialisation continues" (Taylor, 2016) . The current model failed in the development of industrialisation making Africa part of the global production chain. Instead, "Africa's current 'comparative advantage' as a primary commodity exporter is celebrated and reinforced" (Taylor, 2016). Nigeria is a typical example of the "resource curse" predicament. The development of non-oil industry lags behind, and the incidence of poverty remains high. In the process of globalisation of Nigeria, transnational oil companies only focus on seising more economic benefits, seriously ignoring the contribution to local economic development. The newly created oil wealth has been accompanied by shrinkage in other sectors of the economy, leading to increased poverty, especially in rural areas. Large-scale investments by multinational oil companies have not improved the living standards of ordinary Nigerians. Therefore, the welfare state policy without the support of the colonial system is unsustainable. Neo-liberalism policy followed, trying to create a more convenient investment environment for capital. One of its measures is to depress the labour remuneration of both local and developing countries (Hang, 2013) . In conclusion, industrialism in globalisation has had little positive impact in improving local industry capacities and production structure and technology transfer for modern Sub-Saharan Africa.

2.3.2 Social Structure

High-tech revolution has greatly facilitated the global flow of resources. The development and application of the Internet and artificial intelligence are driving fundamental changes in the world economic environment and activities, and the realisation of digital transformation also puts forward a change request in the social structure.

The traditional social hierarchy is maintained in developing new Africa economy. The most striking example is the tribal system, where the colonial rulers even created many new chiefs and ethnic groups out of the need of their rule. "Most of the African colonies were far from solving the problem of reforming (old) social structure".(Fieldhouse, 1983) Western colonists still consciously avoided touching the traditional social structure in the 1950s, new economic interests were distributed according to the traditional social structure. Currently, coupled with the improvement of the quality of the labour force required by the new technological revolution, the phenomenon of large-scale unemployment coexisting with the increase in high-wage jobs has emerged in the world, which makes contradictions between rich and poor and ethnic contradictions more closely intertwined. "A historical of South Africa's system: 1652–1994, traces how a form of entrenched oligarchic rule was

established by an English and Afrikaner elite who developed conglomerates in the fields of mining, finance and manufacturing. Such class power, however, was only achievable through the establishment of a 'complex' between capitalists and political elites in power". (Beresford, 2016) As a result, the traditional upper-class status has not been shaken, and the situation of the lower-class lacking education and welfare has been rationalised by respecting the slogan of traditional society in many Africa countries.

The development of modern social structure in sub-Saharan Africa has been hindered, because of the lagging construction of modern production structure. "After independence, African nationalist governments tried to eliminate colonial influence by nationalisation from buying capital from colonialists and strive for more funds to ease internal social contradictions". (杭聪, 2013) To eliminate capital and realise capital return, western capital was forced to increase investment in technology for new profit growth points. It forced Africa to enter the non-national economy. The resurgence of colonialism has broken the consensus of African countries since independence that they depend on expanding the welfare of workers to enhance national cohesion. "Many traditional systems are still handed down, and the elements that hinder social and historical development within civilisation are strengthened by colonial rule, which still plays a significant negative role in local life after the end of colonial rule". (Fieldhouse, 1983) The unemployment rate in African countries has risen, the welfare of the employed has declined relatively, and social problems have tended to be acute, which endangers the national consensus.

Brain Drain turns out to be one of the continent's major development constraints leading to the lack of social impetus. The emigration and relocation of these African professionals to the West have resulted in the lack of human resources that are needed for organisational backup. The academic name describing these migration trends is known as the 'Brain Drain'. The concept is defined as the "movement of people especially the most skilled and competent individuals or labour from the less developed countries to developed countries where they believed the returns of their human capital is appreciated" (Adeyemi *et al.,* 2018, *Vol,* 7(2)). The generation and growth of the quality labour is relatively slow in Africa. Johannesburg where I stay in South Africa, used to be called a city of gold with lot of mines. Colonialists fostered constrained work models or mobile work models, which prompted the centralisation of the cutting-edge labourers in the separated mining, agricultural sector and transportation areas. Many people only participated intermittently. The low level of modern education in Africa is another longer-term impact of colonialism. Technical education has been neglected, and it is difficult to meet the needs of industrial development. Meanwhile, Africa's development requires the introduction of many external technicians; many indigenous African personnel have been lost. In 1999, more than 30,000 Africans with doctorates lived outside Africa. (Carmody, Pádraig, 2017) This situation results in the lack of a quality labour and the social impetus for historical progress.

2.3.3 Economic Foundation

After World War II, it is generally agreed that developing worlds that developed capitalist countries still maintained an unequal international political and economic order by new colonialism, which affects the economic foundation of Africa negatively.

Modern economy never exists when African countries became independent. After decolonisation, capital that returns to developed areas is used to strengthen the technological innovation, develop domestic markets and support welfare state policies, to smooth domestic contradictions. However, "capital relies on colonialism acquired profits by using super-economic coercion, not by economic methods, new production structures and corresponding systems". (Carmody, Pádraig, 2017) First manifestation is that the investment structure of colonial suzerain is unreasonable and the amount is small. Among the colonial suzerain countries, Britain is the most invested country. From 1870 to 1936, the total private investment was mainly invested in the mining industry. The export value of mineral products exceeded 67% of the total trade volume of the mainland, and 546 million of public investment was concentrated in mining production areas, mainly in the management and transportation infrastructure needed by the mining industry. (Frankel, 1938), the globalisation led by the West has separated capital and labour from each other worldwide. "With transnational corporations expanding and international capital alliance of powerful countries growing, the labour forces of national countries in Africa are in a more disadvantageous state". (杭聪, 2013) One important result of the disadvantageous state is the phenomenon of unemployment and poor quality of labour in Africa. "Youths account for 60% of all Africa's jobless. In North Africa, the youth unemployment rate is 25% but is even greater in Botswana, the Republic of Congo, Senegal, and South Africa, among others. With 200 million people aged between 15 and 24, Africa has the largest population of young people in the world". (Kingsley Ighobor, 2017)

The colonial structure redistributes resources within the agricultural sector and concentrates in the export sector, leading to unreasonable industrial structure. Industrial structure of Africa mainly covers the export of single agricultural and mining products. In addition to the abovementioned mineral exports, the colonial structure redistributes resources within the agricultural sector and concentrates agricultural production resources in the export sector. "One consequence is the persistent famine in Africa, while the second consequence is that economic growth does not lead to employment and productivity improvement. The third consequence is to lay hidden dangers for the development and stability of Africa today". (Zheng, 2000) The dual agricultural sectors left to Africa by colonialism (commodity agricultural production under the system of large-scale land ownership and subsistence agriculture under the system of small-scale land ownership) still affect the development and stability of Africa today. Therefore, the situation in some Africa countries like Zimbabwe has changed dramatically. "The right to decide the price of African products is controlled by the West, which often leads to violent conflicts in African society". (Carmody, Pádraig, 2017) Simultaneously, the links between various regions of Africa and the globalization of colonialism have resulted in the destruction of regional trade. A new trade route has been established, which never serves the major population

and economic centres. It is designed to transport minerals and agricultural products to the host country in the fastest and cheapest way. All railways, highways and waterways lead straight to the sea without road construction between adjacent areas.

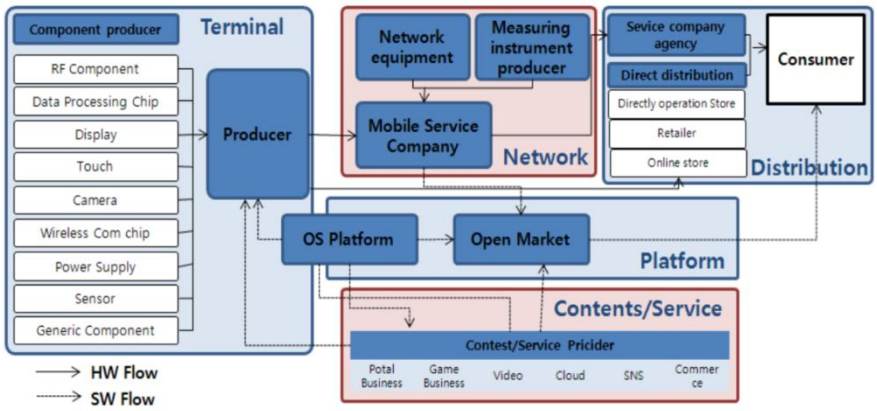

Figure 9 Open Mobile Ecosystem
Source: (Huh, Song and Lee, 2014)

2.4 Steps into the Future

Carriers keep being told that they must transform networks into a "digital ecosystem" to generate new revenue in the 5G era. To open up, they must give up some end-to-end customer control and to live with some uncertainty about commercial outcomes. It requires an open platform for collaborative value creation with the five key elements, “Value proposition - a company's value proposition consists of products and services that add value to customers. Scope - what activities must deliver the company's value proposition and who delivers them (internal or partner). Profit capture - mechanisms that capture profit from the value proposition. Strategic control - elements that protect profits over time. Execution - operational excellence”. (Bovet and Martha, 2000)

2.4.1 Ecosystem and Value Net

The ecosystem encourages experimentation with new feature combinations and expands the pool of creative talent looking for the next killer application or solution. But to participate in the ecosystem, it is necessary to first consider a unique resource that can be offered and then allow ecosystem member companies access to it.

A net organization is a business structure where employees form small, multidisciplinary teams that work independently to achieve common goals (Indeed, 2022). In this type of model, the organization does not rely on the traditional top-to-bottom supervisory mechanisms. The trade-off for less carrier control in offerings is that third parties can integrate the value of the network to generate revenue without direct involvement of the carrier. The value net behind this is a system driven by customer choice. Value Nets have the following five main characteristics: Customer-alignment, Collaborative and systemic, Agile and scalable, Fast flow, Digital. (Bovet and Martha, 2000) The interaction of nodes of the value net is neither through market transactions nor through the internal integration process.

Instead, it is done through coordination between organisations where enterprises can obtain resources through the net to achieve their goals.

In management view, the network is composed of clusters of special units integrated through the mode of non-traditional organisations through market mechanisms. (Snow, Miles and Coleman Jr, 2000) The network is a long-term arrangement established by different profitable organisations to obtain or maintain competitive advantage, which is characterised by multiple connections between enterprises through cooperation and mutual long-term responsibility. (Stabell and Fjeldstad, 1998) To achieve the strategic goals, the members of the network form a net organisation with complementary advantages, shared risks, and multidirectional flow of elements through various linkages (such as contract, equity, etc.). An important goal of establishing an alliance-type network organisation is to incorporate companies with a strong degree of interconnection into the network that constitutes a group of companies, so that they can create benefits higher than the cost of capital through synergies.

In economics, net organisation is a self-contained structural state between hierarchical and market mode. It can solve the problems of internal organisation failures and external market failures. Simultaneously, it places great emphasis on the collaboration and innovation characteristics of network organisation elements and the goal of multi-win. It can promote the development of organisation members inside and outside the network organisation, and can help solve the problem of organisation survival cooperation. A networked organisation is a consortium composed of multiple independent individuals, departments, and companies for common tasks. Its operation does not rely on traditional hierarchical control, but on the basis of defining member roles and respective tasks. "Through intensive multilateral ties, mutual benefit and interactive cooperation to accomplish common pursuit. Driven by a dynamic and knowledge-rich environment, the hierarchical organisations are disaggregating into various network forms, including internal networks, vertical networks, intermarket networks, and opportunity networks". (Achrol and Kotler, 1999, pp. 146–163) The basic constituent elements of the network are numerous nodes and the interrelationships between nodes. Simultaneously, through intensive multilateral contacts and full cooperation, it reflects the adaptability and flexibility, thereby enhancing the network organisation's ability to adapt to unstable environments, and to respond quickly to needs.

In social views, "issues of trust, partner selection, knowledge transfer through co-operative complementarities and synergies between partners have dominated the scientific discourse". (Chaharbaghi *et al.,* 2005) Definitions given above from different angles indicate that the basic elements of identifying network organisations are obtained: 1 Common purpose. It is the common purpose to enable separate companies to join the network. 2. The high degree of complementarity. Each network member has its own advantages and expertise, and complements each other, ensuring the overall competitive advantage of the network. 3. The relatively stable cooperative relationship. Cooperation is the main contact method within the network organisation. It is built on the basis of mutual trust, where partners believe in the strategic information provided by each other and believe

that each partner can provide high-quality products. The aggregation of assets or operating capabilities that cross the boundaries of ownership means that two or more parties participate in the control of the business process and share the benefits of professional aggregation.

2.4.2 Social Net

With the rapid technology change, disruptive innovation makes it difficult for companies to maintain long-term stable competitive advantages.

"Social network is a relatively stable system composed of social relations between certain individuals or organisations as a series of social ties that connect actors. Their relatively stable model constitutes the social structure". (Wellman and Berkowitz, 1988) Social trust was proposed by the political scientist Robert Putnam. (Tarrow, 1996) Tarrow points out that Fukuyama believes that the level of trust in a country with sustained economic prosperity is relatively high. (Tarrow, 1996) "Corporate social capital is defined as processes of forming and mobilizing social actors' network connections within and between organizations to gain access to other actors' resources". (Knoke, 2009, p 1690) It also exists at the interorganisational level of analysis, consisting of the resources controlled by the members of an organisational field connected through sets of multiplex exchange and collaborative relations (Knoke, 2009). The social capital directly affects the opportunity of knowledge transfer, and the structural latitude of social capital through the relationship and cognition.

Social network theory provides a comprehensive explanatory method in the alliance within immature free market, arbitrary governance, limited trust and low level of human resources. "The success of strategic alliances is mainly affected by two major conditions: structural factors and social psychological factors. Structural factors include resource combination, social compatibility, and governance mechanisms, while social psychological factors mainly refer to alliances' relationship capital" (Bao and Wang, 2004, p 10) . The emergence of social network theories and methods can respond to the above-mentioned situations. First, shift of research content from focuses on the factors of alliances and their members to overall factors such as the micro-enterprise conditions, meso-level industrial conditions, and macro-social economic environment in which the alliance is located. Second, the research on alliances has risen from individual and bilateral relationship levels to the network level. "Since the 1990s, scholars have gradually realised that the research on enterprises based on social network theory has a strong explanatory power". (ZHAO, WANG and ZHOU, 2012) Social psychological factors facilitate the understanding of value creation in Africa. The long-term research in the field of strategic management is mainly based on the resource-based view, and it has paid close attention to the various resources and capabilities within the organisation. "The strategic network perspective believes that a company or organisation is embedded in a network composed of a series of external relationships, and this embedding has an important impact on organisational performance". (Zaheer and Bell, 2005) Simultaneously, in the network economy environment, the economic logic of increasing marginal returns has changed the value creation system of the entire society, and the separation of value creation and value realisation has made the value network of

digital players begin to restructure, which is a new business at the microlevel. Participants must implement product innovation, service innovation, and management model innovation to adapt to the dynamic and complex changes in the environment.

2.4.3 Distinctive Competence

The concept of value chain of Michael Porter reflected the contemporary US background and industrial structure in 1980s, which was “fit for the evaluation for traditional production companies where efficient cost was an important goal. However, there is a limitation that entrepreneurial activity, an important factor in competitive advantage acquisition, is excluded”. (Huh, Song and Lee, 2014)

Organisational ability can be obtained through continuous investment in production and management activities. In 1990s Alfred D. Chandler told us that the West has been maintaining a balance between economies of scale and economies of scope. (Chandler, 2009) He extended his research vision to the global field and put forward the concept of "organisational capability". Only when enterprises acquire strong organisational ability, can they establish strong entry barriers in market competition or break through the entry barriers established by pioneers. Once an enterprise acquires this organisational capability, even if it temporarily loses its market due to war and other reasons, it will quickly regain its market share in the short term.

Comparative advantages about natural endowments play a diminishing role in the digital age. Economies of scale explain the comparative advantages, while economies of scope elaborate the competitive advantages. For industries that emphasise the comparative advantage, the theory of economies of scale does have its importance according to Michael Porter. However, it does not answer the question of a competitive advantage. The competitive advantage is the antonym of the comparative advantage in Porter's terminology, which he calls a national competitive advantage. (Cho and Moon, 2000) Porter believes that the comparative advantage focuses on production factors and endowments. That is, a country's natural resources. However, “competitive advantage depends not only on factors of production but also on external demand, related industries, strategies and other comprehensive factors”. (Cho and Moon, 2000) The theory of the comparative advantage generally holds that competitiveness mainly comes from the input of material endowments, such as labour force, natural resources, financial capital, and so on. But these input factors play an increasingly diminishing role in the rapid development of globalisation today. The competitive advantage emphasises the economic development mode of industrial clusters and resources.

A distinctive competence is higher requirement than a core competence. A distinctive competence is a competitive valuable activity that company performs better than its rivals (Peteraf *et al.,* 2015). The competitive advantage acquisition is a key issue for carriers in emerging market. The success of Africa carriers depends not only on the company or the industry but also the value-creating system itself. “This implies also being able to monetise, from a business standpoint, the overall experience and capacity of the network and organisation”. (Wavelet *et al.,* 2016)

2.5 Chapter Summary

Defining digitalisation is the key to concept understanding. Therefore, the main findings on the concept of digital transformations are first explored, including digitalisation, transformation, optimisation. “Digital transformation is a Taking advantage of digitalisation to create completely new business concepts”. (Irniger, 2017) “At a high level, digital transformation represents a thorough reflection on how technology can fundamentally change performance”. (Westerman, 2011) I prefer that “digital transformation is the application of digital capabilities to processes, products, and assets to improve efficiency, enhance customer value, manage risk and uncover new monetisation opportunities". (Schmarzo, 2017) However, the digital transformation is different from pure use of digital tools to "improve" productivity to facilitate the generation of existing revenue streams and enhance customer experience. It requires “cross-cutting organisational change along with the implementation of digital technologies” (Bumann and Peter, 2019, p 31). It is a comprehensive system to assure the sustainability of people and collective goals or objectives of an organisation.

Then, digital technology is seen to be making its way into every aspect of life around the world. There is no exception to carriers in Africa. The degree of marketisation in Africa is far from enough to support the industrial economy. "Agenda 2063" is "The Africa We Want", which has seven visions and a grand blueprint for Africa in 2063 to build a prosperous Africa based on inclusive growth and sustainable development (AU, 2017). African countries have increased their investment in digital infrastructure. In 2016, the committed investment of the African continent in ICT infrastructure was US $1.7 billion, which soared to US $7.1 billion by 2018 (Piao, 2022). The development of digital technology is providing technical support for upgrading of industries. This tremendous change is occurring within the organisation, emphasising changing existing models and enhancing customer experience. The construction of ICT requires sustainable investment of carriers from wireless network (4G, 5G), national backbone network (fibre and undersea cable), data centre and cloud computing clusters. Rapid youth population growth in Africa provides impetus for developing digital economy when the "Silicon Valley Network" launched on the African continent has achieved initial success.

It is not enough for Africa carriers to rely solely on data. Digital services are seen as the sources of the potential for growth, but the current revenue structure of Africa carriers is unreasonable. The disruptive nature of digital propels carriers to invest in customer experience and embark on the path towards transformation. The competition makes the development of technological performance faster than what user needs. (Christensen, 2017) The competitive basis of the market will shift to other aspects that were neglected in the previous stage, such as response speed, convenience, degree of personalisation, or price. Furthermore, a customer-centred approach relies on new value creating process instead of distributing system in old thoughts in the value chain. More and more people realised that without creating new value, it is a zero-sum game in fighting for limited existing value in the market.

Safaricom is a leading communications provider in Kenya and the case of M-PESA is well recognised globally as a typical success. M-PESA was launched in March 2007 and has since been used by more

than 23 million people in Kenya. Here, the innovation comes from a more localised, user-centred context and related technological changes, which facilitates a local ecosystem. M-PESA boosted the development of e-commerce and facilitated operations for thousands of small businesses, online and offline (Jelassi and Martínez-López,2020). Finally, the richness of services creates unique user experience and retain users in the price war. As a result, the business landscape is extended into comprehensive finance with complementary relationship with local banks. Simultaneously, business driven IT capabilities escalation to the next-generation ensures long-term customer experience. "M-PESA's success cannot be boiled down to any one specific factor. In fact, it is consistency among the elements of the customer proposition and Safaricom's attentive monitoring of the entire system that best explain its success".(Lal and Sachdev, 2015)

MTN Group is another example, who aspires to transform from a communication service provider to a digital service provider. MTN is a mobile only operator. Leadership team and continuous investment are the core elements driving transformation. Meanwhile, the emergence of digital service innovation serves a path to a business transformation. As a digital operator, MTN has adopted a three-pronged business models that encompasses "(1) the evolving telco focused on traditional telecom services, (2) the digital operator geared towards emerging digital platforms, and (3) the Fintech player advancing mobile financial services". (MTN, 2019) Finally, cooperate culture and content services and IT-based platforms ensure digital activities in an interface with customer demand.

Next, I come into the evolution of the business theory about digital, examining the theories of innovation, knowledge, absorptive capacity and digital maturity frameworks. Innovation is the first key concept. "The process of innovation must be viewed as a series of changes in a complete system not only of hardware, but also of market environment, production facilities and knowledge, and the social context of the innovation organisation". (Kline and Rosenberg, 2010, p 173) In Economics, innovation is the introduction of technology into organisations to form new economic capabilities. Furthermore, in Africa industrial structures shifts from integration to modularity. Knowledge is the second important factor, which is treated as public goods in economics. Once produced, producers can't decide where it goes and who gets it. Nonaka puts forward the "SECI model of knowledge dimensions" that is a model of knowledge creation that explains how tacit and explicit knowledge is converted into organisational knowledge. (Krogh, Ichijo and Nonaka, 2000) Meanwhile, imitation and frequent flow of technical personnel drive innovative knowledge to spread rapidly. Absorptive capacity is another key element for undeveloped countries. Transformation is not a step after assimilation, but represents an alternative process. Consequently, it suggested that the neat distinction between potential absorptive capacity and realised absorptive capacity does not hold anymore (Todorova and Durisin, 2007). Therefore, dynamic capabilities of transformation require adapt, absorptive, renewal, and reconstruction capabilities. Digital Maturity Frameworks are the fourth focus in the business theories, which can assess the effectiveness and navigate digital changes. Valdez proposes the digital maturity model offering a structured view of digital transformation specific to the context and challenges of the telecommunications industry to benchmark themselves

against peers or them. Huawei believes that user experience is the goal and touchstone of digital transformation and summarises the best digital customer experience into a ROADS model (Real-time, On-demand, All-online, DIY, and Social).

After that I also note that the socio-economic background of digitalisation cannot be neglected. Digital transformation is not a pure management or economic question in undeveloped countries. Based on the Pareto optimum by international trade, Africa should benefit from the global specialisation with abundant labour with lowest costs and rich endowment in mineral resources and oil reserves. But the reality is opposite. In my observation, the late-mover advantage only happens in Asia rather than Africa. Long-term power rent-seeking, government corruption and protracted conflict confined the late comer advantage of Africa. Africa's current comparative advantage as a primary commodity exporter is reinforced. Industrialism in globalisation has had little positive impact on improving local industry capacities and technology transfer for modern Sub-Saharan Africa.

The realisation of digital transformation also puts forward a change request in the social structure. It is found that the traditional social hierarchy is maintained in developing new Africa economy. As a result, the traditional upper-class status has not been shaken, and the situation of the lower-class lacking education and welfare has been rationalised by respecting the slogan of traditional society in many Africa countries. The development of modern social structure in sub-Saharan Africa has been hindered, because of the lagging construction of modern production structure. Modern economy never exists when African countries became independent. The colonial structure redistributes resources within the agricultural sector and concentrates in the export sector, leading to unreasonable industrial structure. Industrial structure of Africa mainly covers the export of single agricultural and mining products.

Finally, literatures are studied from recent studies encompassing digital ecosystem, value net, social net, productivity and competence. It is an open platform for collaborative value creation. However, to open up, carriers must give up some end-to-end customer control and to live with some uncertainty about commercial outcomes. To participate in the ecosystem, it is necessary to first consider a unique resource that can be offered and then allow ecosystem member companies access to it. In management view, the network is composed of clusters of special units integrated through the mode of non-traditional organisations through market mechanisms. In economics, net organisation is a self-contained structural state between hierarchical and market mode. It can solve the problems of internal organisation failures and external market failures. With the rapid technology change, disruptive innovation makes it difficult for companies to maintain long-term stable competitive advantages. Social network theory provides a comprehensive explanatory method in the alliance within immature free market, arbitrary governance, limited trust and low level of human resources. Social psychological factors facilitate the understanding of value creation in Africa. The long-term research in the field of strategic management is mainly based on the resource-based view, and it has paid close attention to the various resources and capabilities within the organisation.

Organisational ability is acquired through continuous investment in production, marketing and management. Comparative advantages about natural endowments play a diminishing role in the digital age. Economies of scale explain the comparative advantages, while economies of scope elaborate the competitive advantages. A distinctive competence is higher requirement than a core competence.

Chapter 3: Research Methodology and Design

Chinese philosopher Confucius once argued, is it unpleasant to learn with constant perseverance and application? If a man keeps cherishing his old knowledge, so as continually to be acquiring new, he may be a teacher of others (Legge, 2009), which indicated the value of application of knowledge and defined the research process as a dynamic and updated one in the old times.

If the research process is dynamic, it is impossible that there is a certain path to conclude by a so-called proper methodology. This chapter focuses on 3 questions.

What paradigm is relatively suitable for the research?

Whether the theory adopted is trustful in 3 levels: representative, subjective and saturation.

What is the conceptual framework and research structure and whether it is the relatively appropriate path to address the research questions properly?

3.1 Methodological Fit

The paradigm is a typical western concept. Easterners, Westerners, and Africans all have their own different cognitive habits. In my learning process, the paradigm summarises the good practices in the cognitive process and provides relatively suitable research paths for different issues. Paradigms are of great help to learners. The first question to be considered is which paradigm is more suitable and compatible with my research and myself.

3.1.1 Interpretative Vs. Rationalism

The challenge on the effectiveness of the rationalism and a favour for the interpretative approach, generally originated from scholars from social science disciplines. It is generally believed by paradigm scholars that interpretative is qualitative, while rationalist is usually but not necessarily quantitative. What is more, most researchers now agree that both qualitative and quantitative approaches can contribute to knowledge. “Qualitative research utilises an open and flexible design and in doing so stands at odds with the notion of rigour so important when conducting quantitative research”. (Corbin, 2014) Whether the data and research process are open and flexible are not decided by what approach is used. It is decided only by data itself. For example, questionnaire survey and statistical analysis of responses are generally considered as quantitative approach(Hathaway, 1995), but responses from interviews are considered open and flexible. The questionnaire survey is not suitable for a highly immature and new topic even without a clear unified definition in Africa, therefore my key research inputs are mainly composed of interviews and case studies.

Quantitative research puts things in certainty and freezes up for a moment, and then performs quantitative calculations; while qualitative research uses language and images as a means of expression to track the changing process of events in the flow of time. “Quantitative research starts from the researcher’s pre-set assumptions, collect data to verify it; and qualitative research attaches great importance to the researcher's influence on the research process and results”. (Chen, 2000)

Social phenomena and categories are not only produced through social interaction but they are in a constant state of revision. “A major anti-positivist stance is interpretivism. There is no, direct, one-to-one relationship between ourselves (subjects) and the world (object). In terms of epistemology, interpretivism is closely linked to constructivism. While the natural sciences are looking for consistencies in the data to deduce ‘laws’ (nomothetic), the social sciences often deal with the actions of the individual (ideographic)”. (Gray, 2013) The research in African business cases has a unique context, which is largely unknown to the researcher in western countries. Inquiries into the individuals are of great value under the framework of interpretivism and constructivism. “Constructionism is an ontological position (often also referred to as constructivism) that asserts that social phenomena and their meanings are continually being accomplished by social actors. It implies that social phenomena and categories are not only produced through social interaction but that they are in a constant state of revision”. (Bryman, 2016)

In my research, the version of the social reality is unique, as the Africa society is going through a digital evolution in a rapid pace that is a constant state of revision itself. Therefore, my project will be inductive and mainly qualitative research within the research paradigm of constructivism. To explore social phenomena continually being accomplished by social actors, it is necessary to create understanding step by step to improve my practise rather than prove the unknown hypothesis and even misleading. As the context of the research is complex, an interpretive approach will be adopted, based on the interviews, case studies and observation from insiders’ perspective.

In summary, why do I choose to use qualitative rather than quantitative methods? Here are some of the most frequently given reasons and my responses.

Why Qualitative Over Quantitative Methods	My Responses
To explore the inner experiences of participants	Inner experiences of participants within 4 potential sources of data for this research are as below. • My own practise from my experience • Professionals from both operation and legal field of African Telecom Operator and ICT Companies in Nigeria, South African • Manager in Content Providers, Device Manufactures in Nigeria, South Africa • Former Executives of Leading Carriers and ICT Companies in Africa
To explore how meanings are formed and transformed	The social phenomena continually being accomplished by social actors, it is necessary to create understanding step by step to improve my practise rather than prove the unknown hypothesis and even misleading. Africa is still “digitally immature”, compared to the rest of the world. Western colonists brought language, culture, and democratic systems to Africa, making an immature free market, high transaction costs, and ICT investment-dependent Africa easily affected by the development of mobile Internet mainly dominated by western culture. The concept of

	digital transformation and upgrade of business model of Africa carriers need to be discussed, formed and transformed in practise.
To explore areas not yet thoroughly researched	When I tried to go further to explore more African carriers and their practices, very limited literature was found and few successful cases were identified. The complicity of Africa in economics and socio-culture as well as a unique context in digital transformation of carriers shifted myself from a positivist to a more relativistic view. Digital transformation is a very broad concept combing sociological, management and technology issues, and the studies on the social and value concerning that are more subjective, dealing with the insights and practical experiences that rely on engagement activities with practitioners. The questionnaire survey and statistical analysis is not suitable for a highly immature and new topic even without a clear unified definition of digital transformation in Africa, therefore my key research inputs are mainly composed of 12 in-depth interviews.
To discover relevant variables that later can be tested through quantitative forms of research	Carriers are confronted with unclear business model, technologies with mature and immature solutions, various value propositions, virtual organisational view from both internal and external, capabilities missing for growth and social justice and complementary efforts of different stakeholders. Relevant variables need to be identified and be tested.
To take a holistic and comprehensive approach to the study of phenomena	With 6 years' stay in 4 biggest Sub-Sahara countries and continuous engagement with leading carriers including MTN, Safaricom and Airtel, I am equipped to understand African socio-cultural issues related to digital transformation although I am from a different continent. Meanwhile, there are some similarities in the formation of cultural traditions in the history of Africa and China and so many successful stories of technology absorption and carriers' digital transformations in China. Those also facilities me a local foreigner, to see it in a more comprehensive way.

Table 4 Why Qualitative Over Quantitative Methods

Reasons provided by Strauss and Corbin (Corbin, 2014) , responses prepared by me

3.1.2 Why Grounded Theory

As a professional researcher, my advantage is not at the large-scale investigation and complex calculation at the macrolevel, but in the proper resource that I can assess from my working experience with carriers in Africa. I work as a bridge of understanding between the interviewee and self, between the individual and the context. "Qualitative research is a form of research in which the researcher or a designated coresearcher collects and interprets data, making the researcher as much a part of the research process as the participants and data they provide".(Corbin, 2014) With limited but high quality of interviewees, I am also part of the participants with similar experiences and topics

in common with them. The method must be representative of the small and quality sample population to form the theory I propose. “Quantitative research proves the average situation of relevant social phenomena, so it is representative of the sample population; while qualitative research is good at exploring special phenomena to discover problems or propose new perspectives”. (Chen, 2000)

Grounded theory is a form of qualitative research developed by Glaser and Strauss in 1967 for constructing theory grounded in data. It allows for identification of general concepts, the development of theoretical explanations that reach beyond the known, and offers new insights into various experiences and phenomena. (Corbin, 2014) Due to unexplored literature, limited successful cases and organisational challenges in Africa, this research is an exploratory interpretation based on unknown future and limited known knowledge. Simultaneously, the digital transformation treats digital technology, digital products, and digital platform infrastructure as the foundation, which in turn triggers a process of transformation at multiple levels such as individuals, organisations, and industries. Different scholars have different focus at multiple levels. “The grounded theory approach is suitable for studying the following phenomena: when a specific group of people faces a specific problem, they are promoted or constrained by various conditions, and they take different actions and interaction strategies, resulting in different results and then forming some patterns. The task of grounded theory research is to exhaustively explore all these patterns and form theories from the bottom up.” (Chen, 2000) The relationship between the researcher and digital transformation is unique with different researchers’ background and experience. And up to now, there is no unified definition about the success of the digital transformation. Therefore, instead of a single ‘truth’ in positivism tradition, there are multiple ‘truths’ dependent upon the way we experience reality. Grounded theory makes a special emphasis on improving theory from data, and believes that only through in-depth analysis of data can a theoretical framework be gradually formed. This is a process of induction, condensing data continuously from bottom to top. Different from the general grand theories, grounded theory does not make logical deductions on the assumptions set by the researchers themselves, but conducts inductive analysis from the data and co-existence between researcher and the data. (Corbin, 2014) The theory should be traceable to the original data it produced, and it must be based on facts. (Chen, 2000)

3.1.3 Validity in The Creation of Theory

“Being objective does not mean being omniscient—it doesn’t mean we can know ‘what really happened.’ It means accepting the canons which govern rational inquiry as a basis for realizing conclusions which are reasonable” (Dey, 2003, p 236). Constructivists are not 100% realists; they are purely ontologically relativistic. Researchers from various backgrounds have different views towards the understanding of a topic. There is no total “real” in understanding the related questions. Therefore, the researcher and the researchee set up a mutual-subject relationship, and the research result is a trade-off reached by different subjects through interaction.

There are “four research quality criteria: construct validity, internal validity, external validity and reliability” (Pandit, 1996, p 2).

A checklist indicated (Pandit, 1996, p 2) is double checked by myself is as follows.

Quality criteria	Checkpoint	My efforts
Construct validity	Enhanced by establishing clearly specified operational procedures.	Clearly defined aims and rigidly implemented project activities in Chapter 4.
Internal validity	Enhanced by establishing causal relationships whereby certain conditions are shown to lead to other conditions, as distinguished from spurious relationships. In this sense, internal validity addresses the credibility or "truth value" of the study's findings	Rigid forms of coding enhance internal validity in Chapter 4. Grounding of theory by multiple evidence, social-economical literature, cases study in Africa and 12 local interviews. Involving more than one researcher in the interpretation of findings, hold further discussion with my co-supervisor from Wits University in South Africa
External validity	Requires establishing clearly the domain to which the study's findings can be generalised. Reference is made to analytic and not statistical generalisation and requires generalising a particular set of findings to some broader theory and not broader population.	Theoretically useful cases in Africa. Rigid insider interviewees selection in 3.3.1 My interpretation and personal discretion. Comparisons with similar frameworks of digital maturity in Chapter 2.
Reliability	Requires demonstrating that the operations of a study can be repeated with the same results	Rigid and transparent data collection procedures.

Table 5 Checklist of Quality Criteria of Validity

3.2 Grounded Theory Method

When studying the digital transformation in emerging market countries, the first-hand material comes from people in relevant ICT industries, the insights of whom are totally different from my previous knowledge on digital business. That leads me to adopt a more inductive and interpretive method to explore more unknown knowledge, which I treated known before. This re-knowledge is the real knowledge I want to acquire from the research. Regarding the uncertainty and unknown knowledge of the research topic, if experienced researchers in this industry verify their own hypotheses according to theory, strategy, and viewpoint from digital developed countries, letting the followers and adherents further verified their hypotheses without real clashes and engagements in Africa, they are unlikely to draw satisfactory conclusions. Such exploration into the unknown field without an in-depth discussion,

neither absorb or produce new knowledge, nor conduct conceptual refinement and digestion into a new context, might not be defined as the creation of knowledge.

3.2.1 How to Make Sense of a Living Situation

Grounded theorists believe that only theories derived from data have vitality. “The theory generated from the data is actually the result of continuous interaction and integration between the data and the researcher's personal interpretation. The original data, the researcher's personal previous understanding, and the research results of the predecessors are actually a triangular interactive relationship”. (Chen, 2000) Meanwhile, the data collected in my research is based on the researchers’ personal observations, and at the same time the subject of the study is limited to a specific group, admittedly it is difficult to extend the conclusions in general occasions, and the objectivity of the conclusions is also restricted. Therefore, the discretion and values of researcher myself become the foundation of the empirical knowledge of researchers in professional research. Real failure in practice is the best teacher and unique resource for me in the practices of digital transformation for carriers in Africa. Some leading western ideas, which I took for granted for years fail to match the realities of Africa. Business transformation modes for Africa carriers in my mind are being modified by reality and engagements with the insiders who experience the same pains like me. Several linked elements in the research, including external obstacles in culture and political institutions, organisation boundaries, service innovation, synergies of strategies are deeply discussed and reflected by us as the first-hand input of the research.

The use of relevant cross discipline literature, knowledge and experience can broaden the horizons and provide new concepts for data analysis. In grounded theory, data are collected by various means. “The most frequently collected types are interviews and observations. However, data collection is not limited to these types. Just about any type of written, observed, or recorded material can be used, including videos, journals, diaries, drawings, internal documents and memos, memoirs, Internet postings, and historical records”. (Corbin, 2014) While using predecessor theories appropriately, grounded theory believes that the researcher’s personal interpretation can also play an important role in constructing the theory. (Chen, 2000) Understanding the data is a process of re-knowledge when researchers bring their own empirical knowledge in the engagement of literature and personal judgement. This means was also popular in China thousands of years ago as part of Chinese traditional epistemological culture, during which researchers had developed the habit of asking themselves and being asked, listening to multiple voices, and understanding the interaction between themselves and the original materials and documents. “The procedures can be used to gain new insights into old problems and to study new and emerging areas in need of investigation”. (Corbin, 2014)

I have both tech and management knowledge, with BSC in communications and MBA. The topic discussed in the research is neither a purely tech issue nor a management one, but it requires combined understanding of both management and technology knowledge. Technological innovation

might drive social innovation to ultimately solve the problem of development in Africa. Based on my unique background I treat that the role of innovation is not only the motive force of business innovation, but also the motive force of social innovation. Although carriers are not in the dominant position in the industry, the social and political environment were different because of historical and geographic reasons.

3.2.2 Serendipity, Verification

Most writing on sociological method has been concerned with how accurate facts can be obtained and how theory can thereby be more rigorously tested. (Glaser and Strauss, 2017) "Grounded theory methodology is marked by differences of opinion and divergences in paradigms, philosophies, genres, approaches, and methods and that variations in grounded theory interpretation are the subject of ongoing debate". (Ralph, Birks and Chapman, 2015) Two questions are discussed below to further understand the how interpretation and re-knowledge can be achieved.

Should question be formed before data collection and analysis? "Researchers can have general research topics, but must not have specific research questions set in advance." (Wu and Li, 2020) In this sense modifiability can be seen as a dynamic feature where there is no universal or pre-set means for verification as the topics and input keep changing. Meanwhile, empirical research itself does not produce theories, it is used to verify theories, and theories are obtained through the serendipity of the researcher. (Merton, Merton and Barber, 2004) Under the trend that the variable paradigm gradually dominates, a common problem has emerged in American sociological research, that is, the separation of theory and experience. (Wu and Li, 2020) Professional researchers' own insights and experience can make up for the influence of paradigms and variables from the same source. It can also be regarded as a mysterious force in the research, which has been pulling research to stay in the original direction. If scholars who engaged in empirical research in sociology have to only verify theories, and the theories to be verified are provided by specialised theoretical workers, this will inevitably lead to dual opposition between theoretical research and empirical research.

Whether the research sample should be typical and representative? Verification of theory is the keynote of current sociology. (Glaser and Strauss, 2017) Kathy Charmaz, the proponent of the grounded theory of constructivism, proposed to re-examine and develop grounded theory. In her view, Glaser, Strauss, and Corbin belong to the positivist methodology camp, who all try revealing the truth of the world through research. But from a constructivist standpoint, any theoretical form provides an explanatory image of the world being studied, not the actual face of the world. (Wu and Li, 2020) Charmaz has said, "striving for a representative sample is often something that I argue against, unless it is necessary for the particular problem you are studying". (Puddephatt, 2006)

3.2.3 Saturation, Modifiability

Does theoretical saturation exist? As a criterion for determining when to stop sampling, "theoretical saturation refers to the moment when additional data cannot be obtained to allow the analyst to add a specific characteristic of development. Theoretical saturation is usually obtained by alternately

collecting and analysing data". (Glaser and Strauss, 2017) Theoretical saturation is often difficult to grasp when the development of the category can be stopped and too much coding process of procedural grounded theory suppresses the creativity of researchers. If the main analytical thinking of grounded theory is comparison, when the comparison between data and data, theory and theory is constantly carried out, the relevant categories and theories are extracted based on the correlation between data and theories. Because of its attributes, the process is endless. The difference between professional research and academic research, is that professionals believe that the degree of theoretical saturation is hugely different and is affected by personal subjectivity and empirical knowledge. Ideal saturation status never exists and the tolerance of ambiguity is the ultimate status in the research.

3.2.4 All is Data

All is data. (Glaser and Strauss, 2017) Except Interview materials, there are observation records, memos, magazines, books and newspaper articles, research documents, opinions, and historical information to be used. "Everything is data", whether the data is vague, basic, appropriate or explanatory. (Glaser and Strauss, 2017) My working experience in the digital transformation also facilitates myself to go into the main carriers and the related people and share the experience globally. In this process, there are multi-disciplinary studies including economics, management, sociology and information science, as well as many public reports of ICT companies like Huawei ZTE and Ericsson, policymakers from government and industry to be digested.

My personal life experience enriches the understanding of the research. I am a practitioner in Africa with both carrier and multinational ICT enabler background in the past 14 years. It is my dream to bring digital to people, homes and organisations for better connected, intelligent Africa. I have both tech and management knowledge, with BSC in communications and MBA. The Chinese story I experience towards technology and economic independence also provoke some of my thinking into the issue. From tech independence China's story, I hold the hope that Africa get self-reliant, local people enhance the value of African resources, cultivate local development capabilities and entrepreneurship.

3.3 Research Design

The methods of analysis will be determined by the questions in the digital transformation of carriers in Africa from my experience. To inquire into the elements of those multilayers in the institutional, social, economic and ideological context, there are some popular paradigms in social research for researchers to get a structured understanding of the concepts and theories have been applied to the topic, the research methods and other information needed. Bryman indicates that "Social research practice comprises elements common to all or at least most forms of social research".(Bryman, 2016) A literature review was conducted to approach the cases to be studied, go into concepts and theories into the value chain, value network, social net, social capital, transaction cost, business model and digital transformation with the African context; clarify research concepts; sample cases. I will

elaborate the plan to do data collection and data analysis; and then finish a writing-up of the research finding in this part.

The data collection and analysis of grounded theoretical methods are carried out simultaneously or continuously, the researcher should follow the temporary conclusions obtained during the research process as a guide, constantly review the abundance of data reserves, continuously adjust the focus of the analysis, and continue to conduct the data in supplementary work. (Glaser and Strauss, 2017)

My interviews are divided into 2 parts as shown below.

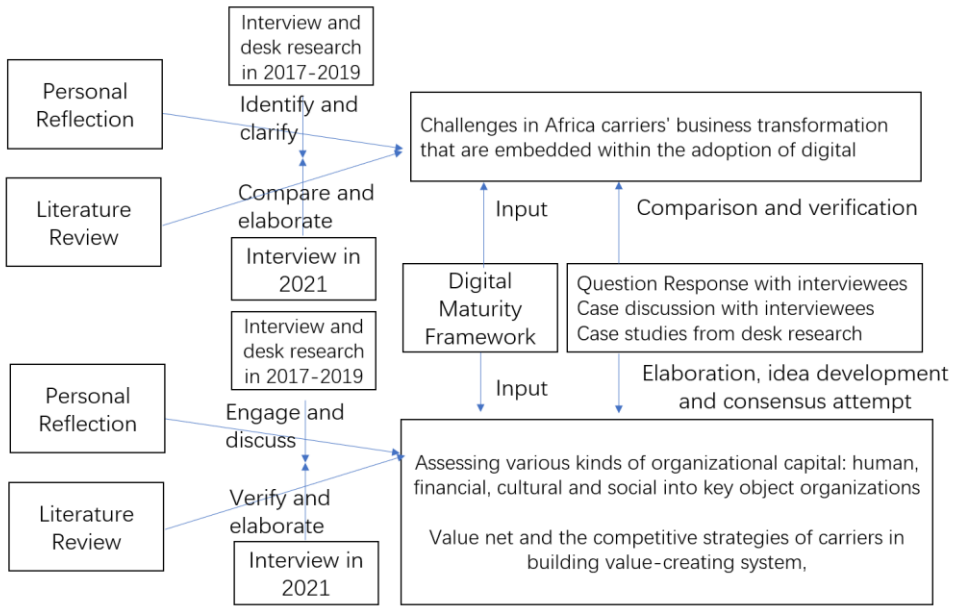

Figure 10 The Research Design Map

3.3.1 Interviewees Selection

"A research design relates to the criteria that are employed when evaluating social research. It is, therefore, a framework for generating evidence that is suited both to a certain set of criteria and to the research question in which the investigator is interested". (Bryman, 2016)

4 potential sources of data for this research are as below.

- My own practice from my experience
- Professionals from both operation and legal field of African Telecom Operator and ICT Companies in Nigeria, South African
- Manager in Content Providers, Device Manufactures in Nigeria, South Africa
- Former Executives of Leading Carriers and ICT Companies in Africa

I invited participants who have relevant experience in digital transformation in several countries. Recruitment of Interviewees are divided into 3 groups

Research group 1 is with practitioners from Telcos who:

- More than 10-year work experience with at least 2-year experience in digital business

- From various typical carriers
- From a range of ethnicities
- Have strong willingness to speak
- Work under ethical standard

Research group 2 are with practitioners from ICT and Content providers who:

- More than 10-years work experience with at least 2-year experience in digital business
- Have engaged in various African regional content
- From a range of ethnicities
- Work under ethical standard

Research group 3 are former Executives of leading carriers and ICT Companies in Africa:

- Former Executives with more than 20-year of work experience
- Have cross African regional experience and insight
- Used to lead business change in Africa
- Work under ethical standard

Field	Number	Experience
Content Provider	Int4	Mgt. 15+ year experience in digital industry in Nigeria, Ghana, SA, India and Bangladesh. Worked as senior manager in Africa music content provider Spice , etc.
ICT Provider	Int3	Mgt. 15+ year experience in digital industry in Nigeria. Worked as manager in Carrier Bharti Airtel, senior manager in Africa digital service giant M-tech, Digital Cloud Hosting Dept director in ICT Provider
	Int1	Mgt. level. 10+ year experience in digital industry in Nigeria. Worked as multiple roles in digital industry incl. digital solution sales for Huawei Nigeria , etc.
	Int 10	Ex Executive of TOP ICT player in Nigeria and Sub-Sahara
	Int8	20 year mgt. experience in world leading ICT company in SA, marketing, digital and enterprise
Teleco	Int2	Mgt. 10+ year experience in digital industry in Nigeria. Worked as VAS manager in Carrier Bharti Airtel and individual entrepreneur in Digital industry , etc.
	Int5	Digital marketing lead. 15 year experience in carrier, marketing, digital and enterprise
	Int 9	Ex Executive of Top Carrier in MEA
	Int 11	Ex Executive of Top Carrier in Sub-Sahara
Legal and Security Privacy	Int6	Sub-Sahara solicitor of ICT industry with extensive experience in 11 countries in Africa
	Int 12	Chief Security Privacy Officer of ICT company

Incubator	Int7	Expert. 20 year experience in ICT. Biggest VC in Africa digital industry.

Table 6 The Interviewee List

3.3.2 Research Questions Round 1

The project is an in-depth research with qualitative in the digital transformation for carriers in Africa. "Because of the controversy described earlier, qualitative studies may be combined with quantitative ones to increase the perceived quality of the research".(Cooper and Schindler, 2014a)

The research questions focus on three aspects in the digital ecosystem:

1. Challenges in Africa carriers' business transformation that are embedded within the adoption of digital services for carriers in Africa and the methodology of building digital organisations.
2. In Meso and Micros levels, assessing various kinds of organisational capital: human, financial, cultural and social into key object organisations, analysing the impacts on the division of labour within organisational fields and consequences from the societal and enterprise levels.
3. Value net and competitive strategies of carriers in building value-creating system, managing the failure risk, clarifying local strategy and deep insight into collaboration with complementor regionally and globally

Table 7 The Research Questions Category

To address the question properly, some quests are break downed as follows.

Part 1 Challenges of Digital Transformation in Africa

- ✓ 1. What is your understanding of the adoption of digital services for carriers in Africa?
- ✓ 2. Do you think it is necessary to carriers in Africa to adopt some digital services or not in Africa?
- ✓ 3. When the carriers are adopting those businesses, they are experiencing a kind of transformation that we call the digital transformation. What challenges are carriers facing nowadays?
- ✓ 4. What are the organisational challenges concerning the adoption of digital services for carriers in Africa?
- ✓ Or do you think that the internal hierarchical structure within marketing and operations impede the progress of carriers in the business transformation to digital services?

Part 2 Become Digital Organisations

- ✓ 5. According to the challenges, what are the key resources African carriers should put in place to achieve the business transformation from communication services to digital services?
- ✓ 6. What dos and don'ts should carriers take to heart if they want to succeed in the digital business?
- ✓ 7. What is your understanding or definition of digital ecosystem in Africa? Is it similar to the ecosystem in US or Asia? What is the main characteristic of it?
- ✓ 8. What roles did ICT enabler (Eg. Huawei, Ericson and ZTE) play in the business transformation in the eco-system?

Part 3 Establish a More Responsive Ecosystem

- ✓ 9. What steps can enablers take to help carriers in Africa build a more responsive ecosystem concerning business exploitation of digital ecosystem?
- ✓ 10. What impact have Chinese enterprises, like Huawei, made on the economic development of Africa?
- ✓ 11. What are the positive and negative consequences of the Chinese enabler's assistance in the business transformation in Africa?
- ✓ 12. Some best practices proved that the business transformation could be successful. What are the common dominator of successful business transformation?
- ✓ 13. Who would become the dominant players in the digital ecosystem?
- ✓ 14. If the enabler built some competitive advantages in the ecosystem, is it a blessing or curse to Africa carriers?
- ✓ 15. What is your role of individual leadership in the growth of digital ecosystem management?
- ✓ 16. What are the key relationships between the value proposition and value network in Africa?
- ✓ 17. How can an enabler achieve a competitive advantage through the adoption of digital ecosystem management in Africa?
- ✓ 18. What would a sustainable business model look like for an aggregator in Africa?

3.3.3 Further Discussions in Round 2

In the year of 2020 and 2021, after the first draft some writing, 4 in-depth interviews were taken to furth elaborate research with former executives and management from carriers and ICT enterprises.

Part 1 Challenges of Digital Transformation in Africa

- ✓ 1. For Africa carriers, is digital transformation a strategic priority, and if so, why?
- ✓ 2. What are the unique characteristics of the digital transformation in Africa compared with EU and Asia?
- ✓ 3. "What do you think of the culture of Africa and its influence on digitalisation?
- ✓ (Is there is co-called pan Africa culture?)"

- ✓ 4. Do you think Globalisation reinforced or lessened the economic dependence on resources of Africa from the rest of the world?
- ✓ 5. The digital readiness of the African Carriers' markets, as both a possible demand-side driver or inhibitor of the digital transformation, and which of these is it?
- ✓ 6. Socio-political factors also affect strategic business of Africa carriers. Some people believe that better governance model is needed for African governments to propel digital adoption. What is the most urgent task for African governments in digitalisation?
- ✓ 7. Ethics, law, and market mechanisms are three indispensable means for regulating digital business. Which ones have the biggest positive and negative effects on the speed and nature of digital transformation of African carriers?

Part 2 Knowledge and Organisation

- ✓ 8. Knowledge and skills are needed for product development, using the 3rd party tech embedded in the carriers' systems, and systems customisation/localisation. What are the key challenges of the knowledge flows in Africa?
- ✓ 9. "Some obstacles including
- ✓ (1) lack of indigenous skills
- ✓ (2) scar of economic capitalisation
- ✓ (3) challenges in digital planning and government policies
- ✓ (4) absence of basic infrastructure
- ✓ Make digital service adoption in Africa more challenging than other regions of the world. Which element above or new element do you think is most important? "
- ✓ 10. Africa digitalisation is highly reliant on FDI as other EMs, and technology spill-over takes effect differently. How can we improve the effect of technology spill-over with external resources in Africa?
- ✓ 11. "Do you think Africa carriers can fulfil their digital transformation without the required local industry environment in Africa?
- ✓ Or do you believe that the fusion and industry convergence in Africa is a prerequisite for carriers' digital transformation? "
- ✓ 12. Do you agree that technology needs to be locally absorbed, or can African Carriers succeed simply by effectively and "smartly" using technology from other regions?
- ✓ 13. Do you think the ICT investment from China is positive or negative for carriers' digital transformation?
- ✓ 14. Most people think the structure of carrier breeds organisational inertia and decreased the efficiency of the carriers. Do you think digital requires overhauling legacy organisational systems or it is more about incremental internal improvement?

- ✓ 15. Do Africa carriers require radical disruption of the value proposition, especially in seeking growth in enterprise market or just adopting digital tools to better serve the known customers need?

Part 3 Value Net and Competitive Strategy

- ✓ 16. "Some people think that historical failures of innovation have inhibited the need for innovation. Which one do you think is most obvious?
- ✓ (1) Revenue restricts the mode of resource allocation, which makes it difficult to take the initiative to make new breakthroughs.
- ✓ Eg. Carriers would not give up SMS revenue, which leaves space for WhatsApp or other OTTs.
- ✓ (2) Emerging small markets cannot meet the growth needs of Africa carriers, leading to failures in long tail businesses like games, music , etc.
- ✓ (3) New technologies are unpredictable, Africa carriers failed in enterprise market of cloud computing/services, IOT etc. compared with European ones. New technologies that do not satisfy the mainstream market have been abandoned.
- ✓ (4) Processes and values and cannot cope with disruptive changes, where risk management and investment assessment are set only for short-term goals.
- ✓ (5) There is insufficient market demand for innovative products
- ✓ 17. African carriers are seeking global cooperation to extend their value proposition and differentiate. What are the purposes and motives of Africa carriers entering into strategic alliances?
- ✓ 18. What are the driving forces behind this process?
- ✓ 19. How do you distinguish suppliers and complementors in cooperation?
- ✓ 20. Pursuing high business efficiency and high value is a way for Africa carriers to get out of the homogeneous competition. What are the key capabilities do you think carriers should own from a strategic alliance perspective?
- ✓ 21. "A successful network increases knowledge and technology compatibility by breaking through the limitations of a single enterprise's own conditions, utilising complementary resources to adapt and meeting market demand quickly and reducing costs and risks. Among joint venture, equity and nonequity alliances, which one do you think most effective in increasing the competitiveness of Africa carriers in competition level?"
- ✓ 22. Which type of strategic alliance contributes more to competitiveness for Africa carriers to get the rid of resource reliance from developed markets in resource dependence level?
- ✓ 23. How can Africa carriers build partner trust to acquire the right knowledge and safeguard against opportunism?
- ✓ 24. How can carriers reinforce trust relations that allow them to reduce their initial reliance on equity investments and technologies?

- ✓ 25. "Do you think Post-Colonial social net (lack of trust) and western knowledge dominant environment (borrowed knowledge instead of absorbed or original knowledge) inhibits or facilitates knowledge creation in Africa?"
- ✓ 26. What are the most important enablers in transformation of 4 kinds of organisational capital: human, financial, cultural, social?
- ✓ 27. "The value net of carriers inherits the flexibility, innovation, rapid response to threats and opportunities, cost and risk reduction advantages of network organisations. Some characters are found from my research, which one do you think most important and why?
- ✓ (1) Be consistent with broader consideration of customers, especially from rural areas.
- ✓ (2) Cooperation and systematisation with limited investment
- ✓ (3) Agility and scalability with higher requirement of knowledge absorption
- ✓ (4) Fast response with local engagement
- ✓ (5) Digital platforms as medium
- ✓ (6) Value-creation

3.3.4 Case Selection

In-depth interviews and participant observation methods are mainly used in the collection of data. “Social research often does not conform to a neat, linear process and researchers may find themselves facing unexpected contingencies and difficulties”. (Bryman, 2016) In the digital transformation research, there is a prerequisite that few carriers in Africa have successful experience. Therefore, inductive exploration in some cases will be a clue to investigate some key elements of the research project.

A qualitative study privileges uncertainty and exploration into the unknown problems and my professional research in emerging market may raise these bold questions with great uncertainty because of the unstable political, economic and social influences. “As a principle of research, trans-disciplinarity sets out research problems that emerge from practice contexts embedded in multilayers of influences (institutional, political, social, economic, ideological) and which are strongly related to a multiplicity of stakeholders and issues of the `common good’”. (Dikerdem, 2015)

To start this cross-discipline research, the cases shall be selected carefully to obtain some sound and valuable evidence for African digital business. I adopt the following case selection principles:

• Cases with continuous engagement in my practise from typical African countries for 6 years

• Incumbent carriers in Africa

• Cases shall be from African stakeholder’s companies (MTN) instead of foreign stakeholders; telecom operator shall have over 10 years’ experience in Africa market and be among the top 3 by subscribers (Safaricom) in the local market, whose business shall focus on the demand of local people

• Carriers positively engaging in the business transformation, whose digital transformation from concept to practise or business transformation has come to market with continuous improvement and reform

• Synergies with carriers' main business. Digital services are different from carriers' main business scope but should be actively operated with the main voice and data service to increase the synergies of the operators' advantages.

2 carriers' case is mainly discussed in the whole paper. Safaricom, MTN Group.

3.3.5 Interpretive Paradigm

As the interpretive paradigm has been chosen, I treat the Interview and Case Study approaches as my main research methodology to observe and understand my research target. Based on the selection criteria of cases, I will mainly focus the two sides of the cases and topics in the real-life context in Africa using multiple sources of evidence collected in the in-depth interviews in my research.

In the research, individual depth interviews (IDI) have been conducted. The individual depth interviews are all face-to-face interviews and are around 1 h (prescheduled). "Case-study research is not a methodology in itself but an approach that can draw on various methods (qualitative and quantitative, as appropriate) to assemble a single case or small number of cases. Its purpose is to investigate and present an example that is useful beyond its face value, for instance, to draw out points that have potential for wider application or to illustrate problems in policy or practise". (Dikerdem, 2015)

My personal perspective influences my methodological orientation while ethical issues shall also be considered. My project absorbs information from research from trans-disciplines.

3.3.6 Data Collection Method

To generate evidence, data collection is required and there are two important considerations in my data collection. Firstly, the justification of the selection of the cases has been discussed, where cases are determined by the genuine need of the project and based on the ethical principles. Second, the selection of interviewees should be achievable and fair, representing a whole picture of the research.

An exploratory investigation is the form of the research. Interviewing is a widely used research technique that can be adapted to various situations where it is desirable to gain information about people's perceptions, experiences or preferences". (Dikerdem, 2015) To explore the views among participants, I prefer interviews and case studies as the main data collection approach. I also bring in their own knowledge in the engagement of literature and personal judgement to further develop ideas. I have designed a more longitudinal study where the collection of data is regular and repeated, perhaps with the same participants to get an in-depth picture of how the strategy and digital ecosystem evolves over 6 years, as digital transformation is a long and dynamic process, and the changes will take time to develop. The data is mainly from interviews with the industry experience combined with some information from desk research. I conducted face-to-face semi-structured interviews and online video interviews, and recorded the audio information if permitted by the interviewees. The minutes of the interview are reviewed by the interviewee for confirmation if necessary. Meanwhile, there is "variability by examining various different documentary sources that have been or can be used in qualitative research". (Bryman, 2016)

Desk research also proves to be effective. I conduct research with comparison and analysis of open documents. It is easier for me to understand a Telco's annual report and capture-positive and constructive information from a professional perspective. The comparison between different inputs gives a comprehensive insight into the changes in their business transformation.

3.3.7 Coding Method

In the classic grounded theory, the coding process is divided into the following: open coding, selective coding, and theoretical coding. As a research methodology, the core concept and spirit of classical grounded theory is that it emphasises that the formulation of research questions and the formation of theories are a process of natural emergence and discovery, not accuracy and verification. Grounded theory is a conceptual approach, not a descriptive one. (Glaser and Strauss, 2017)
This is clearly descriptive goal - trying to achieve a certain level of precision through direct interactive communication. It is not the conceptualisation goal of grounded theory. Open coding refers to a completely open coding process without theoretical presuppositions. Glaser emphasizes not to label events in advance, but to obtain the internal relations between the data through similar and different methods in the process of constant comparison between the data, to form the category, and then compare the existing literature. And form the core category. (Glaser and Strauss, 2017)
Selective coding means the end of open coding, limiting the scope of the core category and confirming and saturating the core category through further theoretical sampling and data collection. (Glaser and Strauss, 2017) The purpose of theoretical coding is to make the difference between the core category and the general category appear in a concrete form, that is, declarative logic that breaks up the initial coding stage forms a new, coherent and theoretical approach in the form of the core category and the general category. (Glaser and Strauss, 2017)

3.3.8 Analysis and Interpretation

"Qualitative research is a research strategy that usually emphasises words rather than quantification in the collection and analysis of data. As a research strategy, it is broadly inductivist, constructionist, and interpretivist, but qualitative researchers do not always subscribe to all three of these features". (Bryman, 2016) To increase the reliability and validity (defined in 3.1.4) in of assessing the quality of social research, my interpretation shall play a vital role. Meanwhile, the internal reliability can be improved by involving more than one researcher in the interpretation of findings, and I hold further discussion with my co-supervisor from Wits University in South Africa to evaluate the feasibility.
I use "dialogue" to engage in different themes with context. The connections between contexts and comparisons between opinions are a good conclusion during this period. "Because qualitative data derived from interviews or participant observation typically take the form of a large corpus of unstructured textual material, they are not straightforward to analyse". (Bryman, 2016) Then I moved on to the next step: coding the data and generalising to find the theme. "Coding means identifying key categories that sum up what is being said or what has been observed". (Dikerdem, 2015) To code those outcomes from the interview, I paraphrased them, and got common ideas from the raw

transcripts. Then, I examined the notes of the interviews, generalised the key categories and find the common themes.

I identified trends and cross-examine information in many ways, which build a body of evidence to support the cases in the project. “Analytic induction is considered the most general strategy of qualitative data analysis. Analytic induction is an approach to the analysis of data in which the researcher seeks universal explanations of phenomena by pursuing the collection of data until no cases inconsistent with a hypothetical explanation of a phenomenon are found”. (Bryman, 2016) Seeking explanations of the conclusions by proving no inconsistent cases should be done later. I believe this process is an iterative process, and the trends, themes and patterns after the analytic induction support some conclusions well. Some findings were shared by some key participants and in the last round before the final writing up.

3.4 Ethical Considerations

Clearly, this is research involves engaging deeply with business and strategic subjects around Telecom operators, partners and some players under the value chain structure. Considering ethics in the research design, a researcher should think about protecting the rights of the participant, or subject at the very beginning of the project. As a practitioner, it is also my responsibility to protect the culture diversity of Africa. My data was gathered mainly from interviews and observations from the participants, and there are many rights of them to be safeguarded.

3.4.1 Permissions from participants

Most of the participants were from my professional relationship, and I conduct research at the written permission of the participants. I avoided participants with strong interests with me to maintain my integrity as a researcher.

Interview participants may request and receive a copy of the results of the project. “Generally, research must be designed so that a participant does not suffer physical harm, discomfort, pain, embarrassment, or loss of privacy. “(Cooper and Schindler, 2014)

To safeguard against these, I followed three guidelines:

1. Explain the study benefits and background to participants.
2. Explain participants the rights and protections in details and inform them they have the right to withdraw their consent at any stage
3. Obtain informed consent from participants

3.4.2 Privacy

The privacy in my research is sometimes more than confidentiality. “Right to privacy means one has the right to refuse to be interviewed or to refuse to answer any question in an interview. Potential participants have a right to privacy in their own homes, including not admitting researchers and not answering telephones. And they have the right to engage in private behaviour in private places without fear of observation. “ (Cooper and Schindler, 2014)

To respect these rights, I followed the guidelines below:

1. Inform participants of their right to refuse to answer any questions or participate in the study.
2. Schedule field and phone/e-meeting interviews in advance.
3. Value the time for the interviewee and limit the time required for participation.
4. Restrict observation to public behaviour only

When I engage with the participants, I ensured that they have the confidentiality and anonymity, especially those who work in the telecom operators as some of the information concerning the weakness of their organisation in business transformation would be sensitive for their employers in the fierce competition of the regional market.

If some views may be held against them and may be damaging to their employment and promotion prospects, I guarded against this by having different versions. In the public version, sensitive views would be removed.

I shared with the interviewees the conception that the value that would be returned to the participants of my research, as well as those who do not participate, as we may all benefit positively from the findings of my research. All insights shall be presented in a non-identifying way and facilitators have an opportunity to review the written summary before the formal project being written up and shared.

Some of the results of this project might be published but any data included may in no way be linked to any specific participant. Interview participants may request and receive a copy of the results of the project. The data collected was securely stored at my personal storage and was taken care of professionally based my security experience. At the end of the project, any personal information was destroyed, as any raw data on which the results are based.

3.5 Limitations of the Research

The findings of this study must be seen considering some limitations.

3.5.1 Data Availability

As a foreigner in Africa, I may encounter the problem of not being able to reach the most appropriate group of people. To solve this problem, my supervisor and the school has supported me in seeking assistance from local co-supervisor. During the review process, many limitations show up, I focus on some specific short comings to enrich the data and keep updating the relatively satisfactory level. It is unavoidable to redesign or re-architect the research method.

3.5.2 Deviation

Researchers may be biased due to the cultural background and personal ideas. During my interviews with local participants, when it comes to China ICT enablers more answers are positive because of the nationality of myself and my relationship to some interviewees. As the interpretive paradigm is adopted, researchers may direct the materials or results that support their own research insights.

Chapter 4: Project Activity

4.1 Introduction

The principle of grounded theory is that the researcher should have an open mind, constantly compare and analyse the concepts collected from the original data, and discover the inner relationship between them. (Glaser and Strauss, 2017) The biggest difference between the adopted method of my project and the empirical method is that there is no need to make assumptions, and the "preconceptions" of myself can be avoided to the greatest extent.

A crucial foundation for any research project is the setting of the research questions. At the beginning of the research, the questions are not clearly defined. I identified 3 key elements from my experience in the digital transformation of carriers, which are challenges, organisation and ecosystem. Therefore, I divided my research activities into two phases, the first phase research was conducted between 2017 and 2019 in Nigeria, Kenya, Chana and South Africa and the second phase was done in 2020 mainly in South Africa. A pilot test was first conducted in 2017 in Victoria Island, Lagos, Nigeria to detect weaknesses in the design of the questions and adjust the methods adopted in the research. The first interview was used as the pilot test.

The first phase is based on the research questions consolidated from my experience and discussion with my supervisor. The research was elaborated on the basis of the discussion on the following topics including, the adoption of digital services, challenges, hierarchical structure, key resources, dos and don’ts, digital ecosystem, ICT enabler influence, best practices, common dominators of successful business transformation, dominant players, individual leadership, value proposition, a competitive advantage and business model. According to the method of grounded theory, there is not a hypothetical basis in the first phase like empirical research, which allows myself to express the most accurate ideas in labelling and categorisation.

After 2019, there are more inputs from both the coding of the interviews and reading of literature in the 3 years. In the interviews, I also find that it is very difficult for interviewees to answer all those questions. Without a direction in the conversation, I find some answers are repeated and the value of input is decreasing. Therefore, I set up the second phase of interviews in 2020. Meanwhile, I conducted the coding work in 2020 of the first phase inputs, when I began generating a series of more specific and directed questions. Compared with the first phase, many presumed contexts are elaborated and questions are more detailed to avoid broad and repeated answers. Meanwhile, a richer outline was provided for interviewees to pick up the most interested parts for them to answer. The topics are wider, including strategic priority, the unique characteristics of the culture, Globalisation, digital readiness, knowledge and skills, technology spill-over, local industry environment, fusion and industry convergence, organisational inertia, radical disruption, failures of innovation, global cooperation, driving forces, the collaborative or rational advantage, strategic alliance, Cross-organisational systems and Post-Colonial social net.

4.2 Collect Data

The research project of Grounded Theory is a bottom-up process, which begins with observations of the real world and I obtain data from a wealth of real-world inputs. The collection of original data is a complex and time-consuming task for me when I first came to Africa in 2016. To obtain the best rooting effect, a large amount of original data is required from on-site interviews in Nigeria. The purpose of doing this is to get concepts that are extracted from the text, and then similar concepts are grouped into categories. As discussed in the last chapter, through the emergence and gradual comparison and induction of core categories, the core categories are obtained. Domains and the relationship between the categories, and then form related theories.

The main source of the research from the real world comes from two cases described in 3.3.4 case selection and 12 interviewees of insiders. To ensure the smoothness of the research, the interview phase of the research began with a pilot testing. The project process is composed of a detailed methodology, data collection, data analysis and interpretation, writing up the results. A pilot test was first conducted in 2017 in Victoria Island, Lagos, Nigeria to detect weaknesses in the design of the questions and adjust the methods adopted in the research. The first interview was used as the pilot test. Research questions were modified slightly as not well designed or the answers are too broad to the key questions.

Part of the questions and original answers are as below:

A	B
Questions	**Answers**
1. What is your understanding of the adoption of digital services for carriers in Africa?	Haven comes from part of Asia, you would know. Any new technology first comes to Asia, Japan, China, Korea and India and then other countries. Once the technology gets adopted, in half a decade, it will come to Africa. That is how the technology progression has been. We have been living with this situation for quite some time. However, for the past few years /decades China has become more powerful in the BRICS developing nations, (Brazil India Russia and South Africa). South Africa, I mention because it's part of Africa.
2. Do you think it is necessary for carriers in Africa to adopt some digital services or not in Africa?	When telecom came to Africa, it was just voice, sms and games. People didnt get along with it that fast. The progress of getting used to it was very slow compared to the growth in India, UK and USA. The operators became worried and skeptical about launching something new like digital or data services.When these operators were not able to improve, it affected the managers/company's performance. So the operators are really cautious as it gives a risk factor in their mind. So the main challenges are getting the services started or launching the package. They need the confidence to go ahead and with this confidence, we, (the partnering company), gives the boss or operators the go ahead to launch the new service.
3. When the carriers are adopting those businesses, they are experiencing a kind of transformation which we call digital transformation. What challenges are carriers facing nowadays?	So any new technology that first comes into African countries - Haven said that, the challenges we are talking about here include : 1. The resources: the resources can't foresee the future technology. They get behind where the wall is.This is worrisome because to launch something new is difficult as the resources to do this can't be not easy to get
	2. Another important point we failed to mention in the adoption of digital service as you mentioned earlier, is the issue of lack of low cost of smart phones. We have,unlike China, smart phones sold as low 100 or even 50 dollars; technological 4g phones. In digital service you need fast speed, good phones, data etc. Otherwise, you will not be able to install softwear into the phone. With these situations, the industries can't boom.
	3.Another problem is electricity: there is a struggle to have electricity for 10 hours daily which can only be enough for voice calls and when want to listen to digital services, they are worried about charging - which becomes a practical issue. When I asked some people in the mainland like V.I, OBALENDE, or IKOYI which is Lagos area not villages or locally, they will tell you they can't afford electricity for 10hours a day. Rather they spend their money on fuel and diesel which is very expensive.
	All these factors do matter in some way. I;m not saying these are the only factors, but these are part of the important reasons. Electricity is very important because smart phones consume more power.
4.What are the istitutional challenges with regard to the adoption of digital services for carriers in Africa?	My coming to Africa and Nigeria in specific was in 2010 and I have been observing that there are no good human resources and the operators depend a lot on the low standard of these human resources. Lots of the operators used to come to Europe, India, UK and China; and when they came, they would see everything as a new innovation and project into the future without considering the present. On the other hand, lots of Africans travel to the UK, America and Canada for studies and never come back after they get jobs and are paid well. This leads to Africa's lack of good human resources for organizational back-up. This also makes the company/organization depend heavily on

Table 8 A Screen Shot of The Original Answers of Pilot Test

Some changes of questions happened after the pilot test when interviewees have challenges in answering those questions. The main measure I took is to avoid academic terms and broad concepts that make the interviewee free more comfortable, and give more elaboration. Two questions are modified as stated below:

Original question: What are the ***institutional*** challenges concerning the adoption of digital services for carriers in Africa?

Modified question: What are the ***organisational*** challenges concerning the adoption of digital services for carriers in Africa? Or do you think that the internal hierarchical structure within marketing and operations impede the progress of carriers in the business transformation to digital services?

Original question: How can an enabler achieve a competitive advantage through the adoption of ***value net*** management in Africa?

Modified question: How can an enabler achieve a competitive advantage through the adoption of ***digital ecosystem*** management in Africa.

In the year of 2020 and 2021, after the first draft some writing, 4 in-depth interviews were taken to furth elaborate research with former executives and management from carriers and ICT enterprises. Compared with the first phase, many presumed contexts are elaborated and questions are more detailed to avoid broad and repeated answers.

Example 1: Most people think the structure of carrier breeds organisational inertia and decreased the efficiency of the carriers. Do you think digital requires overhauling legacy organisational systems or it is more about incremental internal improvement?

Example 2: "Some people think that historical failures of innovation have inhibited the need for innovation. Which one do you think is most obvious?

- ✓ (1) Revenue restricts the mode of resource allocation, which makes it difficult to take the initiative to make new breakthroughs.
- ✓ Eg. Carriers would not give up SMS revenue, which leaves space for WhatsApp or other OTTs.
- ✓ (2) Emerging small markets cannot meet the growth needs of Africa carriers, leading to failures in long tail businesses like games, music, etc.
- ✓ (3) New technologies are unpredictable, Africa carriers failed in enterprise market of cloud computing/services, IOT etc. compared with European ones. New technologies that do not satisfy the mainstream market have been abandoned.
- ✓ (4) Processes and values and cannot cope with disruptive changes, where risk management and investment assessment are set only for short-term goals.
- ✓ (5) There is insufficient market demand for innovative products

Meanwhile, based on the fact that the interviewee cannot answer or some of them are not willing to answer all questions, a richer outline was provided for interviewees to pick up the most interested parts for them to answer. In addition, questions were sent to interviewees 5 days before the official interview day. More in-depth data was collected in round 2 as supplement input of the writing.

4.3 Process Data

As indicated in Chapter 3, the coding process is divided into the following: open coding, selective coding, and theoretical coding. (Glaser and Strauss, 2017) The methodology reminds me of maintaining sufficient attention to the emerging data so that the I can keep an open mind to the concerns of the research object, rather than my own professional problems, as one of the basic conditions for a grounded theory researcher. Abstract concepts are not limited by time, place and people.

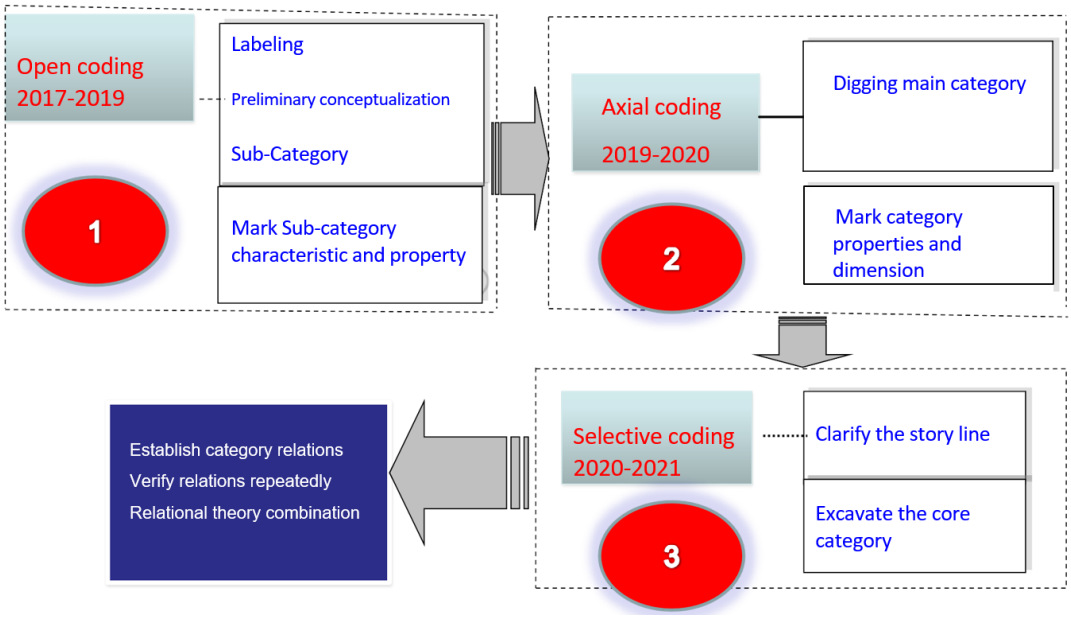

Figure 11 The Coding Process from 2017 to 2021

4.3.1 Initial Coding

Open coding has been done since 2017 as a process of breaking up the original data, giving concepts, and recombining them into concepts. 161 themes were identified from my first round of open coding before 2019.

After the preliminary data collection is completed, it is necessary to conduct data processing and analysis through substantive coding timely, which is the key and basic link in constructing a theory, which includes two major steps: open coding and axial coding. When I did the open coding, I tried to code data line by line, conceptualise and abstract it layer by layer, and breaking, smashing and re-synthesize the data and abstracted concepts through constant comparison. This process lasted for 4 years and the modification never stops. During this process, I tried preventing any preconceived codes and make myself remain completely open until the second round of interviews in 2020. I compared the similarities and differences of the data, and conduct theoretical sampling according to the concepts and categories that have emerged to determine what data to collect further and where

to collect in round 2. Even during 2017 to 2019, after collecting the data, compare the new data with the original data and the concepts extracted allowed me in further comparisons with categories.
The labelling process is actually the key refinement of the data, and the original sentence is compressed into keywords. Categorisation is the grouping of identical or similar labels to further abstract. In fact, the process of categorisation is iterative, and when there is no similarity or identity between categories, the main category of the data is obtained. This continuous analysis and comparison lead to the development of core categories, and then to the stage of selective coding. The result of this process is to discover the core category. It is important not to label events in advance, but to obtain the internal relations between the data through similar and different methods in the process of constant comparison between the data, to form the category, and then compare the existing literature etc. to form the core category. (Glaser and Strauss, 2017)

4.3.2 Selective Coding

Selective coding began in 2020 only after I identified a potential core variable at the end of 2019. By focusing on the core and other related categories, subsequent data collection went very smooth after the first few interviews in 2018.
Selective coding means the end of open coding, limiting the scope of the core category and confirming and saturating the core category through further theoretical sampling and data collection. (Glaser and Strauss, 2017) Around 26 main categories were further concluded after the open coding. The purpose of the theoretical coding is to make the difference between the core category and the general category appear in a concrete form, that is, declarative logic that breaks up the initial coding stage forms a new, coherent and theoretical approach in the form of the core category and the general category. (Glaser and Strauss, 2017)
Through repeated inspection of the obtained concepts and their categories, this paper finally abstracts 161 themes and 26 categories from the data. Due to the large number of concepts and their overlapping, category is the reclassification and integration of concepts and has become the focus of subsequent research excavates 26 categories (G1 ~ G26), which are the Cultural Hindrance, Inhibited Knowledge Creation, Reactive Innovation, Indigenous Skills, Resource Dependence, Institutional Weakness, Absence of Infrastructure, Bureaucracy and Legacy System, Innovation Negativity Bias, Obedience Culture, Depressed Demand, Confluence of Business and Policy, Digital Spill-Over, Technology Application, Education and Trust, Absorptive Capability, Costs of Institution, Responsiveness Agility, Collaboration, Individual Empowerment, Openness Culture, Africa Value Net, Value Proposition, Core Competences, Incubation and Co-Value Creation.
Initial coding of the digital transformation of this research (limited to space, only part of the coding table is intercepted) is shown below in Table 8. The rest can be seen in the appendix.

Theme	Concept	Category	Property of Category	Dimension of Category

a1	slow digital adoption culture	Traditionalism	Cultural Hindrance	Social-Cultural Barriers	Social-Cultural
a2	trend of technology transfer	Technology	Resource Dependence	Obstacles of Digital Adoption	Digital Adoption
a3	trend of knowledge transfer	Knowledge	Resource Dependence	Obstacles of Digital Adoption	Digital Adoption
a4	carrier based service economy	Market	Reactive Innovation	Social-Cultural Barriers	Social-Cultural
a5	OTT competition	Disruptive innovation	Reactive Innovation	Social-Cultural Barriers	Social-Cultural
a6	Do not treat apps as opportunities	Disruptive innovation	Reactive Innovation	Social-Cultural Barriers	Social-Cultural
a7	OTT independence	Disruptive innovation	Reactive Innovation	Social-Cultural Barriers	Social-Cultural
a8	access to information	Information	Absence of Infrastructure	Obstacles of Digital Adoption	Digital Adoption
a9	internet penetration	Internet use	Absence of Infrastructure	Obstacles of Digital Adoption	Digital Adoption
a10	Africa user behaviour	User behaviour	Reactive Innovation	Social-Cultural Barriers	Social-Cultural
a11	roadmap differentiation	The competitive advantage	Reactive Innovation	Social-Cultural Barriers	Social-Cultural
a12	Brain Drain	Labour	Lack of Indigenous Skills	Obstacles of Digital Adoption	Digital Adoption
a13	quality labour	Labour	Institutional Weakness	Obstacles of Digital Adoption	Digital Adoption
a14	conservative culture	Conservatism	Cultural Hindrance	Social-Cultural Barriers	Social-Cultural

a15	religion restriction	Conservatism	Cultural Hindrance	Social-Cultural Barriers	Social-Cultural
a16	Traditional core business	Organisational inertia	Reactive Innovation	Social-Cultural Barriers	Social-Cultural
a17	uncertain regulation	Regulation	Institutional Weakness	Obstacles of Digital Adoption	Digital Adoption
a18	arbitrary government fines	Administration	Institutional Weakness	Obstacles of Digital Adoption	Digital Adoption
a19	Corruption and bribe	Administration	Institutional Weakness	Obstacles of Digital Adoption	Digital Adoption
a20	unknown technology	Technology	Resource Dependence	Obstacles of Digital Adoption	Digital Adoption
a21	poor innovation attempts	Conservatism	Innovation Negativity Bias	Organisational Challenges	Organisational
a22	a struggle to electricity	Infrastructure	Absence of Infrastructure	Obstacles of Digital Adoption	Digital Adoption
a23	low cost of smartphones	Infrastructure	Absence of Infrastructure	Obstacles of Digital Adoption	Digital Adoption
a24	cut budget from innovation	The competitive advantage	Resource Dependence	Obstacles of Digital Adoption	Digital Adoption
a25	legacy team	Organisational inertia	Bureaucracy and Legacy System	Organisational Challenges	Organisational
a26	old thinking	Traditionalism	Cultural Hindrance	Social-Cultural Barriers	Social-Cultural
a27	bureaucratic organisations	Organisational inertia	Bureaucracy and Legacy System	Organisational Challenges	Organisational

a28	segmentation within organisation	Collaboration	Bureaucracy and Legacy System	Organisational Challenges	Organisational
a29	Investment in new businesses	The competitive advantage	Resource Dependence	Obstacles of Digital Adoption	Digital Adoption
a30	funding	The competitive advantage	Resource Dependence	Obstacles of Digital Adoption	Digital Adoption
a31	cultural complexity	Cultural complexity	Obedience Culture	Organisational Challenges	Organisational
a32	inherent poverty	Economic condition	Resource Dependence	Obstacles of Digital Adoption	Digital Adoption

Table 9 Part1 of Initial coding of the digital transformation of this research

4.4 Theoretical Coding

The theory-building work of classical grounded theory research is mainly done through theoretical coding, that is, organising concepts or categories formed in substantive coding to build a theory. Theoretical coding refers to the implicit interrelationship between concepts or categories formed by conceptualising substantive coding, such as juxtaposition, causality, and progression. (Glaser and Strauss, 2017) In my research, the ideas, concepts and categories formed in the research process are gathered together since 2020, and conceptualised and synthesised to form a complete theory. If the theory cannot be saturated through theoretical coding, it may be necessary to trace the entire research process, or re-sampling theoretically from the starting point, or perform selective coding again to supplement new data and achieve theoretical saturation.

The content is grounded in 7 core categories of Social-Cultural Barriers, Obstacles of Digital Adoption, Organisational Challenges, Characterises of Digital Transformation, Innovation, Reshape the Organisation and Value Net Synergies. Although existing studies of digitalisation are mainly based on the presumed conditions in developed markets, including free market, rule by law, trust and high quality of human resources without considering the social and historical obstacles, absorptive capacities of organisations and the influences of foreign ICT enablers. Few studies cover the socio-economic background of digitalisation of undeveloped countries. Neither does the popular framework of digital maturity. Therefore, the research comes from the realities of Africa where the digitalisation of carriers is constrained by the facts of a late mover, high transaction costs and limited organisational capacity with restricted absorptive capacities.

Using a qualitative research paradigm, which privileges the insiders' perspective, I have examined the different backgrounds of digital transformation in Africa. The social-cultural elements from culture, knowledge to the reactive innovation constitute a unique cultural and historical characters. Consequently, the traditional solidarity norms depress the spirits of Africa entrepreneurship. There is a lack of knowledge about how technology works and how to provide innovative measures around it. Africa's digital transformation is embedded in financial dependence on the developed digital nations without the emergence of an indigenous entrepreneurial class. As a result, I hope that the theoretical coding of the research overcomes the disadvantages discussed and is shown below.

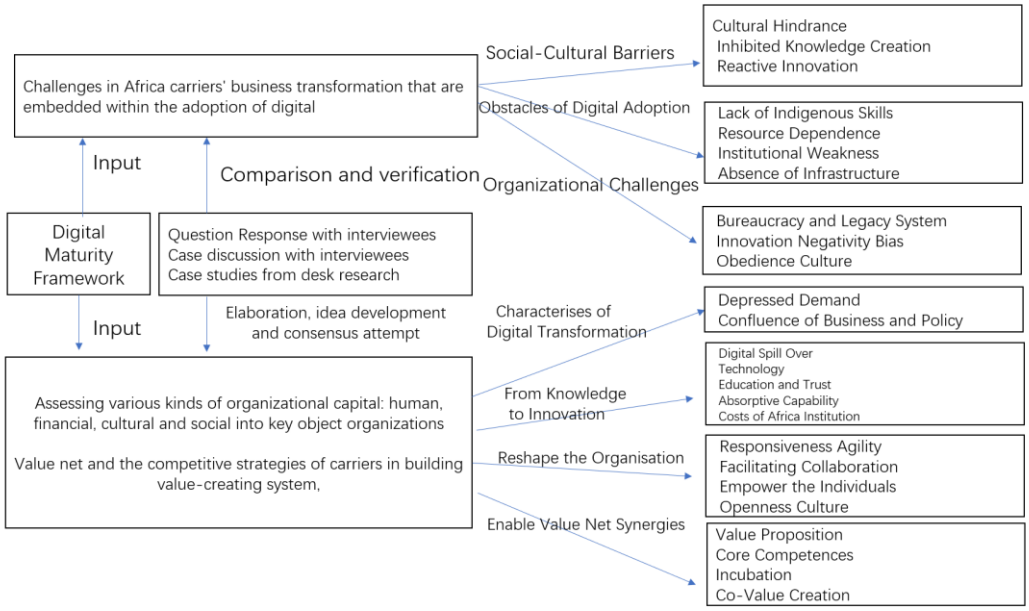

Figure 12 The Theoretical Coding of the Research

According to the classical grounded theory, around the core category of digital transformation in Africa, the following research results can be obtained based on the network relationships constructed according to the implicit interrelationships between concepts or categories formed by conceptual substantive coding.

Chapter 5: Challenges of Digital Transformation in Africa

5.1 Introduction

I would evaluate challenges concerning the adoption of digital services for carriers in Africa and identify the most significant elements and the key factors in the African corporate landscape that may explain the slow adoption of digital transformation in this Chapter.

I begin this chapter by examining the different backgrounds of digital transformation in Africa. Africa has demonstrated a unique culture in the process of modernisation. The social-cultural elements are elaborated from culture, knowledge to the reactive innovation to identify the unique cultural and historical characters. This allows me to set a holistic context with regard to Africa's digital adoption and the challenges that have arisen because of this. A further examination goes into subject matters concerning the organisational challenges in Africa and the simultaneous effects on African carriers.

5.2 Social-Cultural Barriers

In my research, four features are most distinctive in Africa. They are externalities in culture and in knowledge in Africa, market dominance of carriers and disruptive innovations of global OTT. Externality is an economics term, which indicates the cost or benefit that affects a party who did not choose to incur cost or benefit by itself. "Externality has various forms – external economies and diseconomies, divergencies between marginal social and marginal private cost or product, spill-over and neighbourhood effects, collective or public goods".(Buchanan and Stubblebine,1962) Culture factor is mainly discussed in my interviews when I try using the concept of externality to describe and study the relationship between culture and digitalisation.

5.2.1 Cultural Hindrance

The role of cultural factors in economic development is the most elusive in Africa. As defined in Chapter 2, institutions are the humanly devised constraints that structure human interaction, including informal constraints (e.g., norms of behaviour, self-imposed codes and conduct), and their enforcement characteristics. Max Weber linked the development of economy with the culture behind the mainstream society, advocating that Protestant ethics play a positive role in the prosperity process of industrialisation. "Weber wished to demonstrate that one important source of the modern work ethic and orientation to material success, which he calls the "spirit of capitalism," is located outside the realm of "this-worldly" utilitarian concerns and business astuteness".(Weber, 2013) In many Asian regions including China, Korea and Japan, culture plays a positive role in social and technology changes, which can be defined as positive external. The role of traditional values in East Asia in the economic development mode under the new market economy is generally acknowledged. Confucian culture exerts a positive influence in promoting the development of East Asia after absorbing the advanced western culture under the market economy condition. Some scholars believe

that the Latin American traditional Catholic culture has a negative impact on Latin American economic development. “The United States, which is dominated by Protestant ethics, develops rapidly, which is in sharp contrast to Latin America, which is dominated by Catholic ethics. The first step for Latin America to go out of underdevelopment is to go out of cultural and spiritual ‘underdevelopment’ ”.(Wang, 2006, p 34)

African unique culture has been influenced by its traditional philosophy. Many Africans view their culture from an alien European perspective, as they have been trained in “the western, empirical tradition”. “Particularly in view of the costs and failings of western style culture, Africans must now mold their own modern culture by blending useful western practices with valuable indigenous African elements.“ (Makinde, 1988) Therefore, when we look into the objective and path of digitalisation of Africa, the culture dependency and related effects could not be neglected. In my view, there are similarities in the formation of cultural traditions in the history of Africa, and China. Nigerians believe in the evil forest while Chinese believe in Ghost. “In the Things Fall Apart by Chinua Achebe, when the white man came, the indigenes gave the ‘evil forest’ for their settlement to make it impossible for them to survive since the evil forest is specifically sacred and is believed to be an abode of the wicked spirits”.(Chuka, 2012) African unique culture has been influenced by its traditional philosophy, “the Africans believe that everything reserves within itself a value given to it by nature/God. This belief of the Africans in the intrinsic functionality and relevance of everything in the world, whether human or non-human bring up what we can label as ‘respect’ in the African mode of existence”.(Chuka, 2012) When I stayed in Nigeria, I found people still have strong worship of nature when I talked to some local people. For instance, Zuma rock with its popular nature has been depicted on the one hundred Naira note in Nigeria.

Traditional ways of thinking are not conducive to the production of accurate and rigorous logic methodology. Africa and China didn't generate science in modern times with similar culture in understanding the world. Firstly, there is no independent nature in the world view of people’s sense of nature and man in China and Africa traditional cultures. In my observation they respect the existence and will not actively question and explore nature. It is quite obvious in the medical treatment of Chinese medicine and traditional African medicine in these regions compared to the west. Westerners invented surgeries to tear out human bodies and fix the abnormal organs, while African and Chinese prefer to eat herbs to adjust the balance of their bodies to recover by themselves. Secondly, the traditional way of thinking is not conducive to the production of accurate and rigorous logic methodology, which prohibits innovation in digital and scientific fields. Traditional thinking of both Chinese and Africans is good at summing up, which is not the right condition for generating modern science, but effective for generating other wisdom. Third, the strict hierarchy of identity is not conducive to the academic atmosphere of freedom and equality. Furthermore, this atmosphere also prevents people from breaking the current order to seek new balance in scientific and social change. We can verify this point by the evidence that the Pan African movement and its political form was not born in Africa, but originated from the black descendants of the American

continent and gradually spread to Western Europe and Africa. The atmosphere of freedom and equality of America also facilitates the emergence of the spirit of innovation in Silicon Valley.
The traditional solidarity norms depress the spirits of Africa entrepreneurship. My life experience indicates that African entrepreneurs are better at taking risks, calculating costs and benefits and looking for all opportunities at the strong will to eliminate poverty. For example, after my landing in Lagos or Nairobi, I find local entrepreneurs are more active in finding business opportunities than in other countries. Taxi drivers already approached you before you exit the airport, dealers of fruit and vegetables put the goods in your hands before you parked well in supermarkets. Entrepreneurship is usually defined as discovering what needs and opportunities are in the market, and then organising various materials and commodities to sell to the market, seising profit opportunities, and daring to take risks. (Kirzner, 2015) People of African countries are very entrepreneurial, but innovation has therefore been stagnated because of the traditional solidarity norms. Platteau explains that private wealth accumulation is perceived as an anti-social behaviour in most traditional Africa. He quotes the anthropologist Woodburn in Hadza Hunter-gatherers in Tanzania “People who have more than they manifestly need are put under relentless pressure to share”. (Alby, Auriol and Nguimkeu, 2013) Those informal constraints of self-imposed codes and conduct and their enforcement characteristics depress the spirits of Africa entrepreneurship. Simultaneously, another problem is that there are not enough people in Africa who understand the technology and its uses. There is a lack of knowledge about how technology works and how to provide innovative measures around it.

5.2.2 Inhibited Knowledge Creation

As indicated in Chapter 2, knowledge is treated as public goods in economics. Once knowledge is produced, producers can't decide where it goes and who gets it. The cost is close to zero, but the potential profit is very high. Africa should have this privilege to absorb the knowledge with almost zero cost, as many countries speak the same language with the most abundant knowledge producers, US and EU. However, several English-speaking countries incl. Nigeria, Kenya do not benefit from free knowledge compared with India and some Asian countries.
Knowledge is imparted by people, especially those who study and work in advanced regions and return to homes after the knowledge absorption. Indicated in Chapter 2, higher productivity holds only when the host country has a minimum threshold stock of human capital, which facilitates the four capacities: (1) recognize the value of new external knowledge, (2) acquire, (3) assimilate or transform, and (4) exploit new external knowledge. With this regard, it is quite different between Africa and Asia. For instance, after China cultivates a minimum threshold stock of human capital within recent 20 years, the circle of recognising new knowledge, acquiring, assimilating and exploiting is being implemented step by step by government and millions of talents migrate back from developed regions like EU and US. Migration trends of Africans to the West contribute immensely to the organisational challenges that are accompanied by digital adoption. The Interviewee perceived this to be a challenge because African talents never come back after they get jobs and are paid well,

leaving a deficit of skilled workers in the continent(Int 4) Countries that have become the most popular for African emigrants are the UK, Canada and America. In contrast to Africa, these regions provide new innovations, better employment opportunities and economic security that is not always found back home. As a result, this leaves the African continent lacking a workforce that is skilled or educated and organisations are forced to depend on the few that come back or those that have attained their education in developed regions.

The local ecosystem is difficult to be established without various domestic partners. Mentioned in Chapter 2, Value Nets have a key characteristic: Collaborative and systemic. With the evolution of communication networks to the IP-based mobile Internet, the network of carriers cannot be a guarantee of sustainable profit, but only a business supporting platform. The reality is that services are no longer an extension of voice products, but a group of social life-diversified products when value creation entities have diversified, and lucrative regions spread from the operating network to the operating content and service. In the era of Internet, competition between companies in the industry is not just competition between individual companies, it gradually falls into a competition between one enterprise ecosystem and another. However, cooperation between Africa enterprises becomes extremely difficult because of limited capacities of local companies. For example, it is even difficult for me to find a reliable software out sourcing vender in Lagos, the biggest city of Africa, in 2017. The evolution from the value chain to the commercial ecological value network cannot be reversed by any enterprise. As a result, Africa carriers failed to grow the digital economy bigger and therefore keep their dominant market position without sharing more benefits with partners.

5.2.3 Reactive Innovation

The innovation motivation of individual Africa carrier is not proactive and initiatory, which is different those from EU and Asia. Except the success carrier's mobile payment service M-PESA in Kenya, carriers' digital services revenue occupies a very limited portion in the digital economy in Africa. However, the increasing consumer demand for information drive operator to participate gradually with other industry players in the value chains, forming multiple value sharing value networks. Customer loyalty is reduced as business model is impacted by the Internet, making carriers passively innovate the service model. Indicated in Chapter 2, new technology and business strategies are transforming the way products and services are created and marketed. Customer demand is more diversified and personalised, whose bargaining power is continuously improved, and purchase decisions are complicated to make. The original lucrative products of Global carriers have lost their advantages due to more choices in 4G age, and their profits have gradually been diluted. Given unique historical influences, Africa carriers lack distinctive competence and fall into a homogeneous price competition. Customer loyalty is reduced as the traditional business model of operators is impacted by the Internet business model, making carriers in Africa passively innovate the service, and even rebuild the business completely to obtain excess profits with a differentiated business model. One example is the "have to" cheap data bundle of every carrier in cooperation with WhatsApp,

which sacrifices the core revenue to improve customer loyalty due to the dominant market place of WhatsApp in social market.

WhatsApp Bundles			
Network	**WhatsApp Data**	**Validity**	**Price**
Hourly Bundles			
Vodacom	10MB	1 hour	**R1**
Daily Bundles			
MTN	50MB	1 day	**R2**
Vodacom	50MB	1 day	**R3**
Vodacom	250MB	1 day	**R5**
Three Day Bundles			
MTN	100MB	3 days	**R5**
Vodacom	100MB	3 days	**R6**
Weekly Bundles			
Cell C	300MB	7 days	**R10**
MTN	250MB	7 days	**R10**
Vodacom	250MB	7 days	**R12**
Two-week Bundles			
Cell C	600MB	15 days	**R20**
Monthly Bundles			
Cell C	1GB	30 days	**R29**
MTN	1GB	20 days	**R30**
Vodacom	1GB	30 days	**R35**

Table 10 Cheapest WhatsApp Data Bundles in South Africa (1 R = 0.06 USD)

Source: (Staff Writer, 2021)

Worsen benefits of participants decreased the motivations of innovation in digitalisation. Compared with EU and Asia carriers, Africa operators have weaker capacities in capital, technologies and poorer industry partners within their own countries. Base on this, the carriers focus more on its dominant market positions, which prohibits the evolution of business models caused by a series of changes in the status, role, value transfer, and benefit distribution in the ecosystem. Therefore, it turned a more garden walled ecosystem for Africa carriers, worsens the benefits of participants and decreased the motivations of participants in investment and long-term devotion in the continent. My work in 2016 and 2017 also verified this idea. When we cooperate with MTN to facilitate Content Owner's monetisation in music and video, I had monthly workshops with managers from the content ecosystem in Lagos in the Q1 of 2017. From the direct feedback of them, benefits of participants kept going down due to deteriorating economy and arbitrary policies and regulations for NCC, the regulator in Nigeria.

5.3 Obstacles of Digital Adoption

The digital economy can promote the decentralization of regional industries, promote rural development, help build a unified regional market (Eg. EU and China), make up for shortcomings in public services and promote more adequately and balanced digital infrastructure. The challenges with regard to the adoption of digital services are grave. Participants of the research alluded to the fact

that Africa is still “digitally immature” compared to the rest of the world, although African countries have made notable development within recent years.
38% of the adult population in Africa is illiterate, and the participation rate in tertiary education is only 6%, which is the lowest in the world, compared to a global average of 26%. (Smith, 2010) Obstacles including lack of indigenous skills, resource dependence, institutional weakness and absence of basic infrastructure make digital service adoption in Africa more challenging than other regions.

5.3.1 Lack of Indigenous Skills

Brain drain has consequently impacted the continent’s progress with regard to its digitalisation. The causes of brain drain can be explained using a push-pull theory: the push factors refer to the unfavourable conditions including job scarcity, low wages, crime, armed conflicts, political repression, human rights abuses, devaluation of currency and poor educational systems while the pull factors describe the favourable conditions in the receiving countries including higher salaries, greater mobility, less bureaucratic control, safety of environment, and a higher standard of living. (Benedict and Ukpere, 2013)
Affordable technology is a reality due to the transfer of knowledge, technology and resources in the process of globalisation. It cannot be ignored that globalisation has had a positive effect on the continent in the transfer of knowledge and resources. Globalisation as the integration of economies and societies worldwide. It is a multi-dimensional process that influences all economic, environmental, social and cultural relations between states and nations. The transfer of knowledge and resources from global powers to Africa has helped significantly with the growth of technology and betterment of infrastructure. A handful of interviewees have therefore noted that the transfer of knowledge and technologies has had significant constructive impacts within specific regions in Africa(Int1, Int3, Int5) Most of the technology advancements in Nigeria were birthed because of the transfer of knowledge and resources that came with Chinese enterprises. The advent of companies like Huawei, ZTE in Africa have made possible the widespread provision of low-cost, affordable technology. Through this, interviewees conveyed that these companies have shown that technology does not have to be expensive but can be affordable while still being efficient(Int1, Int4)
The global power’s dominance brought about the investors’ economic gain at the expense of skills of African people. There are some critics of trade imbalances that are handicapping the nations involved, while grossly advantaging investors at the expense of the African people. The main concerns amongst the interviewees have been unequal pay, taking money out of the country. Foreign ICT providers’ assistance has also been criticised as transferring little knowledge to African countries, which has resulted in a lack of localisation. One interviewee explicates this point further stating that although Chinese interference has provided opportunities and added value, they end up taking more than they provide(Int 3) He mentioned the cost of having one Chinese person in his country is more expensive compared to having a local Nigerian fill the same position. The fact that many positions are

only available for foreigners sacrifice the opportunities of skill improvement of African people. Technologies from foreign companies especially China make the digital process affordable for African people, but level of indigenous skills has not been increased in a short period. Many companies and organisations within Africa therefore have to settle with low skilled and under educated individuals due to lack of talents available.

5.3.2 Resource Dependence

Colonialism established an adoption of certain policies aimed at the structural and economic capitalisation in Africa. This process left an acute wound that has since healed, but the cicatrix still exists. Colonialism is one experience significantly affected Africa in several ways. The recent decades have seen many socio-political and economic thinkers blaming colonialism as the primary reason for Africa's backwardness in all spheres of life, especially its economy. Colonialism therefore results in a set of unequal relationships between the colonial power and the indigenous population within that colony, especially in the increased economic inequality, reinforced resource dependence.

Africa's digital transformation is embedded in financial dependence on the developed nations without the emergence of an indigenous entrepreneurial class. "Following largely an inward-oriented development strategy in the early decades of the post-independence period, most African countries failed to take advantage of the opportunities provided by the dynamic growth impetus associated with globalisation in the 1970s and 1980s" (Nissanke and Thorbecke, 2007, p 6). Africa's digitalisation journey has depended on financial assistance from nations such as United States, EU and China. This dependency has led to global powers having a significant amount of control over Africa's economy because of their presence in a range of African countries. Therefore, an interviewee indicates that the local government missed the opportunities to take proactive and conscious measures to facilitate the emergence of an indigenous entrepreneurial class(Int 12) Africa has not been able to reap massive benefits from the phenomenon. Economically, globalisation has therefore reinforced the economic marginalisation of African economies and their dependence on resources from the rest of the world. With massive ICT investment, Africa is heavily indebted and must make greater compromises. ICT companies have been able to offer more appealing packages due to their access to funding. An interviewee indicates that "finance is important because access to funds is difficult. With any telecommunications infrastructure or advancement in your Digital Services, vendor financing is quite effective to roll money into the network providers". (Int6) Although their impact has been seen in a positive light by many interviewees, some participants have considered their impact to be negative. Local people believe in claims that imperialism and colonialism are precursors of underdevelopment, most of whom tried identifying external factors to explain the backward economies and unequal exchange imposed from 'other' countries. "China's economic progress and imposing presence may not transform the economies of Africa yet we should not dismiss the possibilities of economic development through such relationships". (Amadi, 2012)

Path dependence is a negative social psychological factor as a result of the post-colonial social net. The position of people in the social net structure determines the ability to obtain resources and its influence on others. Digital adoption is neither a purely tech issue nor a management one, but it requires the combined social innovation. Technological innovation might drive social innovation to ultimately solve the problem of development in Africa. Technological innovation usually has three stages: technological innovation, business innovation and social innovation. From the development of Internet in China the innovations before 2000 and after 2000, many new business models have sprung up. The rise of the Internet recently marks the beginning of technological innovation and business innovation. The role of innovation is not only the motive force of business innovation, but also the motive force of social innovation. Path dependence is a negative consequence of post-colonial social net and western knowledge dominant environment. Path dependence is remarkable feature of the social psychological factor mentioned in Chapter 2 embedded in Africa. When people encounter new problems to be solved, they always first consider whether they have experience in solving similar problems in their past experiences; if not, search for similar experiences and experiences among other members of the network; if neither, people will think logically. (Loasby, 2002) Therefore, the scope of knowledge is limited by the accumulation of previous experience which is created for the interests of colonists, foreigners instead of local citizens.

5.3.3 Institutional Weakness

Although carriers are not in the dominant position in the industry, the social and political environment were different because of historical and geographic reasons. “The preponderance of evidence and plausible argument supports the idea that colonialism-retarded development”(Heldring and Robinson, 2012).

Vested interest slowed down the process of digital adoption. “Governments play four complementary roles in fostering digitisation. These include setting policy, regulating companies and activity, invest in developing the sector, and “e-enable public services (bring them online, along with appropriate links to private-sector services)” (Sabbagh *et al.,* 2012). These roles will assist in ensuring that governments drive rather than hinder digital adoption. One factor is the level of institutional weakness in many African countries, making it possible for political leaders and public servants to misuse national resources and abuse their power without being checked. There is also a lack of supervision of bureaucratic institutions as the operations within companies are largely dependent on decisions made by the “boss”, leaving room for corruption to slide in. There is need to clean up business or organisation from the beginning because of the pervasive presence of corruption(Int 6) I feel that corruption has been a tradition almost everywhere in sub-Sahara countries. Instead of hearing how can I help you in the airport of Lagos, me and most foreigners will be asked what do you bring for me by customers and police officers in Nigeria. In recent 5 years, I had a lot of miserable experience of being blackmailed by police in South Africa, by customer officers in Nigeria, and even taxi driver in Kenya, and I always suggest my friends not bring too many dollars in Africa to decrease your loss of

being blackmailed in those countries. I remember I had my haircut with a barber in Victoria Islands in Lagos in August 2017, in his mind to fix corruption is more important for President Muhammadu Buhari of Nigeria compared with solving other problems. Instead of playing four complementary roles in fostering digitisation, politics increases the transaction costs of the continent and the overall threshold of digital adoption. Institutional Weakness creates huge costs and inefficiencies by draining resources and opportunities out of the fruit of digital adoption and redirecting them to benefit only a few people. The interest of a few people prevents digital adoption in driving shared interests and promoting urban-rural integration regional development. Public service like sufficient electricity and balanced digital infrastructure, cannot reach every African people.

An arbitrary administration causes uncertain environment for players in digitalisation. One interviewee explicitly elaborated the effects of arbitrary administration and corruption of government by saying; “Nigeria imposed government fines and sanctions for MTN. That wouldn't arguably happen in a western developed world country where the government doesn't have so much power”. The centralised power that is given to the government has therefore worked as an element that has dominantly hindered the adoption of digital services in the continent(Int 6) According to some insiders, MTN successfully bided for the mobile communications licences in 1990s and became the leading carrier in Nigeria, the relationship between MTN, the regulators and the government in Nigeria is complex and further shows the intricate relationship between politics and business within the African markets. Bureaucracy tends to foster and protect the political interest of those in charge and in most cases, the adoption of digital services is slowed down because personal agendas are prioritised before digital transformation.

5.3.4 Absence of Infrastructure

Basic infrastructure such as electricity and fast, reliable technology is therefore a core element that assists in driving digital adoption. The infrastructure plays a more important role in Africans than people from other regions because of the low level of development, as an interviewee stated that infrastructure does not only give individuals access to information, it works as an educator and an enabler(Int 6)

The core of the challenges is the lack of electricity. Several interviewees also elaborate on the impacts of electricity with regard to the adoption of digital services. (Int4, Int7) It does not make sense if customers only get cell phones, they need electricity to charge them. There is a limited amount of it available due to the expensive power in Nigeria. Citizens often prioritise spending on fuel and diesel rather than electricity. Consequently, this indicates that the availability of digital services is open to those who can afford to make electricity a priority. Looking at the lack of power through a sociological lens, it is evident that the fundamental problem lies in the issue of poverty.

Reliable and affordable smartphones have become the foundation for digital adoption for African people. The concern of poverty is accompanied by many broad challenges of affordability and low consumption. (Chingwete, Felton and Logan, 2019). An interviewee elaborates on this point, stating

that there is an issue with the lack of low cost of smartphones. Smartphones in Nigeria can be sold at prices as low as $100 or even $50(Int 4) Resultantly, this stagnates the industry. To adopt digital services, fast and reliable smartphones are needed otherwise software installation cannot occur.

5.4 Organisational Challenges

Once organisations become mature and fall into an established trajectory, they tend to stay on that path. To fully capture a comprehensive examination into the sociology of organisational challenges in Africa, it is imperative to focus on the makeup of the organisations themselves and the role they play in further contributing to the challenges. An investigation into the hierarchical structure and agility, culture and competition status of African businesses within the digital space was done in my research. Serval themes of discussion with interviewees are conducted: bureaucracy, organisational inertia, negativity bias, conformity, agility and localisation. An interesting finding is that when negativity bias and conformity come together in organisational inertia originated from inequality and colonisation, the effect has been multiplied in Africa where limited knowledge and technology are absorbed locally. Carriers are more likely to choose a maintenance of the status quo to obtain the risk of failure.

5.4.1 Bureaucracy and Legacy System

Organisations of Africa carriers are supposed to be dynamic as the average age of employees is lower than that of EU. However, Africa carriers suffer a lot from the cost of organisational inertia in telecom industry that has been experiencing a radical disruption for years globally. Webber developed a theory around bureaucracy in which he believed that bureaucracy was the most efficient way to set up an organisation(s), administration and businesses. He saw bureaucracy as “Systematic formation, designed to ensure efficiency and economic effectiveness, with emphasises on the division of labour, hierarchy, rules and impersonal relationship” (Mulder, 2017). Using Webber’s definition, many carriers in Africa have used this system to outline their hierarchical structure.

Validated learning and autonomy abilities are suppressed. Indicated in Chapter 2, the process of knowledge innovation consists of interactions between two types of knowledge between individuals and organisations. The system of the bureaucracy of African carriers has placed the needs and interests of those at the top as the priority, which has slowed down the process of digital adoption. A handful of interviewees asserted that the bureaucracy of African carriers has been a significant organisational challenge, one of whom in particular stated that bureaucracy does not only impede the adoption of digital transformation in the continent, it also takes away “freedom of speech”(Int 2, Int 3, Int 4) Bureaucratic structures leave little room for validated learning and autonomy for new business and the brain drain of Africa worsened the outcome of participation in decision making and strategies for local employees. Interviewee 3 also believes that “key resources carriers need are their staff, they must start hiring staff from OTT companies to be able to transform their vision from traditional to digital”(Int 3) Interviewees expressed different expectations on how to reshape the bureaucratic organisation. The main problem is the hierarchy in which bureaucracy tends to foster. Due to this hierarchy, actions are taken by what the boss says or what the boss likes, which in essence

works as a tool to reinforce the unequal power relations within the organisation. Consequentially, validated learning and autonomy abilities are suppressed, which are critical elements that carriers should put in place to achieve business transformation.

Legacy IT fails to provide seamless experience to users and create segregation within organisations. The advent of the digital economy has brought profound changes. Indicated in Chapter 2, Value Nets have the characteristics of Customer-alignment, Agile and scalable. Customers have increasingly requirements for personalisation, online use, independent participation, and social sharing. “The biggest challenge is that carriers are not providing seamless experience. Integration of creative collective service offering and a strategy to address this are equally important. Carriers should focus on addressing this function to eliminate segregation within organisation”. (Int 7) The operation of a carrier includes business, accounting, customer relations, etc. For a long time, various parts have existed in the form of information islands, and businesses have been separated from each other. Sabri Ali Yahya, Etisalat (a leading carrier in Middle East and Africa) Chief Information Officer, also admits "The increasing competition and rapid technology evolution have put enormous pressure on our Business Support Systems landscape. “ (News Wire Feed, 2013) The interviewee agrees that “there's no doubt that the hierarchical structures of carriers are not suitable for modern digital evolution. Organisational structures need to be overhauled obviously. But the biggest impediment is the Network Support Systems (NSS), Operational Support Systems (OSS) and the Business Support Systems (BSS), because changing that is hugely costly and risky. Carriers cannot transform with the old IT stack”. (Int 9) Not only for the interviewee, even for myself in China Mobile, the Business Enabling Systems of Shandong Province play a strong role and in optimising the organisational structure and process of the enterprise, and improving the management level and organisational agility. But it was established in 1999, and we spent about $ 30M to amend the most supplicated and legacy BES in Asia managing 60M subscribers of the province every year. Unfortunately, it took at least 60 days to create a new campaign in China Mobile, which OTTs need only 1 week.

5.4.2 Innovation Negativity Bias

Historical negativity bias in innovation as a social psychological factor inhibits organisation’s ability to change for Africa carriers. Historical failures have inhibited the need for innovation. Carriers have struggled with the ability to create value and adjust to the rapidly evolving digital ecosystem among ever-changing customer needs. One interviewee states a fact that the progress of getting used to new service in Africa was very slow compared to the growth in India, as carriers are not tolerant with failure that affected the executives’ performance in the past(Int 4) “The operators became worried and sceptical about launching something new digital services. They need the confidence to go ahead and with this confidence”(Int 4) It is evident that operators are extremely reluctant to innovate again because of possible risk of failure. Today, any new technology that comes into African countries is compromised because of the fear of carriers. The poor innovation attempts in Africa are a reason why many African talents have migrated out of the continent in search for new opportunities in the

diaspora. The negativity bias in innovation put Africa carriers into organisational inertia amplified in a group setting, where innovation culture is missing as a common organisational character. When carrier's leadership discuss a major decision, the individual fears shall aggregate and multiply. This in turn makes carriers less likely to assess the ideas that may change the business model and reform. The influence of mature foreign services has also played a negative role in the levels of innovation in Africa. The massive difference between the levels of innovation between Africa and the U.S is what drags the former continent milestones behind America. Nollywood is a sobriquet that originally referred to the Nigerian film industry. I visited some directors of Nollywood for the purpose content cooperation in the mainland of Lagos in 2017. The workshops of famous directors are located close to slums in the city. Participants of the film industries, including directors and brokers were looking for sponsorship all the time due to limited return in the local market. I learnt that the cost of producing a film in Nollywood is less than 1% of that of a Hollywood one. Foreign contents from the US with the same English language suppress local film industry with leading technologies and higher investment, making local digital services impossible to get profit from high end users and some local content providers go bankrupt easily. The presence of mature foreign services has worked as a tool against local innovation in Africa. Without a technologically informed and educated market, the cycle of utilisation deficiency of technology and knowledge will repeat itself and continue to contribute to the myriad of challenges in adopting digital services in Africa.

5.4.3 Obedience Culture

"Yes, Sir" is what I listened most from local Africans in recent 6 years in Nigeria, Kenya, Ghana and South Africa. In the management and operation of business, local front-line managers replied to requests from their superior in the same voice without hesitation. Being a traditional market, Africa's adoption of digital services has been slow and less agile than the rest of the global market. The intersection of Africa's conservative culture and religion is partly responsible for the slow the adoption of digital services within the continent, and culture of obedience also plays peculiarly negative role in organisational level when companies think about new business opportunities. Traditionalism with religious factors has been embedded within company structures and relations. Traditionalism of Africa is a trade-off between customs of originally ethnicity tribe and influence of colonial power. "Tradition was a complex discourse in which people continually reinterpreted the lessons of the past in the context of the present. Colonial power was limited by chiefs' obligation to ensure community well-being to maintain the legitimacy on which colonial authorities depended. Furthermore, ethnicity reflected longstanding local political, cultural and historical conditions in the changing contexts of colonial rule". (Spear, 2003) An interviewee alluded to the cultural and religious impact of an area as the primary reason carriers opt to work as traditional companies instead of converting into digital. (Int2) Similarly, the result of this has led to African carriers becoming inflexible to any kind of transformation. Carriers have therefore been stubborn and unwilling to expose themselves or their networks to specific content that may not agree with their culture or religion.

Unlike OTT players, their old ways of cooperating and old ways of thinking assist in making their adoption rate slower. Even within the African context itself, there are certain countries including Nigeria that are viewed as being more culturally and religiously strict than others like South Africa. One interviewee gave an example of launching the digital service in Nigeria. “When launching new music service in many parts of Africa, parental control become an obstacle. The risks of running a digital service are multiplied. As a result, operators become oversensitive and strict with services they want to launch. Within a religious spectrum in Nigeria with Islam and Christianity, carriers worry too much about offending subscribers with the kind of content they put out there instead of seeking AI and high-tech method to reduce the risks”. (Int3)

Obedience culture adopts an inside-out approach, causing ineffective empowering practices, decreasing the overall innovation capacity. In a culture of inequality, which stems from colonisation, local managers would rather conform to an idea, even if they are not all agree with that, than take a stand against the group and propose an alternative in Africa. Employees show obedience, awe and other behavioural reactions when management are unwillingness to authorise, downward communication, own exclusive information. Illuminated effects of obedience culture of carriers regarding digital services are obvious. Obedience organisational culture adopts an inside-out approach and the atmosphere of publicly agreeing with the boss’s decision, inhibits the capabilities of African carriers on innovation. In my observation, administrative procedures are excessively complicated and repeated audit is done due to high risks of business compliance risks. in Africa. The ‘inside-out approach’ also fails to consider the perspectives of the customer first. From this point, operators are also known to be cautious as the launch of a new product brings about risk within their minds. This is in contrast to OTT players who have prioritised the importance of customer/user experience first. Employees are fully empowered to make the business decisions by themselves. One interviewee explores the contrast between OTT players and African carriers stating that although user experience is not number one elsewhere, “OTT players have developed a world where it has become a priority in their adoption of digital transformation”. (Int2)

5.5 Chapter Summary

This chapter sets out to provide a whole picture of the social-cultural elements, challenges of digital adoption and organisational problems accompanied in Africa.

First, Africa has demonstrated a unique cultural and historical characters in the process of modernisation. Four features are most distinctive: externalities in culture and in knowledge, market dominance of carriers and disruptive innovations of global OTT. The role of cultural factors is the most elusive. Max Weber linked the development of economy with the culture behind the mainstream society. In many Asian regions, culture plays a positive role in social and technology changes, which can be defined as positive external. African unique culture has been influenced by its traditional philosophy. “The Africans believe that everything reserves within itself a value given to it by nature/God”.(Chuka, 2012) Furthermore, traditional way of thinking is not conducive to the rigorous

logic methodology. Firstly, there is no independent nature in the world view of people's sense of nature and man in China and Africa traditional cultures. Secondly, the traditional way of thinking is not conducive to the production of accurate and rigorous logic methodology, which prohibits innovation. Third, the strict hierarchy of identity is not conducive to the academic atmosphere of freedom and equality. In addition, the atmosphere also prevents people from breaking the current order to seek new balance in scientific and social change. Consequently, the traditional solidarity norms depress the spirits of Africa entrepreneurship. People of African countries are very entrepreneurial, but innovation has therefore been stagnated because of that. Another main problem is that there are not enough people in Africa who understand the technology and its uses. There is a lack of knowledge about how technology works and how to provide innovative measures around it. The effectiveness of knowledge creation cannot be neglected. Once knowledge is produced, producers can't decide where it goes and who gets it. Africa should have this privilege to absorb the knowledge with almost zero cost, as most countries speak the same language with the most abundant knowledge producers, US and EU. However, several English-speaking countries incl. Nigeria, Kenya do not benefit from the free knowledge compared with India and some Asian countries. Knowledge is imparted by people, especially those who study and work in advanced regions and return to their homes. Competition between companies in the industry is not just competition between individual companies, it gradually turns into a competition between one enterprise ecosystem and another. However, the local ecosystem is difficult to be established without capacities from domestic partners. Simultaneously, the innovation motivation of the individual Africa carrier is not proactive and initiatory. But the increasing consumer demand for information and the rapid development of technology drive operator to participate gradually with other industry players in the value chains, forming multiple value sharing value network. Customer loyalty is reduced as business model of operators is impacted by the Internet, which makes carriers in Africa passively innovate the service model. The carriers focus more on its dominant market positions, which prohibits the evolution of business models caused by a series of changes in the status, role, value transfer, and benefit distribution in the ecosystem. Therefore, it turned a more garden walled ecosystem for Africa carriers, worsens the benefits of participants and decreased the motivation to investment and long-term devotion in the continent.

Second, the challenges with regard to the adoption of digital services are grave. 38% of the adult population in Africa is illiterate, and the participation rate in tertiary education is only 6%, which is the lowest in the world, compared to a global average of 26%. (Smith, 2010) Some obstacles, including lack of indigenous skills, resource dependence, institutional weakness and absence of basic infrastructure make digital service adoption in Africa more challenging than other regions of the world. Brain drain has consequently impacted the continent's progress with regard to its digitalisation. Affordable technology is a reality in Africa because of the transfer of knowledge, technology and resources in the process of globalisation. Meanwhile, the global power's dominance brought about the investors' economic gain at the expense of skills of African people. The fact that

many positions are only available for foreigners sacrifice opportunities of skills improvement of African people. Colonialism therefore results in a set of unequal relationships between the colonial power and the indigenous population within that colony, especially in the increased economic inequality and reinforced resource dependence. Africa's digital transformation is embedded in financial dependence on the developed digital nations without the emergence of an indigenous entrepreneurial class. Path dependence is another negative consequence of post-colonial social net. The position of people in the social net structure determines the ability to obtain resources and its influence on others. Digital adoption is neither a purely tech issue nor a management one, but it requires the combined social innovation. As a result, the scope of knowledge is limited by the accumulation of previous experience which is created for the interests of colonists, foreigners instead of local citizens.

Although carriers are not in the dominant position in the industry, the social and political environment were different because of historical and geographic reasons. First, vested interest slowed down the process of digital adoption. There is also a lack of supervision of bureaucratic institutions in Africa as the operations within companies are largely dependent on decisions made by the "boss", leaving room for corruption to slide in. Public service like sufficient electricity and balanced digital infrastructure, cannot reach every African people. Secondly, arbitrary administration causes unnecessary concerns and uncertain environment. Bureaucracy tends to foster and protect the political interest of those in charge and in most cases, the adoption of digital services is slowed down because personal agendas are prioritised before digital transformation. Basic infrastructure such as electricity and fast, reliable technology is therefore a core element that assists in driving digital adoption. The core of the challenges is the lack of electricity. Meanwhile, reliable and affordable smartphones have become the foundation for digital adoption.

Third, a further examination is done on the organisational challenges and the simultaneous effects. Once organisations become mature and fall into an established trajectory, they tend to stay on that path. Organisations of Africa carriers are supposed to be young and dynamic as the average age of employees is lower than that of EU. However, they suffer a lot from the cost of organisational inertia in telecom industry that has been experiencing a radical disruption for years globally. Validated learning and autonomy abilities are suppressed. Bureaucracy does not only impede the adoption of digital transformation in the continent, it also takes away "freedom of speech". As a result, bureaucratic structures leaving little room for validated learning and autonomy. Legacy IT fails to provide seamless experience to users and creates segregation within organisations. The biggest impediment is the Network Support Systems (NSS), Operational Support Systems (OSS) and the Business Support Systems (BSS), because changing that is hugely costly and risky. Carriers cannot transform with the old IT stack.

Historical negativity bias in innovation also inhibits organisation's ability to change for Africa carriers. Negative information influences evaluations more strongly than comparably extreme positive information. (Ito *et al.,* 1998) Historical failures have inhibited the need for innovation for African

carriers. Carriers have struggled with the ability to create value and adjust to the rapidly evolving digital ecosystem among ever-changing customer needs. It is evident that operators are extremely reluctant to innovate again because of possible risk of failure. The influence of mature foreign services has also played a negative role in the levels of innovation in Africa. “Yes, Sir”. is what I listened most from local Africans. In the operation of business, local front-line managers replied to requests from their superior in the same voice without hesitation. Traditionalism with religious factor has been embedded within company structures and relations. Actually, traditionalism of Africa is a trade-off between customs of originally ethnicity tribe and influence of colonial power. Obedience culture adopts an inside-out approach, causing ineffective empowering practices, decreasing the overall innovation capacity of organisation in the digital transformation.

Chapter 6: Empower the Organisation

6.1 Introduction

The organisational challenges in Africa described in Chapter 4 identifies the most significant elements contributing to the hindrance of digital adoption. I describe the characterises of digital transformation in Africa, make an attempt to make implications for carriers on solving the organisational challenges, which impede the business transformation to digital services in this chapter.

The information that was discussed in the previous chapter has enabled this current chapter to continue looking into the insights presented by interviewees to develop a dense understanding of the digital makeup that exists and will develop in Africa carriers. I would mainly focus on societal and enterprise levels, assessing three kinds of organisational capital: human, cultural and social. Characters of digital transformation will be first analysed in an Africa context. After that, I try answering the question of the way we transform knowledge into real innovation and assess the key influencing factors. Finally, some suggestions are given to carriers on reshaping the organisation to take advantage of existing strategic assets.

6.2 Characterises of Digital Transformation in Africa

Reliance on external resources to provide funding as well as technology is an important feature of the Africa economy. The least developed countries have made slow progress in the structural transformation, which is reflected in the continuing current account deficit.

6.2.1 Depressed Demand

Lack of internet access and mobile services (especially in rural areas) is the main obstacle of the digitalisation process. High data costs as well as mobile device costs hinder penetration of digital services. It is estimated that only 1.4% of the African population currently enjoys a fixed broadband connection, and more than half of the African population does not have reliable electricity supply. Users demand from rural area is key as a foundation of digital adoption. Indicated in Chapter 2, Value Nets theory shows two main characteristics: Customer-alignment, Collaborative and systemic. The most frequent case discussed with interviewees are mobile money of M-PESA from Safaricom, when an innovative business model focusing on users from rural areas increases the adoption of digital services and facilitates the establishment of ecosystem of merchants, agent and application developers. This is a typical interorganisational activities. As indicated, “market convergence leads to collisions between existing business models and removes boundaries between the relevant industrial sectors—that is, industry convergence”. (Lee *et al.,* 2016) As a technology provider, I studied the 3 representative mobile money cases on site in Kenya, Bangladesh and South Africa. I paid a visit to the

Safaricom in Nairobi in 2017, BKash (the biggest mobile money business of Bangladesh) in Dhaka in 2018 and met Flash (the biggest mobile money business of rural areas in South Africa) team in Johannesburg in 2019. I observed many fathers, husbands working in cities use the digital service to transfer money to their family members who live in the countryside and support the family in this way. Without mobile money, I saw one of my company drivers in Nigeria spend 16 h travelling, to send only 30 USD to her sick daughter in the countryside in 2017. In developed areas, this user demand serves as improving convenience purposes, but in Africa and emerging market, it is purely a survival and compulsory need for most users.

Figure 13 M-PESA Agent in Rural Area
Source (Alumni, 2015)

Infrastructure worsens and depresses the strong demand of digital services in Africa. Indicated in Chapter 2, the best digital customer experience is a ROADS model (Real-time, On-demand, All-online, DIY, and Social). If the telecommunications infrastructure in rural, suburban and township areas is underdeveloped, the ROADS will never happen. A South African interviewee states that the digital ecosystem in Africa compared to the rest of the world "is not similar. Because of the inherent poverty that is in Africa, several people don't have the access to information to even know where to start with developing an application or being involved in a digital ecosystem. What is the main characteristic? Poverty". (Int 6) Low data penetration is an extension of poor infrastructure of Africa's ecosystem. In developed regions such as the U.S, China and the U.K - data penetration is significantly higher because of the infrastructure and innovation that is available. In Africa, however - many regions are still suffering from low data penetration. An example of low data penetration can be seen through Nigeria, which is considered as one of Africa's digitally advanced countries. One Nigerian interviewee (Int 4) asserts that data service is not covered everywhere in Nigeria as there are still some regions that are suffering from its absence. I verified his opinion when I travelled to rural islands in Lagos in 2016 and 2017, and some villagers even do not have access to electricity and mobile broadband. Data penetration is therefore a major obstacle that affects the digital adoption in Africa. Increasing data penetration within the African system will help African carriers achieve effective digital transformation just as seen in the Asian, Europe and U.S regions. Sustained low data penetration will

continue to contribute to the differences between the Africa's ecosystems to the rest of the emerged markets.

6.2.2 Confluence of Business and Policy

I realise that the importance of ICT development is neglected in Africa, which has not given the same priority as the development of other infrastructure and social services such as roads and bridges. Recently, I observed Chinese companies have begun transferring the labour-intensive production lines of manufacturing products to Africa, and gradually developed into related industrial chains, which have played a positive role in driving the development of local industries. But the construction of ICT requires not only intensive production but also sustainable investment from wireless network (4G, 5G), national backbone network (fibre and undersea cable), data centre and cloud computing clusters. I see that the efforts and footprints of global enterprises are limited. Meanwhile, a technology roadmap for investment in Africa is never clear and forethoughtful to attract and guide multinational companies to invest step by step according to Int 10, and to build value and supply chains for investment industries enhancing the industrial agglomeration capabilities of investment in Africa.

Investors in Africa are conservative because ICT facilities are "external" where the social benefits cannot be 100% turned into corporate benefits. In Europe of high-welfare and China with dominating state-owned enterprises, the government's responsibility is to provide public goods including ICT infrastructure. In my work in 2017 and 2018, I discussed with managers of Carrier of Nigeria Airtel in Lagos and Bangladesh Banglalink in Dhaka. Talking about digital services, they always shook their heads because the digital business relied on 4G networks, but their 3G network investment has not yet been recovered. Therefore, relying solely on foreign capital to solve investment in ICT facilities is currently ineffective in Africa. The government need to do more. It is an important premise of ensuring sustainable ICT investment to keep companies profitable eventually. In Africa telecom market, the Pigovian tax indicated in Chapter 2 on ICT is too high to afford including but not limited to the high electricity costs, the cost of overseas talents, land costs of the legacy upper classes of colonialist and tribe chieftains, the corruption and policy failures (arbitrary government fines etc.). Coase's idea proved not effective and it is difficult to achieve the situation that transaction costs are zero in Africa. Indicated in Chapter 1, "total cost" is composed of transaction and production costs. North argues that if the political rules conform to the Coase theorem, that is, the low transaction cost of the political market may produce effective property rights. If the opposite is true, invalid property rights may appear. (Richter, 2005)

The government should keep the dynamic adjustment between investor and public balancing benefits, strictly protect property rights and create a fair environment. ICT-positive externalities separate private and social returns for global investors, which might lead to the consequences that overseas capitals do not invest in ICT infrastructure. Regardless of ideas from Pigou and Coase, when such positive externalities exist, can the market make social returns into investor returns? There was

a battle over mobile phone masts in Northcliff, 5 km from my living place in Johannesburg happened in 2013 in South Africa. A local carrier, planned to build base stations in that place. Because of the negative externality of base station radiation, residents resisted the construction of a station; the similar cases happened when enterprise invests in the construction of optical fibre, including ground and submarine cables and data centres as a node to facilitate data circulation. With jobs creation and improvements of the regional ICT environment as positive externalities, residents naturally have no objection. In the classic economics case, the beekeeper lives next to the orchard owner, and bees can pollinate the fruit trees; the fruit trees can be used by bees to collect nectar, so both the beekeeper and the orchard owner can enjoy the social benefits provided by each other. The problem is, what should we do when the beekeeper and the orchard owner do not have equal social benefits? Pigou's suggestion is a quick win for Africa government, which is out of date in EU as the free market is quite mature, that is the government subsidises those who benefit less. A debate also happened between me and interviewees whether interfere from government is effective, no consensus was reached. But a conclusion is reached that eventually the true Africa free market will allow the parties that benefits more to pay the party that benefits less, which require a gradual elimination of corruption to strictly protect property rights in a fair environment. Therefore, to encourage foreign capital to invest, it is necessary to convert social benefits into investor benefits, and to make investment ICT investment returns not less than the average return on social investment. In countries where the market is powerless, the government subsidises investors. When the government cannot provide subsidies, it is more urgent to reduce transaction costs, reduce taxes, and eliminate corruption and policy uncertainties. Globally speaking, the government can introduce policies to reduce barriers of digital adoption in various ways. For example, Germany requires that all new houses and roads must be equipped with optical fibre cables; Thailand provides subsidies to enterprises to encourage ICT construction in rural areas. As the government can not only provide incentives such as simplified approvals, universal service funds, tax cuts, but also can use ICT to provide public services efficiently and fairly, people will benefit from the sustainable development of the country.

6.3 From Knowledge to Innovation

One question to be clearly answered is what knowledge is needed to enable the process of innovation in Africa carriers. Foreign investment will increase the host country’s capital stock and provide impetus for economic growth. In my experience from both China and Africa, Telecom industry is born with investment and intelligence, which grows with sustainable investment and extensive engagement of various parties. Admittedly it is painful that SMEs as most African service providers are less competitive in the global markets. While new ICTs are being adopted rapidly, they are generally used for communication, not deeper forms of information processing and management, which has done little to stop a trend towards the devaluation of the goods and services provided by the SMEs in Africa. Moreover, ICTs often further marginalising local firms and industries. (Murphy, Carmody and Surborg, 2014) The result of ICT development is sometimes related to the resurgence of

imperialism, represented by a more serious “knowledge dependence”. It is indicated that “while locating the marginality of Africa in cyberspace within its colonial past, current international attempts are part of wider efforts to configure the world in the interest of the new imperial powers”.(Ya'u, 2004)

New knowledge is created during the process of imitation, exchange and dissemination of individual knowledge, boosting the organisational capabilities in innovation. Enterprises can also be regarded as nodes in the social network. Companies should use existing knowledge to create new knowledge (Krogh, Ichijo and Nonaka, 2000). Indicated in Chapter 2, Nonaka's theory emphasises the form of knowledge innovation mechanism, that is, knowledge innovation is the mutual transformation between different types of knowledge, but it ignores the subject of knowledge innovation activity-the subjective role of people. The knowledge innovation is an organic combination of individual knowledge creation and knowledge transmission in the organisation. Knowledge is first produced in the individual's brain, and then transferred between the brain, thereby forming a larger amount of more comprehensive and more comprehensive knowledge. More than a certain amount of knowledge must be achieved through the efforts of multiple people. New knowledge occurred, then was digested locally to become solution knowledge, this process helps carriers obtain more business opportunities, expand cooperative relationships and improve their competitive advantages.

6.3.1 Make Digital Spill-Over happen in Africa

Carriers in Asia benefit greatly from the digital spill-over the multinational companies of developed countries since 1990s. My learning in China is that during the process, technology accelerated the knowledge transfer, business innovation and performance improvement within the local enterprises, the upstream and downstream supply chains of cross-industry, and has a sustained impact on the economy of the host country. One important discussion is whether the universality of technology can produce a spill-over effects and how to make the digital spill-over happen in Africa?

Africa digitalisation is highly reliant on FDI, yet technology spill-over takes effect differently. “The increase in FDI has brought a package of capital, management expertise and production technology, which can not only help boost host country’s economic growth rate by supplying capital and facilities but also spur industrial development through positive spill-over occurrence”.(Zhu, 2010,p178) The African economic development model is still a mode of economic growth driven by resource development and export demand without “sufficiently developed or diversified” economy. Even worse, the income level of Sub-Saharan Africa has declined recently. Africa’s good economic performance results mainly from the combined effect of external factors such as aid, debt reduction, and rising commodity prices in the international market, as well as internal factors such as the elimination of malpractice including corruption. I conclude that Investment-based economic growth has not brought about real changes in technology and human resources because of the structural disadvantages of industry convergence. Taking FDI in the oil industry as an example, most of the current oil control rights in Africa are in the hands of multinational companies in France, Britain, Italy,

and the United States, African countries have only received a portion of the revenue from petroleum exploitation. Nigeria is a typical country. However, the current value of oil development in Africa is limited to oil extraction and transportation. I even suffered from lack of petrol in Lagos in 2017, as there are no oil refining factories in Nigeria, which has the richest oil resource in Africa. When the legal currency of Nigeria Naira went weak in that year, Nigerians cannot import the most abundant resources of their country, refined oil, by the legal currency due to lack of US dollar reserves. Almost all African countries still have weak oil refining capabilities and short industrial chains, and have not received the benefits of value-added processing. Therefore, I conclude that with the growth of FDI, the technological progress and the production rate of all elements in Africa have not achieved simultaneous growth, and the efficiency of economic growth has not been significantly improved.
The universality of technology shall not produce spill-over effects unless the transaction costs are greatly reduced. This idea was argued by interviewee 10, who was the president of an ICT giant in charge of Africa carrier business and majored in economics in Nankai University 20 years ago. We think that the synergies of the technology and social development in digital transformation of carriers may be divided into 3 categories, category 1 is based on the relationship between government and carriers within a country, category 2 relies on the relationship between the host country and multinational ICT players, category 3 is about the relationship among different carriers within Africa. Multinational enterprises come into Africa with the purpose of chasing quick profits, yet the host country government is responsible for long-term planning. Politicians in Africa prefer to mention that creation of jobs as direct contribution of global ICT player. However, policy makers should be aware of increasing the level of absorption and utilisation of direct investment is far more important than just creating jobs. A consolidated idea (int1, int3, int7, int 9) shows government failed in the incentives to increase technology spill-overs for Africa local enterprises to reach the effect of scale for sustainable growth leading to the key disadvantage between Africa and other digitally fast-developed regions. It is further concluded that up to now there is great space for multinational enterprises to raise the level of industry and technology transfer implement effective localization strategies, improve the adaptability of manufacturing and technology to localization, and finally enhance the technological spill-over effect of investment in Africa. Furthermore, the first step suggested by int 9 is to make local manufacturers part of global supply chain, making some supplementary parts around the core parts of multinational companies(Int 9) Another effective path is to identify the technologies from the top, carriers can vertically integrate and maximise the effects(Int 9) From the case study of M-PESA, we can conclude that the links between local Africa enterprises and multinational companies in the upstream and downstream industrial chains are essential to promote the specialisation and agglomeration of enterprises, thereby reducing production costs and improving domestic production capacity.
Industry convergence requires combination of technology and long-term policy. Technology requires fusion and industry convergence and the right government strategy to match them in Africa, the copied experience from other countries never works (consolidated from int1, int2, int3). The

correlation between multinational companies and the host country's telecom industry is another important aspect of promoting the development. Some government setup realistic plans to put the resources of domestic and foreign players together. A disadvantage in Africa is that rapid changes of political parties have led to short-term policies and instability(Int10) In contrast, in Germany's Industry 4.0 and Made in China 2025, it is clearly defined that the use of ICT helps the country's manufacturing industry become smarter. According to the Ex-CEO of Huawei Africa, the smart community strategy launched by the Malaysian government has enabled the digital economy to jump to 17% of the country's total GDP in just three years, with the growth rate among the highest in the world. (Li Peng, 2018) The fact is that the degree of convergence in Africa is much lower than the rest of world. ICT as a complex technology intensive industry has less likelihood of convergence than traditional industries in Africa. Policy changes in African countries have prevented multinational companies from developing effective long-term investment strategies, leading to conflicts of interest(Int3, Int6) At present, the policies developed by the government lack continuity and arbitrariness, resulting in insufficient protection for multinational investors. It is necessary for policymakers to think long and identify the correlation between fusion possibilities and investment from the merging fields to create the most possible and applicable field of new technology areas to be grown.

6.3.2 Technology, Not Prerequisite

Technology is the process of organisations turning capital, material, labour and technology into more valuable products and services. (Christensen, 2013) Technology could be achieved by purchase, transfer and development of techniques. However, enterprises cannot produce innovative products and processes exclusively through in-house R&D due to the burden of investment and risks. It would be easier for them to procure and absorb technology from other entities through technology transfer to boost organisational technology advancement to benefit from lower level of risk, less costly investment and higher level of efficiency. (Huynh, 2018) Therefore, I see the digital strategy of Africa carrier is a typical tripartite participation strategy based on a win-win framework for the government as the advocator, the carrier as the key promoter, and the technology partner as the solution provider and enabler.

Technology in the digital transformation is less important compared to other endowment resources with its originality in Africa (Int10) One of the basic assumptions of economics is that the demand curve tilts to the lower right, which means that demand is negatively correlated with price. The long tail theory creates niche market space with huge demand outside the existing industry by breaking away from competition and game with rivals in the existing market. It enters a new field. The utility value of goods or services becomes the decisive factor affecting demand, and price degenerates into a secondary factor. (Anderson, 2007) One important resource for Africa carriers is that the access to local originality of content. I visit Nollywood and met some famous directors in their simple and humble workshops at the mainland of Lagos in 2017. From the content perspective, locally made films

create a huge entry barrier for global OTT players in Africa market. Although content consumption in Nigeria is driven by the need for information, entertainment and education. Some Africa carriers position themselves as media and entertainment gateway to use the originality of Africa content as its core resource, others as smart pile lines. “Mobile content and services are the future: a world where customers will, through a handheld device, transact banking services, make purchases, access news and stories, play games, view videos and TV, gamble, etc”. (Peppard and Rylander, 2006) Admittedly content plays an essential role in defining industry structure and creating value because complementary approaches to monetising content across the value chain is quite challenging for multinational companies. When I work with MTN on behalf of my employer in the digital services in Nigeria in 2017, we found that must-have content like local music and short videos connected the Telecoms and end users and created the value for both sides. Instead of prematurely conducting R&D to create advantages in product differentiation, it is more realistic to create more economic surplus and accumulate capital by providing services like must-have content locally. It is concluded that the way to maximise the ability to create economic surplus is to give full play to one's own comparative advantages of carriers. (Int10)

Low levels of digital success result in a mismatch of demand, which leads to an untapped demand in digital services. The misalignment between demand and supply contributes to some misunderstanding and doubts about Africa carrier innovation capacities. “The key is understanding how to achieve the needs in the emerging Africa telecom market”. (Int 7) Meanwhile, “the biggest challenge is that services of carrier are not providing seamless experience” after the demand was identified. (Int7) We conclude that integration of creative collective service offering is more important and the right and realistic strategy to response to the identified demand. Carriers must focus on addressing this function to eliminate segregation of untapped demand and the services. M-PESA is a typical example of finding the untapped demand of banking services and make it a seamless experience with technologies from China and EU. I believe that product market adaptability, personnel and business matching are core capacities for Africa carriers. “All companies focus on a high-income group, but the long tail market is neglected, where the potential for carrier lies in solving simple problem for users, does not need to be all round player”(Int 5)

A further market convergence instead of technology convergence might trigger new industry convergence. The cost of technology adopted in Africa is cheaper than the rest of the world according to Int 10, as the R&D cost has been split by the first users from developed markets like EU and Asia. In this situation, technology-driven input-side convergence is not the key driver of the industry convergence in Africa. We see that the trend of digitalisation, networking and wireless after the 1990s have led to the convergence of information processing and communication methods. Technology convergence happens when the combination of current technologies replaces established technological methods, resulting in disruption of the existing industry value chain. As a result, the traditional industrial boundaries have been reintegrated and divided. However, this is not the case in

sub-Saharan Africa. The scale of the market for financial services undeveloped provides a great opportunity for Fintech start-ups. As a mobile payment platform, M-PESA is reorganising the financial industry in East Africa. At present, mobile payment has not fully covered Africa's largest economy. Even though the mobile penetration rate is close to 80%, still there are 57% of adults who cannot enjoy the financial services. Therefore, the market-driven convergence instead of technology-driven, leads to the development of a new inter-industry segment. Existing studies suggest two major precursors of industry convergence: first, the technology convergence and, second, market convergence. As firms gradually engage in these interorganisational activities, market convergence leads to collisions between existing business models and removes boundaries between the relevant industrial sectors—that is, industry convergence (Lee *et al.,* 2016) . Market convergence becomes the foundation for industry convergence in Africa.

6.3.3 Education and Trust

An unexpected topic of elementary education occurred in the interviews of my studies. Elementary education is not employment-oriented. However, its influence upon the digital revolution is repeatedly indicated by participants. Ethnic conflicts, political corruption, transaction costs, social & interorganisational trust and social responsibilities discussed become important influencing factors. Therefore, we find ICT companies are not only profitable entities, but also important to information security and digital transformation of the host country. To make digitalisation happen, companies not only provide capital in the form of currency, but also in the form of trust about social capital. Management of carriers and officers of the nation should expand their eyes to elementary education since right knowledge of digital started from primary education. (Int 9) The lowering age of the population in Africa is not only a potential factor for an increase in the unemployment rate but also poses a serious challenge to education and digital transformation. Elementary education is the precondition for cultivating future talents. Although Africa's current primary school enrolment rate is above 80% on average according to official statistics, the quality of teachers and level of teaching lagged far behind, which makes the knowledge and skills of students less competitive. Unfortunately, during my stay in Nigeria, some schools are even shut down due to lack of finical support in 2016 and 2017. When I travelled in Ghana, Kenya and South Africa in recent 5 years, I also see more and more young people without schooling locally and from neighbouring countries gathered in big cities for survival, which leads to a doubt to the 80% of the official number mentioned before. This idea was also reflected in the interview. Africa educational system need make people realise that they can play in this domain as most apps and services are provided internationally in Nigeria(Int1) Another interviewee addressed the tech impact from ICT industries is more important in making the knowledge flow in rural areas, especially in Nigeria(Int3) An interviewee suggests that carriers depend a lot on the low standard human resources. Brain drain leads to Africa’s lack of good human resources for organisational back-up. This also makes the company/organisation depend heavily on the few ones(Int4)

The ethnic conflicts and political corruption brought about by colonisation influenced social trust that needs to be rebuilt urgently. Indicated in Chapter 2, the level of trust in a country with sustained economic prosperity is relatively high. (Tarrow, 1996) Economic sustainable development depends on the accumulation of social trust resources. ICT companies seeking development in Africa require not only excellent technology and low prices, but also the trust of the public locally. It has been criticised by interviews (int3) that Chinese ICT companies perform transparently poorly and strive to handle relations with the host country badly. It is suggested trust is acquired for a long time to enable digital technology adoption (int7,8). It also requires a "mechanism for long-term risk avoidance and complexity" (int6). In summary, interviewees request a general foundation of transparency, trust and long-term commitment to the process of digital to global ICT giants. Meanwhile, it is necessary to review the cause for this phenomenon from a historical perspective. Many independent countries existed with the increase in communications between various ethnic groups before colonisation. There had been also been a tendency to use a unified language in some regions. However, the colonists adopted the policy of "divide and compulsory assimilation". Areas with the same language and customs were forced to separate, and different areas were compulsorily divided into one place. Moreover, distrust and conflicts between various ethnic groups have increased, political differences have been intensified, and reforms that have just started were forced to stagnate. The slave trade between countries have begun. The city of Lagos, where I stayed for 2 years, used to be the principal port of the 'Slave Coast' at the end of the eighteenth century. "European traders in the sixteenth century used the Lagos channel and the lagoon to approach the Ijebu kingdom, where slaves and cloth were purchased, but this trade lapsed in the seventeenth century". (Law, 1983) To exchange for Europeans with self-defense guns, many Africans were busy catching slaves, and when more people were arrested as slaves, the need for personal self-defence became more urgent, so some people hope to catch more slaves even from their relatives or people they know. Exchange for weapons and catching slaves finally became a "gun-slave cycle" and trust was totally lost in society. The legal system was corrupted when court force people to be slaves in exchange for temporary peace with other tribes or colonists.

An effective digital evolution is based on inter-organisational trust. The ability to be open and collaborative is the key to a more responsive ecosystem, which in turn creates high performing businesses. Indicated in Chapter 2, "when an organisation mobilises its corporate social capital, gaining access to some valued organisational resources held by its collaborators, it also generates commitments and obligations reciprocate to those partners" (Knoke, 2009, p 1690) . ICT is a high-tech industry where the trust of multinational companies should be gained in long-term engagement instead of project-related services. Many ICT companies rely on globalised capacities instead of local ones. A fact is that technical experts of global giants are in the customer country in bidding period while those people are gone when a local customer requests more engagement. Most global companies are claiming that they are localised, but the reality is that the top experts are only in EU and China. ICT giants, who played major roles in Africa, should create a multilateral dialogue system

to balance the interests of multiple parties when assuming social responsibilities. Compared with in EU and US, ICT companies in Africa lack the ability for multilateral dialogue (int7, int8). In the interviews, when talking about the “Belt and Road” initiative of China, many negative comments show that the own interests of local community are not valued. This is reflected in more equal employment, cultural respect and the demands of localization industry cultivation. The international community hopes that ICT companies can take on more responsibilities in the process of foreign development and investment. A typical example is that during my visits to Wits University in Johannesburg in South Africa in 2019, major ICT companies in Europe and the United States, such as Microsoft, Cisco, and Siemens, have in-depth cooperation with universities, such as scholarships and laboratory naming. In contrast, scholarships and naming laboratories are very limited with Chinese ICT companies who invest generously in technology-intensive areas such as Europe and the United States. This shows that Chinese ICT companies tend to pay more attention to technology acquisition and transformation, and have shortcomings in technology dissemination and localization contributions.

Carriers can reinforce trust relations through inter-organisational engagements to reduce the reliance on technologies. “Corporate social capital also exists at the interorganisational level”. (Knoke, 2009) The social capital directly affects the opportunity of knowledge transfer, and the structural latitude of social capital through the relationship and cognition. Carriers in Africa have the privilege to engage with various partners incl. ICT and content providers, the relationship and cognitive elements between organisations create the opportunities, motivations and capabilities of knowledge transfer, and ultimately promote the occurrence of knowledge transfer between enterprises(Int10) With the popularity of internet communication, virtual teams are temporarily assembled to complete a specific goal. Even in a small project, team members are distributed in different regions and communicate mainly through the Internet. Most of their tasks have no path to follow and are knowledge-intensive. The completion of the task mainly depends on the communication of network technology and the transfer of tacit knowledge. Indicated in Chapter 2, through interactions of knowledge, different individual knowledge in the enterprise can create new knowledge during the imitation process, exchange and combination, and disseminate it in the group.

Ethics, law, and market mechanisms are three indispensable means for regulating business operations. As a practitioner who expect long-term return of the market of Africa, with ethical and moral regulation, the effects of market regulation, legal regulation, and government regulation will be more obvious and effective. Social responsibility of both carriers and ICT players will be more proactive and active, especially when entering Africa market. However, as mentioned earlier, the current cultural compatibility of China ICT companies, especially in the moral aspect, is still a short coming compared with economic and technical capacities. Therefore, it is necessary to strengthen the efforts in corporate ethical culture(Int6). Relevant government departments from both host county and home countries should make vigorous publicity, and guide enterprises to establish an appropriate sense of social responsibility.

6.3.4 Absorptive Capability

Human capital is the indispensable path linking the transfer of technology to local productivity as indicated in Chapter 2. A sufficient absorptive capability of advanced technologies is available in the host economy is the prerequisite. (Borensztein, De Gregorio and Lee, 1998) Africa's digitilisation journey has depended on financial assistance from EU and China. Structural and economic aid has allowed global powers to have the upper hand and gain more economically leading economic inequality. Most successful technology transfer goes beyond the transfer of physical properties; it also involves other intangible elements such as knowledge and experience sharing (Huynh, 2018) The knowledge sharing directly leads to technology convergence, which requires local enterprises to acquire organisational learning and absorptive capacity to detect, integrate and absorb knowledge. Organisational learning requires transformed cognitive structures when new knowledge cannot be assimilated. To use knowledge is more important than to create knowledge in Africa(consolidated from discussions with Int1, Int2, Int 3, Int 9) "Technology has no boundaries, the later you use, the cheaper you get. Africa carriers' acquisition cost of tech is lower than other regions because the use the later tech compared with Asia"(Int 10) Another interviewee argues multinational ICT companies play both the enabler and aggregator by providing equipment and applying the knowledge learned on the platforms, respectively, in Nigeria(Int1) Absorptive capacity, as a process capability for enterprises to process knowledge in a constantly changing environment, is not only based on the resource-based view, but also the embodiment of the enterprise's capability. During my visits in Lagos, Accra and Nairobi, I find that many employees from carriers were educated in UK and developed regions. Although brain drain exists, carriers still have relatively best local human resources compared with other industries in Africa. Firms transform their knowledge structures when knowledge cannot be assimilated (Todorova and Durisin, 2007). The technology level of Africa carriers keeps low, most of which are companies dressed in high-tech cloaks. Local interviewees hope that ICT companies implement openness of codes, build local labs with carriers and universities (Int1, Int7), but it is more urgent for Africa carriers to set up own organisation capacities for local absorption. A comparison from my experience between Africa carriers and China is that the high costs of purchase spending in Africa because of the low level of tech absorption. After China carriers bought equipment from western countries, the tech absorption makes them quickly catch up with tier 1 player and become less dependent. Therefore, absorptive capacity has become the link between the traditional resource-based way and the current enterprise competence concept.

Knowledge sharing from global ICT suppliers is the quick path to build absorptive capability. "Only collaboration with research organisations and competitors have a positive effect on product innovation capability. Furthermore, in process innovation capability, collaboration with research organisations and suppliers are the most important factors". (Schweisfurth and Raasch, 2018) However, there are limited research organisations. Therefore, the collaboration with global ICT suppliers became dominant factor in building process innovation capability for carriers in Africa. R&D costs for Chinese ICT companies are sunk costs after they target the main market like EU and Asia.

Carriers can use the principle of affordable technology (lower prices compared with mainstream western customers) to develop new technologies in Africa. Smartphone around 100 USD is a typical positive example mentioned, which greatly enhances the adoption of digital services in rural areas across Africa. During this process, Africa carriers have more opportunities to lower the costs of product innovation and put the saved costs into local training and enablement of related industries. “Telecommunication in Nigeria has grown significantly since the entrance of the Chinese experts through their companies”(Int1) The maintenance of communication base stations has improved the localization capabilities of power, air conditioning and refrigeration, firefighting and power for computer rooms. As T3 data centres have increased significantly in Africa, more and more local engineering and technology companies have emerged(Int 10)

Corporate social capital increases through work-related organisational roles, which facilitates knowledge to flow. A Nigeria interviewee suggests, “sponsorship of local tech competitions is an effective way for ICT companies to facilitate knowledge to flow, which enables and educates students and SMEs in developing their solutions for big organisations”(Int1) For example, it is likely that carriers establish different services with multiple partners. When Huawei cooperated with MTN in Music in 2016, MTN can still choose cooperation with Spotify to target the high-end market in Africa. Different business models can also be supported in multiple relationships when new software systems facilitate different tasks. Mobile Internet and self-service portals automate the process of collaboration. Corporate social capital increases through work-related organisational roles. Cross-organisational knowledge transfer relies on the opportunities, motivations and capabilities of knowledge transfer between knowledge transferors and receivers. The level of social capital owned by enterprises is positively related to the level of knowledge transfer between enterprises.

6.3.5 Costs of Africa Institution

The transaction costs in Africa requires full society to reduce it, not only within carriers(Int 10) Institution increases transaction costs and affects the performance of foreign ICT companies negatively. I learnt from older people in Nigeria, who have one playbook: “go slow, find a path to profitability and stay the course”. In other developing countries, internet industry grows faster than traditional ones, but Nigeria is different. Local people believe that companies do “flashy things”, they will “burn” in Africa. Some international OTT giant failed with million investments, for instance OPay from a Norwegian multinational technology company Opera discontinued ORide, OCar, OExpress businesses in Nigeria within 2 years. According to some casual discussions with insiders from Lagos, Nigeria market is an outcome of political rules, which are controlled by interest groups, with "interests" rather than "efficiency" as the basic principle. “Flashy things” will “burn” without meeting the expectations of the interest groups. Therefore, the so called “free market” in Africa does not necessarily "reduce" transaction costs, it can only "affect" transaction costs, which may decrease or increase. This explained the opinion why it is necessary to go slow in the digital business in Africa. We generally believe that "digitalisation" can reduce production costs, but I realise that the division of

labour, the transfer of interests of the original benefiters and political games caused by digital progress will increase transaction costs. "Africa Institution" affects transaction costs and the outcome of digital transformation. When we analyse the problems in Africa, it is totally wrong to purely estimate the reduction of production costs caused by digital technologies. The assessment should involve reducing the "total cost" composed of transaction costs of Africa Institution and production costs globally. This situation in Africa can also be explained with the idea from North, if the political rules conform to the Coase theorem, that is, the low transaction cost of the political market may produce effective property rights. If the opposite is true, invalid property rights may appear. The system and the technology used together determine transaction and production costs, which in turn affect economic performance. (North and Institutions, 1990)

6.4 Reshape the Organisation

In the digital age, the abilities of employees in the ICT industry are constantly improving. The knowledge, abilities, information, and degree of independence possessed by employees enable them to clearly understand their own needs and values. Simultaneously, the management of organisations owning resources, platforms, and the power of integration of resources understand more of their attributes and values. Organisation is most mentioned and discussed in my interviews, which is core in assessing digital maturity in Africa.

Organisations with powerful individuals will have more powerful influence on control uncertainty; and powerful individuals need to be grafted into a powerful organisational platform to release the huge value of individuals. “Successful digital transformation comes not from creating a new organisation, but from reshaping the organisation to take advantage of valuable existing strategic assets in new ways” (Westerman, 2011). To be the best digital player, the key focus is to transform the organisation(Int1) .

In Africa, the environment in which companies operate is highly variable, and the unpredictability of political factors is higher than others. Organisation turns out to be the most important element in the process due to its unique and unreplaceable function of combining people and. Some criticism repeatedly occurs from my interviewees of diverse backgrounds: legacy team and old thinking, bureaucratic conservative organisations, cutting the budget from future innovation, segmentation within an organisation with different KPIs between different people, disconnect between the investment function and the growth function when it comes to acquisition, etc. Internal organisation inertia and external unpredictability force Africa organisation to be more adaptive and open to win.

6.4.1 Responsiveness Agility

Strategy leads the organisation. The direction of organisational change is where the strategic business grows, and where the organisational capabilities reside. “The managerial approach to implementing and executing a strategy always must be customised to fit the particulars of company’s situation”. (Peteraf *et al.,* 2015, p. 288) Admittedly, Africa carriers choose to improve for better instead of implementing radical strategy changes.

The ideal digital organisation is project-based, rather than position-based. It is no doubt that the carrier organisation failed not only to change around the value of customers but also in making the organisation simpler, more agile to respond to customer needs. “Only overhauling legacy HR systems can extend business boundaries of carriers, increase technology level to serve more customers”(Int 11) He also indicated that MTN already started creating separate business divisions of Fintech on mobile finance business, which attracts new talents without support from the legacy organisations. Another example, Djoliba company was created separately, which becomes a standalone separate network of Orange in West Africa(Int 11) Admittedly, it is a global trend. China Mobile also separates the legacy traditional organisations in new business units. The core of building a customised organisation is to improve the response speed of the market no matter in the format of separate business divisions or small projects teams with autonomy. Therefore, many carriers in Africa are broken down and started to build a smaller business unit. As functional departments must serve both business and headquarters, it needs to be centralised and platform-based. In the interviews, we did not draw a clear picture of the final effective forms of organisation fit. The purpose of structure change is to improve overall customer value innovation collaboration ability, and resource sharing within the organisation. To sum up, any change towards the responsiveness that interacts with customers, suppliers, new technologies and processes to a business transformation is worth a shot. Optimising platforms in the middle office help reduce operation risks and increase customer satisfaction. Although we did not depict a clear and ideal organisation structure, most of interviewees with carrier background agree that the current Business Enabling System (BES) as the middle office are incapable to win in competition. I believe Carriers’ organisational structures cannot be overhauled successfully without agile systems; a typical middle office platform controlled by the headquarters of each country. Recently, customers’ consumption habits have become more Internet-based, and business models of carriers have become complex and diversified. The operation of carriers evolves from managing purely network assets only to placing equal emphasis on customer and network assets. The services promoted to customers are more abundant, the channels for contacting customers are more diverse. This is because the systems break the barriers that IT and business can only belong to different departments under the traditional enterprise organisational structure, integrates business and technology, eliminates the need for cross-departmental transfer of business data, and directly transforms technology-based data analysis results to optimise the plan for the business. Unfortunately, the BESs of carriers are not young and agile. It takes at least 60 days to create a new campaign in my experience in China and no less than 40 days in Africa, which OTTs need only 1 week. Africa carriers realised the shortcoming when MTN in South Africa first optimized the BES with more templatize and standardise tools to accelerate the service delivery, “MTN implemented Catalogue Manager to templatize and standardise the way we make these choices more configurable and therefore simpler to deploy to give the customer a very granular set of choices. The customers can build their own experience, manage their spending”. (Ericsson, 2020) It is concluded that BES has carried out a new reconstruction and design from the dimensions of customer

experience, products, marketing, and cooperation. Different operators adopt different paths to improve their systems, such as coexistence of new and old, superposition, gradual transformation, or even end-to-end replacement, which proved to be effective.

6.4.2 Facilitating Collaboration

Collaboration rather than division generates value, where organisational value is reflected on the level of efficiency. The design of the organisation must be integrated with the business process. One indicator of the efficiency is reflected in resource sharing. The other one is in collaboration facilitating, when carrier management shifted their focus from the division of labour on production efficiency of itself to collaboration towards the synergy of a wider value net.

Agility capacities that require high levels of cross-function collaboration in various formats. The digital service department of many carriers, where innovation requires collaboration from many departments will benefit most from agile modes. In the interviews, one example I proposed for discussion is the case of China Mobile that founded many new separate innovation companies. One significant move in 2015 was the establishment of its mobile internet company MIGU in Beijing over RMB 10 billion investments as the start of “China Mobile’s specialised operation in digital content services”. (Limited, 2016) However, “with splitting of the functions of the MTN Group to focus on digital and separate for voice, SMS and data, as discussed above, the two business units are still part of the same business, especially with the shared service being rolled out, operational efficiencies are a key focus”. (Mohamed, 2015) MTN already started creating separate business divisions of Fintech to attract new talents and Djoliba was created separately from Orange. Whether splitting the digital function as a separate company, there is another voice. “Telefonica is a good example splitting out home digital business and just over two years after that split they're integrated the digital business into the core business and the learnings on that was having it as a separate unit was not driving the total shareholder value and hence the reintegration and scaling down to some extent to avoid duplication of resources.” (Mohamed, 2015) Safaricom also works differently with the separate business trend of MTN and Sub-Saharan Africa, who is not willing to spin out the M-PESA unit into a stand-alone business because it highly depends on the original distribution channels of carrier and rely on data analytics of the users to grow revenue. Therefore, the structural design of the entire carrier organisation, whether it is the headquarters, branch companies, or business groups, must be designed around the structure that is conducive to the realisation of strategic goals and business growth. I conclude that for 2C digital business reliant on the resource of voice and data including distribution channels and customer data, operational efficiencies are achieved by the same business unit, for new business without strong support needed from traditional businesses like cloud computing, big data and Internet of Things, totally splitting out the digital function and executive might be more effective. Therefore, the transformation puts forward the requirements of dynamic allocation of resources and even dynamic chaos for organisations to test and verify the effectiveness

first. This structure with agility capacities will finally break from the static bureaucratic model and attain a state of responsiveness to facilitate cooperation successfully.

Functions as components can be pulled apart or put together according to the request of competition. Organisational changes can "facilitate the renewal of traditional business models and creation of a new business model. The company approached innovation without following a structured path, giving no homogeneous structure to the rather scattered internal innovation initiatives". (Latilla *et al.,* 2020) Different business models impose different functional requirements on the organisation. "Because of new technology, companies can pull functions and operations pieces apart and put them back together in new combinations, based on judgments about which operations the company wants to excel at and from where and which are best suited to its partners".(Bhide, 2013) In different periods of strategic growth opportunities and different periods of strategic development, the choice of corporate organisational model and organisational structure is different. One interviewee once argued that "carrier revenue share policy is skewed as it doesn't encourage innovation (carriers take too much revenue share). It worked under SMS but on digital service the current revenue model doesn't encourage innovation, and what will happen and continue to happen is that a few innovative organisations will continue to look for alternative payment methods because right now they feel cheated" (Int 2). Additionally, the strategy also includes the development of core competencies, and the formation of the core competencies needs to be cultivated through the priority development of organisations and talents. When I worked with MTN in Nigeria in 2016, the carrier reduced the investment in traditional Caller Ring Back Tone (CRBT) of value-added service, making a thinner organisation of itself and reducing the revenue share to its platform provider. This is also an appropriate organisational change making a traditional business model of value-added service alive. Functional requirements on the organisation also adapt to business model, for the mature businesses like Voice and Data, it is necessary to optimize the organisation, simplify the organisation, set up people for posts, reduce people to increase efficiency, and improve per capita efficiency; for high-growth businesses including Cloud, Media and Entertainment, it is better to expand the organisation, set up posts for people, and increase the momentum to grab the opportunities; for the future business, it is necessary to pre-set and innovate the organisation case by case. It emerges how decentralization of "authority, the creation of weak management hierarchies, the extension of firms' boundaries through collaboration with third parties and the establishment of an appropriate organisational culture are the most relevant change actions for implementing effective business model innovation". (Latilla *et al.,* 2020)

6.4.3 Empower the Individuals

Africa carriers are mostly bureaucratic organisations. The organisation has a stable structure, the employees have a clear division of labour, and the relationship between the organisation and the employees is clearly defined. In the traditional organisational structure of the employment system, employees must obey the psychological contract of the organisation. During my visits to some key

carriers in Africa from 2016 to 2021, I find that the initiative of individuals in the organisation is feeble, their creativity is restricted, and their autonomy cannot be truly exerted.

It is the influence of compaction in social structure that depresses creativity of carrier employees(Int 10) The interviewee also mentioned a case that Huawei Technologies is offering “salaries of up to $291,000 per year to new graduates with advanced degrees, as it bolsters in-house R&D”. New graduates can also quickly grow and replace the current management people with higher positions. This will not happen in Africa. Compaction or stagnant social structure prevents people from inferior background to come into mainstream society. One negative example is that government officers in Africa with power will easily get scholarship or sponsorships to send their children to get the best education in foreign countries. And after graduation, those with better education have more opportunities to work in local top companies, where carriers are included. Rent seeking in the procurement of ICT projects within Africa society also depressed the creativity of staff, as business decisions are not made based on market demand but on personal interests. It returns to the topic on the Costs of Africa Institution, the total costs, including transaction costs plus production costs in Africa prevent the employee from, making the pyramid-shaped social structure more solidified.

The relationship between the organisation and its members should be based on equality and cooperation. One difference between carriers and other hi-tech companies is that the carrier operates under government licence and intensive capital in Voice and Data services. The production factors recognised by economists such as land, labour, and capital are important, but they are no longer the core factors because people with knowledge make these traditional factors valuable. Compared with Hi-tech companies, capacities of individuals are not placed as top competitive resources. With the continuous emergence of digital opportunities, the traditional employment relationship of carriers hurts people's creativity. New digital organisations must be consistent with the needs of employees. In Voice and Data business of carriers, members depended on the organisation to create value as they cannot get government licence and intensive capital. However, digital business and organisations rely more on members to create value. The relationship between the organisation and its members has changed, which is no longer a relationship of obedience and employment, but a relationship of equality and cooperation.

Improvement of value creation efficiency is carried out by activating the ability of individuals. People take actions to create “social structures”. These structures restrict people's social actions through institutional relations and rules, and people restrict their actions according to the original structural relations. (Whittington, 2010) With the increase and importance of individual value, this HR rule of carriers is undergoing subversive changes. Crowdsource is a typical example. New productivity emerges, specifically in Information Productivity. (Liang, 2015). Traditional carriers demonstrated two major capacity shortages in operation: empowerment and collaboration. In Africa, empowerment has become control at the execution level, and coordination has become an inefficient operation with unclear responsibilities. Therefore, upward, resources and empowerment platforms cannot be aggregated; downwards, it is difficult to integrate comprehensive capabilities in the front line.

“Transformation starts with a new team that grasps the whole concept of the business and how to present the product to customers”. (Int 1) Front lines are both managers of daily affairs and specific operators of long-term strategic directions. Therefore, they can quickly make a coordination strategy and consider the feasibility of collaboration along with practical problems, which can effectively improve the rationality of collaborative decision-making. As discussed previously, a transparent information system makes authorisation possible allowing resource supportive employees.
Remove class rigidity and let everyone have opportunity to become a CEO. What kind of mechanism can activate individuals? The decentralization of decision-making power, especially for traditional carriers in Africa, is an effective way to escalate from traditional organisation to digital. The lack of delegation is especially obvious in my study where trust becomes the most scare resource within organisations. Delegating the collaborative decision-making authority to the front line is a must of Africa carriers. An interviewee once mentioned “they need some level of autonomy, I can talk about this because I lived this and grow themselves, that is not saying that they are unaccountable, or you don’t hold them to their objectives and performance. But generally, they need some level of space to grow, learn, fail, learn again and move on”. (Int 2) “Class rigidity is a great obstacle for young people in Africa carriers who have ceilings to get promotions to key positions. Gifted People Plan are very effective ways to break out the class rigidity of traditional organisations like carriers in Africa and let young people grow”(Int 10) Net structure enables responsibility sinking. Some successful corporate practice indicates it is effective to build a platform to empower individuals and teams, and then to effectively empower, manage independently, and drive themselves; the organisation must be "decentralised" and de-leader. “The main problem is a hierarchy whereby actions are taken based on the boss likes” (Int 3) In Nigeria and Kenya, I also found local team members were more reluctant to share responsibilities but prefer to push responsibility up to others due to the lack of net structure. When we change the reporting relationship from the Title to the Role, organisation changes from one centre to multiple centres that avoid excessive concentration of power and the respect of the power of individuals can happen. In each task, members will get more resources and right to speak.

6.4.4 Openness Culture

“Resources (people, technology, information, cash, etc.) are the most tangible factors because they can be hired and fired, bought and sold, depreciated or built. They are often visible and measurable, and can be easily transported across the boundaries of an organisation”. (Christensen, 2013) However, several authors (Bangura, 2005; Bolden & Kirk, 2005; Eckert & Rweyongoza, 2015; Malunga, 2006; Masango, 2002; Nafukho, 2006; 2008; Jackson, 2004) have specified “the manner in which management and leadership theories and practices are imported from the West and the fact that this leadership practices tend to have limited application to the African context and culture”.(Muyia and Nafukho,2017) The intersection of Africa’s conservative culture play a significant role in the adoption of digital services, and culture of conformity also played a peculiarly negative role in organisational level in new business opportunities.

Tolerance to mistakes is the key factor of culture against innovation fatigue of Africa. "In the increasingly complex world we live in, constant adapting (and accepting failure as part of the learning curve) is the most effective way to solving complex issues". (Harford, 2011) In ICT industry, the success or failure of countless new product developments or new business models have verified that the best way to deal with the VUCA (Volatility, Uncertainty, Complexity, Ambiguity) era is to quickly try and error, and use short-term feedback loops to continuously collect feedback and make adjustments to ensure. However, "many traditional systems are still handed down, and the elements that hinder social and historical development within civilisation is strengthened by colonial rule, which still plays a significant negative role in local life after the end of colonial rule". (Fieldhouse, 1983) In my practice, the products and services in ICT industry seldom meet the expectations of the customers at the very beginning, which takes a long time for improvement. "Wrong decisions aren't necessarily bad but indecision is worse" (Int 2). As an ICT practitioner, finding new growth point is neither a rigid plan nor a negative "reaction", but a dynamic future obtained by trying various small-scale, fast, flexible, and low-cost practices. Conservative culture strengthened by the remaining colonial rule prevents the carriers from building its future. The result of the strategic planning and balance of flexibility is to quickly respond to market changes, better predict future business, and more innovation and opportunities. Furthermore, as there are limited successful cases in Africa, learning from practise is better than second-hand experience. The most effective exploration practise can not only reveal unexpected future direction but unpredictable random factors. From my cooperation practise with carriers it is not a blind pursuit of perfection, but market feedback obtained through products, and rapid upgrading. The failure of path dependency in Africa tells that there is no need to spend too much time to try predicting trend that cannot be grasped at all. The effective way is to plan the own development strategy concept, and constantly explore and test the effectiveness of strategy under various possible conditions. A vigorous strategy will certainly stand the test.

Adaptive leadership requires more frequent reviews aligning goals with diverse parties within the organisation. "Maturing organisations are nearly twice as likely as less digitally mature entities to have a single person or group leading the effort". (Kane *et al.,* 2015) Kane proposed a concept of "leaders' digital fluency", which requires the "ability to articulate the value of digital technologies to the organisation's future". (Kane *et al.,* 2015) Human resources coupled with the correct executive mindset paves the way for digitalisation. Africa carriers are latecomers to digital strategy and talent acquisition. As latecomer, it is more important to set goals and adjust for it from the top. As a result, "transformation starts with a new team that grasps the whole concept of the business and how to present the product to customers, and a more promising approach is to train current staff in digital capabilities". (Int 1) The executive leadership of carriers is critical because of unpredictability of politics and the inertia of organisations in Africa. The scarcest resource of carriers is not necessarily technological know-how but an adaptive leadership. Meanwhile, carriers must accept the alternative leadership paradigm. "Organisations infused with hard work humaneness, caring, dignity, respect,

community involvement, and sociability are likely to enjoy more sustainable competitive advantage than those that do not".(Muyia and Nafukho,2017)

Culture of openness reduces conflicts in operation, promote innovation and encourage risk taking. Culture of ICT industry comes from a fusion of consistency and diversity from the different participants of ecosystem. In Africa, diversity is a normal state as the organisational culture within the organisation is formed on the basis of absorbing the core cultural concepts of various upstream and downstream enterprises from EU, China and US. For example, as an employee from Asian companies have overtime working culture, and suppliers in Africa or Europe often adapt to this culture. Cultural diversity is conducive to breaking the organisational inertia and forming a cultural atmosphere that stands out for innovative ideas. Industrial collaboration has fostered the integration of cultures, and mutual learning has promoted an innovation culture. Whether in US or Africa, the characteristics of the digital industry participants are unchanged, that is, ecological dependence and high division of labour. Even the giants rely on thousands of ecological partners to make their products competitive. Microsoft only supplies the operating system software, Intel can only do the processor, and from the application to the middleware, there are tens of thousands of business partners to complete the offer to end users. Another example is the 4G network of MTN in Nigeria, which is also the result of the collaboration of industrial partners such as Huawei, Microsoft, Oracle, Cisco, Samsung, and Transsion. Moreover, MTN is most proud of is his SIM card sales network all over urban and rural areas and the huge contribution it brings to the employment of vulnerable people. Openness is a prerequisite for organisations to fully collaborate in digital operations. The organisation is a cooperative organisation formed by different parties with heterogeneous resources on the basis of modular division of labour under unified rules and standards. Around the common goal, all enterprises integrate with each other in terms of corporate values, business philosophy and organisational atmosphere, forming a certain consistency.

6.5 Chapter Summary

After identifying the most significant elements that have contributed to the hindrance of digital adoption in the continent, this chapter focuses on factors in societal and enterprise levels, assessing three kinds of organisational capital: human, cultural and social.

Characters of digital transformation are first analysed in an Africa context. Reliance on external resources to provide funding as well as to provide technology for carriers is an important feature of the Africa economy. The lack of internet access and mobile services (especially in rural areas) is the main obstacle during the digitalisation process and high data costs as well as mobile devices hinder penetration of digital services. Users demand from rural area is key as a foundation of digital adoption. In developed areas, this user demand serves as improving convenience purposes, but in Africa, it is purely a survival and compulsory need for most users.

Infrastructure worsens and depressed the strong demand of digital services. Sustained low data penetration continues to contribute to the differences between the Africa's ecosystems to the rest of

the emerged markets. The importance of ICT development is neglected in Africa, which has not been given the same priority as the development of other infrastructure and social services such as roads and bridges. Meanwhile, a technology roadmap for investment in Africa is never clear and forethoughtful to attract and guide multinational companies to invest step by step. Investors in Africa are conservative because ICT facilities are “external” where the social benefits cannot be 100% turned into corporate benefits. Therefore, relying solely on foreign capital to solve investment in ICT facilities is currently ineffective in Africa. It is an important premise of ensuring sustainable ICT investment to keep companies profitable eventually. Coase’s idea proved not effective and it is difficult to achieve the situation of zero transaction costs. The government should keep the dynamic adjustment between investor and public balancing benefits, strictly protect property rights and create a fair investment environment. Therefore, to encourage foreign capital to invest in ICT, it is necessary to convert social benefits into investor benefits, and to make investment ICT investment returns not less than the average return on social investment.

Next, how to transform knowledge into real innovation and the key influencing factors are assessed. New knowledge occurred, then was digested locally to become solution knowledge, this process helps carriers obtain more business opportunities, expand cooperative relationships and improve their competitive advantages. Africa digitalisation is highly reliant on FDI, yet the technology spill-over takes effect differently. Investment-based economic growth has not brought about real changes in technology and human resources because of the structural disadvantages of industry convergence. Therefore, the technological progress and the production rate of all elements in Africa have not achieved simultaneous growth, and the efficiency of economic growth has not been significantly improved. The universality of technology shall not produce spill-over effects unless the transaction costs are greatly reduced. Up to now, there is great space for multinational enterprises to raise the level of industry and technology transfer, implement effective localization strategies, improve the adaptability of manufacturing and technology to localization, and finally enhance the technological spill-over effect. Industry convergence requires combination of technology and long-term policy. It is necessary for policymakers to think long and identify the correlation between fusion possibilities and investment from the merging fields to create the most possible and applicable field of new technology areas to be grown. Technology is the process of organisations turning capital, material, labour and technology into more valuable products and services. (Christensen, 2013) Therefore, I see the digital strategy of Africa carrier is a typical a tripartite participation strategy based on a win-win framework for the government as the advocator, the carrier as the key promoter, and the technology partner as the enabler.

Technology in the digital transformation is less important compared to other endowment resources with its originality in Africa. Instead of prematurely conducting R&D to create advantages in product differentiation, it is more realistic to create more economic surplus and accumulate capital by providing services like must-have content locally. It is concluded that the way to maximise the ability to create economic surplus is to give full play to one's own comparative advantages of carriers(Int10)

Low levels of digital success result in a mismatch of demand, which leads to an untapped demand in digital services. I also conclude that product market adaptability, personnel and business matching are core capacities for Africa carriers. A further market convergence instead of technology convergence might trigger new industry convergence.

To make digitalisation happen, companies not only provide capital in the form of currency, but also in the form of trust about social capital. Management of carriers and officers of the nation should expand their eyes to elementary education since right knowledge of digital started from primary education. The ethnic conflicts and political corruption brought about by colonisation influenced social trust, which needs to be rebuilt urgently. In the past, many independent countries existed with the increase in communications between various ethnic groups before colonisation. Meanwhile, the legal system was corrupted when court force people to be slaves in exchange for temporary peace with other tribes or colonists. An effective digital evolution is based on inter-organisational trust. The ability to be open and collaborative is the key to a more responsive ecosystem, which in turn creates high performing businesses. However, the study shows that Chinese ICT companies tend to pay more attention to technology acquisition and transformation, and have shortcomings in technology dissemination and localization contributions.

Ethics, law, and market mechanisms are three indispensable means for regulating business operations. The knowledge sharing is one significant element in digital economy, which directly leads to technology convergence, requiring local enterprises to acquire organisational learning and absorptive capacity to detect, integrate and absorb knowledge to evolve in ICT industry convergence. Organisational learning requires transformed cognitive structures when new knowledge cannot be assimilated. Therefore, absorptive capacity has become the link between the traditional resource-based way and the current enterprise competence concept for Africa carriers. Knowledge sharing from global ICT suppliers is the quick path to build absorptive capability. Corporate social capital increases through work-related organisational roles, which exchange information and facilitate knowledge to flow. Again, the transaction costs in Africa require the full society to reduce it, not only within carriers and assessment should involve reducing the "total cost" composed of transaction costs of Africa Institution and production costs globally. (North, 1990)

Finally, some suggestions are given on reshaping the organisation to take advantage of existing strategic assets. In the process of transformation, organisations with powerful individuals will have more powerful influence on control uncertainty; and powerful individuals need to be grafted into a powerful organisational platform to release the huge value of individuals. In the emerging markets of Africa, the environment in which companies are operated is highly variable, and the unpredictability of political and economic factors is higher than others.

Strategy determines and leads the organisation. The direction of the organisational change is where the strategic business grows, and where the organisational capabilities reside. The ideal digital organisation is project-based, rather than position-based. Optimising platforms in the middle office with a robust service management capability helps reduce risks, and increase customer satisfaction.

The BES has carried out a new reconstruction and design from the dimensions of customers and experience, products and commodities, marketing and promotion, services and transactions, cooperation and openness.

Collaboration rather than division generates value, where organisational value is reflected on the level of efficiency. Agility capacities that require high levels of cross-function collaboration in various formats. This structure with agility capacities finally breaks from the static bureaucratic model and attain a state of responsiveness to facilitate cooperation successfully. A distinct character depressing autonomy and creativity of carrier employees is that the influence of rent seeking and compaction in social structure. The relationship between the organisation and its members should be based on equality and cooperation. Improvement of value creation efficiency is carried out by activating the ability of individuals. Therefore, they can quickly make a coordination strategy and consider the feasibility of collaboration in combination practical problems, which can effectively improve the rationality of collaborative decision-making. Remove class rigidity and let everyone have opportunity to become a CEO. The decentralization of decision-making power, especially for traditional carriers in Africa, is an effective way to escalate from traditional organisation to digital. In each task and field, some members will get more resources and right to speak than others. Tolerance to mistakes is the key factor of culture against innovation fatigue of Africa. Adaptive leadership requires more frequent reviews aligning goals with diverse parties within the organisation. Culture of openness reduces conflicts in operation, promote innovation and encourage risk taking. Culture of ICT industry comes from a fusion of consistency and diversity from the different participants of ecosystem. Around the common goal, all enterprises integrate with each other in terms of corporate values, business philosophy, organisational atmosphere, etc., forming a certain consistency.

Chapter 7: Implications for Future Practice: Enable Value Net Synergies

7.1 Introduction

In Africa, if we follow the literature with presumed conditions of free market without considering the historical formation among carriers, it is difficult to understand the process of organisations entering the digital ecosystem, and driving forces behind. I would attempt to identify main characteristics of a digital ecosystem in Africa, elaborate what are the key factors of the digital value network and go into the capacities needed in the establishment and management of the digital ecosystem in this chapter.

In a market full of uncertainty, the era of relying on a single party to win is gone, the possibility of a single enterprise's growth is getting smaller and smaller. Every organisation is in an ecosystem, so the fate of an enterprise is combined with other symbiotic ones. Linking members together to form a community with a shared future is a choice that must be made.

In this chapter, I would use the concept of value net as a key industry logic to further evaluate the strategy to enable symbiosis and overall performance in a responsive digital ecosystem. I first looked into background of telecom ecosystem and examine the characteristics of the value net. A key question on how to establish the required capacities would be elaborated. Then the discussion leads to a converged study on building a value-creating system, managing the failure risk, clarifying local strategy and deep insight into collaboration with complementor. Finally, four aspects are examined in value proposition, core competence, incubation and co-value creation to enable the value net synergies.

7.2 Background of Telecom Ecosystem in Africa

In telecom, the network (short for net) is a kind of "net" structure formed by connecting nodes and fibre lines, metal wires and other similar objects in communication lines. The net is used to describe the connections. During the participation process in the digital transformation, through the flow of resources, various formal or informal relationships are formed between each other.

The organisation in the network is called a node. Indicated in Chapter 2, the interaction of these nodes is neither through market transactions nor through the internal integration process. It is done through coordination. Admittedly in the market competition, companies need mutually different core capabilities to form a greater competitive force, which is the driving force for both parties to establish a cooperative relationship and aggregate with each other's core capabilities.

7.2.1 History of Carriers' Value Net

The most important motive for establishing a net organisation is to obtain resources that cannot be independently obtained from individual vendors to create value. Carriers have limited resources for innovation. By establishing a net, the enterprise obtains complementary resources and capabilities

from net partners and can quickly cultivate and develop new competitive advantages. In other words, by maximising the utility of internal resources of the enterprise, can carriers and partners realise the state of synergy.

Africa carriers have achieved continuous growth by integrating equipment providers, terminals manufactures and content providers. Before the 1990s, global telecom operators were in the early stages of development. They provided telephone services to users based on circuit-switched networks, with extensive network coverage and voice connection quality as their core capabilities. The structure of the value system is simple, the participants produce and deliver clear products, and their value activities and capabilities are clear. In the traditional value chain, equipment suppliers provide network equipment when operators construct and maintain switching networks providing voice services, ultimately realising the telephone switching function. This is a stable, pre-defined value system, which mainly relied on increasing investment, expanding the scale of the network and attracting users to promote growth.

In the late 1990s, carriers in China and Africa began to develop and grow, making partial improvements to meet the special needs of segmented user markets with the trend of global technologies. At the second stage, the intelligent network system attached to the basic telephone network came into being. The intelligent network was a new telephone network concept proposed and developed by the US telecom community in 1984. Since in the traditional telephone network, the software of the switch must be changed every time, business development is still slow. The intelligent network uses the principle of separation of control and business. With the intelligent network, various voice services can be flexibly carried out based on the telephone switching network. Africa Telecom operators have launched many flexible services using intelligent networks. In my experience of supporting carriers since 2016, some services are same as EU, while others are unique just like mobile money. At this stage, it is mainly through adding an intelligent network platform to the original switching network to create added value. The services provided by the intelligent network are mainly developed by equipment manufacturers like Ericson, Huawei and ZTE, and the value activities and participants have not changed. This partial improvement has increased the added value of the original exchange network and promoted the stability of the value system. In the third stage, a future-oriented value system has been gradually formed. The goal of the value system is to develop new business concepts. Fundamental changes have taken place within the value system, resulting in many new value activities. The first step of the continuum is a stable system based on the carrier's own core capabilities of communication services; the second step is to use partial changes to form a stable system. In recent 10 years, new digital services platforms have become cheap and common capacity platform with the efforts of Huawei and ZTE, and the traditional business and operation supporting systems are being adopted globally without regional differences. New value activities in Africa are developed by integrating terminals (Apple, Samsung, Huawei and Transsion) and content/service providers (Netflix, Spotify etc.). With the development of ICT industry, the business integration of telecom and other industries as well as the uncertainty of the value activities will increase.

The presence and supply of affordable technology from China increase smartphone and technology penetration. China has established a reputation as the preferred low-cost, yet high-quality mobile network builder. “The number one major impact is that Chinese companies like Huawei, ZTE and Tecno (TRANSSION), showed that we could get quality technology products at cost effective prices. They showed that literally everything is possible”(Int2) Chinese enterprises have therefore made it possible for their technology to be affordable throughout Africa, and as a result have contributed to the increase of smartphone and technology penetration within the continent’s borders. TRANSSION has also proved to be an effective example conveying the affordability that has accompanied Chinese technology. Their low price-points (phones from 50 to 100USD) make smartphone ownership a reality for people in rural areas in Africa. Meanwhile, an increasing number of no-brand or unknown Chinese brand mobile phones present in Africa from China have been shaping the mobile phone experience for many Africans.

7.2.2 Ecosystem Cases

The high cost and low construction efficiency have always been obstacles difficult to overcome in the construction of rural power grids. Because of the poor rural infrastructure, there is no stable power, and no transmission resources, the cost of building a traditional iron tower macrostation is higher than in the city. Moreover, a village with a population of 500–3000 people, per capita communication consumption (ARPU) can only reach $1~$1.5, resulting in a Return On Investment period (ROI) of more than 10 years and even the cost cannot be recovered.

MTN cooperates with Huawei to innovate and adopt the latest RuralStar 2.0 rural network solution. Under the same coverage area and population target, it reduces costs by 50% compared to traditional solutions. The low-frequency LTE relay used by RuralStar 2.0 has a single-hop transmission distance of up to 40 km and supports multi-hop backhaul to increase the coverage depth.

In 2020, the partnership between AWS and Safaricom (Kenya’s largest telco) started a collaboration of Could Computing in Kenya. Although carriers have local enterprise customer resources and the network advantage, they themselves do not own the technologies of cloud nor have know-how of business as professional company like AWS does. In the cooperation, Safaricom facilitates its region’s capacities to grow successful businesses through leveraging the abilities of AWS Cloud Services, which provide access to emerging technologies.

7.2.3 Characters of Africa Value Net

The new value net breaks the previous development model of low interdependence, maximising the use of external resources based on complementary advantages and sharing. Carriers still play a core role in the industry. The transactions among a carrier, its suppliers and distributors in its supply chain never change while the profits are decreased due to fiercer competition from both carriers and OTTs. The gains from opportunistic behaviour cannot make up for the loss of future gains due to reputation damage, so they must establish a long-term cooperative relationship to form a new supply chain. Furthermore, the network promotes the sharing of information, which is conducive to the quick

market response. Additionally, other forms of network organisation, such as strategic alliances, outsourcing and virtual enterprises, strengthen their own core capabilities and expand the market with the integrated advantages of complementary resource, which not only reduce costs, but also diversify market risks. To sum up, the value net of carriers inherits the advantages of flexibility, innovation, quick response, and risk reduction advantages of network organisations. Meanwhile, I conclude the value net has 4 following unique characteristics to assess digital maturity in Africa:

1. Extremely Various Needs of Customers

The value network emphasises the needs of customers, and the organiser determines the goal of the value network and develops a clear value positioning based on the understanding of the customer needs of the target market. However, the ARPU of customer differs greatly in Africa compared with other markets.

Take MTN for example, the ARPUs of Cape Town and Lagos are quite different, neither is the customer needs. The customers are no longer the passive receivers of the business, but the providers of business needs with biggest differences, especially from rural areas.

Extremely various needs of customers become the key feature of the value network in Africa.

2. Cross-industry

The value creation activity is a process in which telecom operators systematically integrate internal and external resources. Africa carriers are committed to organising related suppliers in the backward-related industries and a target customer group in the forward-related industries to build a unified value-added network.

As seen in the Cases of MTN and Safaricom, both step into the financial sector due to the unbanked market of the continent. The partner selection is no longer only reliant on traditional equipment provider like Ericsson, Huawei and ZTE. Carriers select the best partners in value creation activities and obtain optimal value creation system.

3. Locally Adopted Business Model

The carrier service changes are correlated with business model upgrade and organisation reforms. The business model emphasises the mutual adaptability of the special advantages of a local area and the talent elements.

"MPesa is successful based on locally adopted business model. However, the fact that the products are not suitable for customers rely too much on external talents and fail to see the characteristics of local channels and partners causes many unsuccessful cases" (Int 10).

4. High Sensitivity in Costs

The flexible cross industry network structure sensitively responds to changes in market uncertainty, and has high sensitivity in reducing operating capital. There is a higher requirement of knowledge absorption with carriers in Africa to achieve the agility and scalability based on the situation of brain drain in Africa.

Partner selection is based on the principles of low Capex or Opex instead of Capex. One example of MTN is the cooperation model in CRBT (Caller Ring Back Tones) service. In China, carrier will invest in

buying the platform, while MTN choose to do revenue share with its global suppliers without upfront investment. From business development to maintenance services, they will meet customer needs with the fastest response speed and the best quality in low costs. The local engagement also creates unique advantages for global participants in Africa.

7.3 Enable Value Net Synergies

Pursuing high business efficiency is the only way for Africa carriers to get out of the homogeneous competition.

The future physical network of carriers will evolve without territory restrictions and Africa carriers will be more internationally integrated. The Internet is showing a strong driving force and innovative ability for social innovation. The promotion of Internet to social innovation is mainly embodied in five aspects: connection, communication, empowerment, aggregation and collaboration. “Because of the rapidity and frequency with which environmental changes occur, the benefit or success of a strategic alliance may be closely associated with its strategic flexibility and the ability to adjust the relationship to changes, including the timely termination of the relationship when the alliance no longer meets the partners' needs”. (Niederkofler, 1991)

Digital markets around the globe are different because of politics, regulations and levels of economic development. However, Global OTT players like Google, Facebook, Amazon and Skype “were starting to cut into long standing profit pools of Telcos, like Voice and Message services, that have been untouched for a long time. Also, most of these companies have been successful in building a direct relationship to customers, bypassing carrier sales and billing channels”.(Aumann et al., 2014,p129) In fierce competition, carriers’ success is marked by its ability to adapt. Africa carriers need not only clarify a broad strategic outline but also be open to ideas from competitors, customers and partners. The strategy is an inevitable result of the carriers continuously adjusting the organisational structure, making changes to make right business choices.

7.3.1 Extend Value Proposition

Indicated in Chapter 2, an open platform for collaborative value creation is required with the five key elements, “Value proposition, Scope, Profit Capture , Strategic control, Execution”. Global telecom industry has embarked on the road of transformation to mobilisation, broadbandisation, intelligence, integration, and internationalisation since 2004. (Xu, 2012) African carriers are seeking global cooperation to extend their value proposition and differentiate. “The driving forces of value net of carriers is what people do with your network. That really drives loyalty, which can draw future revenues. Users watch videos, communicate over the top apps and get access to cloud services, what carriers seek to do is to drive usage of their network by partnering with people with services in the network”(Int 9) Another interviewee put “creating value add and differentiating themselves”(Int 11) as two driving forces of global cooperation. I believe the rapid development of digital media, wireless broadband, IDC, CDN, Cloud Computing centre and OTT applications expanded the transmission pipelines to be a comprehensive pipeline with various capacities.

Expanding business scope extends the value proposition and necessitates adaptive organisations. Expanding the bit transmission function to the network function of various resources forms a comprehensive resource advantage of carriers. The transmission pipeline is extended to the application pipeline. One interviewee stated that carriers are in walled gardens who must redefine their value position. “MTN music plus is open only to MTN users, not allowing other network users to use and pay. Why shouldn’t you make money off your competitors’ subscribers? If your competitors haven’t created a platform that provides value, why keep them out. Open a platform so that you can eventually convert them to full subscribers. What is happening right now is a walled garden”(Int 2) Opening up services to customers regardless of their network provider is a fundamental lesson to learn for Africa carrier as the digital business is totally different from the pipe line one. In my observation, new revenue of MTN, Vodacom in Africa has been found within servicing partnership agreements not in standalone services (Example: MTN and Vodacom cooperate with Netflix to launch video services.) It is evident that the extended value proposition will “positively affect business metrics and conversion to paid subscribers rate, become stronger habit-forming product and delight its users” (Ospanov, 2016). Therefore, if the organisation and the environment are separated, all elements that constitute the strategic posture become independent and ineffective. Successful digital strategy makers scan the objective environment to discover opportunities and threats, and find the best strategic plan that matches this environmental fact. As changes come from more factors such as global competitors, government policies, market fluctuations and high transaction costs, flexible strategy is not just adaptive but a must of the new competitive advantage creation. “What carriers need in the process is designing your own business model” (Int 10) Responding to changes in the competitive environment necessitates an adaptive capacity of the organisation with the mutual adaptability of the special advantages of a local area and the human capital elements.

The value proposition should be extended from internal to value net towards symbiotic value. “Verizon in the US design their products, services and channels in progressive adoption of the latest technology. It can also happen in Africa when we serve the real customer needs in this way with both real investment and people who operate that”(Int 9) The smooth development of an organisation depends on its accurate grasp of the environment and timely self-modification. A core problem arises from this, that is, the value of the carrier itself needs to be transferred from the inside to the outside, especially to the value net. Therefore, carriers should cooperate with partners that have a consistent value orientation. As the interviewee explained “digitalisation is based on applied technology from the right source. Poor power has created a solar energy giant in Kenya, M-Kopa (Note: M-Kopa provides customers with essential products including solar lighting, televisions, fridges, smartphones & financial services). M-PESA happened under the situation of fewer banks and limited credit card usage. In the process of 3G evolution of MTN after 2000, MTN cooperated with Huawei in Caller Ring Back Tone (CRBT), Mobile Newspaper Service (MNS) and Short Video, kept a sustainable growth, which benefitted SMEs and made positive social effects in Nigeria”(Int 10) In the African cases of RuralStar2.0, Kenya Cloud, CRBT, MNS, the internal recourses and value net are combined towards

symbiotic value and meet the customer need with right technology. Digital services do not need to be provided 100% by carriers. Carriers can open up cooperation on the basis of focussing and strengthening the core modules, and use the world's most advanced platforms and services to achieve this. (Int 9)

7.3.2 Focus on Core Competences

Carriers are being criticised as they have failed in innovation compared with the OTT players, and "the predominant mistake that Telcos did was not focus on their core competences, and underestimating the competitive market environment in some of these innovation areas".(Aumann et al., 2014,p 129) I believe that the combined infrastructure and network advantages differentiate Africa carriers in the competition. When wireless broadband has reached all major cities in Africa, the related infrastructure such as Internet Data Centre, Content Delivery Network, and cloud computing nodes has developed from South Africa to whole Sub-Sahara. To construct a comprehensive pipeline, the foundation is the communication transmission channel, backbone network, its related sales network and formed customer billing behaviour. As I proposed, the aggregation function of network forms a comprehensive resource advantage and realises the extension from the transmission pipeline to the application pipeline. Li argues telecom operators must develop innovation capability on the basis of traditional advantages. "AI + Big Data + Cloud enables business upgrading, AI + Big Data + Cloud + Chemical Reaction + Expertise = New Service + No.1 Survive, that is, ABC2E = N2 unlocks the intelligent door despite ICT transformation. ABC is the intelligent cloud big data and artificial intelligence for the future, then the other C is the chemical effect, E is the professional and in-depth knowledge in the vertical industry, and N2 is to form a new business format leading to new business". (Li, 2018) Safaricom defined its Digital Competencies as "a leading infrastructure provider in East and Central Africa and this provides a good backbone upon which we can build your cloud offering". (Safaricom, 2020) Indicated in Chapter 2, MTN has adopted "a three pronged business models that encompasses (1) the evolving telco focused on traditional telecom services, (2) the digital operator geared towards emerging digital platforms, and (3) the Fintech player advancing mobile financial services". (MTN, 2019) That is "changing things internally around the core business to supplement or compliment technologies that will be brought to market. Success in new markets is a question of overall competitive strength, scale, ability to make large bets, and overall company agility and DNA". (Aumann et al., 2014, p 130) "No matter how different competition is, the intra-firm endogenous factors are still in place"(Int10) When the telecom market in Africa has fully involved in globalisation and more international elements are brought, he also believes that "one unique difference in Africa is that OTT players have not been successful in building a direct relationship to customers, bypassing carrier sales and billing channels, because of the lowest bank card's penetration rate of Africa"(Int10) Carriers in Africa can still make the best of its sales network and billing channels to acquire end users effectively, but the time window is very short. Therefore, the combined infrastructure and network

advantages from the coverage of wireless broadband, wide-area backbone, extensive sales network and convenient billing channels differentiate Africa carriers in the competition.

Locally adopted ecosystem facilitates a value-creating system. Carriers like MTN and Safaricom have sufficient certified engineers with ICT knowledge and certifications like Google, AWS, Huawei and Cisco. They can support local customers comprehensively in ICT field, and build best practices on their own business attempts. For example, “Safaricom built the world’s most successful mobile money transfer and payments service platform in Kenya and become the first AWS Advance Consulting Partner in East Africa”. (Safaricom, 2020) From my observation, the scope of technology capacities of carrier talents has been extended from in wireless access, wired access, bearer network, core network, operation to in cloud computing, cyber security, Internet of Things, Software-defined Network and other new fields. Another difference between the Africa carriers and other regions is the quality of local start-ups and their engagement in local digital business. One interviewee suggests “instead of having only limited people who have access, carriers should create APIs that any Tom or Harry, can easily connect with and start a business”(Int2) Success of AppStore of IOS and Google Play of Android encourage numerous Africa developers create applications, greatly expand the capability of mobile phones and enhanced user experience of carriers. With the enhancement of absorptive capacities, Africa carriers already owned the capacities to develop together with local start-ups. However, “they still keep the door blocked for many Africa players due to the restrictions of so-call short lists in procurement requirement. We have platforms that are trying to bring in all these various interests together to work closely”(Int2) Meanwhile, improving the relationship with local star-ups facilitates a better value-creating system. Local services and content providers can only take small revenue in the less profitable businesses now. “Firstly, operators should reduce their revenue share. Secondly, the aggregators should bring businesses that can create value and are not taking over other people's (local service provider) jobs. Otherwise, the 100% value is not given to the whole market”(Int3)

7.3.3 Incubate with Clear Goals

The bureaucratic organisational structure brings about unnecessary internal collaboration, resulting in a lot of time spent on low-return market opportunities. Traditional business makes carriers prone to produce a unified, indifferent treatment for different businesses. Short sighted KPI orientated culture worsens the situation due to lack of know-how in the new field. Incubation has become a popular approach to drive innovation and help carriers to enter new fields.

Africa carriers should focus on incubation efforts on clear strategic goals. MTN’s new business development and diversification strategy for the last decade has focused on mega start-ups, with over a half billion Euro investment in various start-ups. Some start-ups are seen as a leader in Africa and the Middle East now, which includes Jumia (O2O m-commerce), aYo (micro-insurance), TravelStart (online Travel site), Wadi (ecommerce) and Snapp (Taxi hailing). Unicorns (the first from Africa) emerge via Jumia and the second promising Unicorn is Snapp in Iran. In Oct of 2020, MTN gave up the

stake in Jumia, pocketing R2.3-billion. Herman Singh, Group Executive Innovation Strategy of MTN, explained that “the MTN approach is to search for firms that are taking a uniquely African approach to addressing a broad-based need using digital technology where MTN’s assets in Network, customer base, brand, go to market capability, distribution, identity and payment capability van be leveraged to assist the start up to scale fast”. (Singh, 2018) For Africa carriers in particular, having access to potential products, services and technologies by incubation can reduce the risks they see in internal development. However, in many cases, the objectives were never clearly defined. Not all goals of the incubator are driving revenues in the short to mid-term. Nor is incubation the only way suitable for carriers. “Rigid equity strategic alliance does not fit the market. Relationships of cooperation need to be flexible”(Int11) Meanwhile, incubators were established with a chasm between the underlying goals and the execution of the incubation approach. “No acquisitions will succeed without full confidence. During the cooperation process, trail and testing in early phases can be an effective means to identify the value and reduce risks”(Int10)

Effective combined functions of investment and growth increase success rate of incubation. The true sustainable development of incubators depends on the success of the incubated companies under its umbrella. One interviewee elaborates that “a barrier of the failure is the separation of investment from operational support. The investment function and the curation of enterprise will sit outside the organisation and there's a disconnect between the investment function and the growth function when it comes to acquisition”(Int7) In fact, in some cases, carriers fail to recognise the goal of incubators as service providers. Meanwhile, the role of ICT and Enabling platform providers cannot be neglected and most SMEs are unable to set up an end-to-end business model in incubation. One interviewee suggests that ICT enterprises play “a role as an intermedia to both users and SMEs so that they can achieve digital standards in their services. Small business enterprises can be plugged in and go to market quickly”(Int3) Another interviewee expects Chines ICT enterprises to “be partners with abundance of experience in marketing of digital business. When they come, they should be consultants like Coach to the operators rather than be partners in the business, bringing the mature experience form China to support them”(Int4) In the system of MTN incubation, “start-ups will be able to join our soon-to-be-launched, Bright Ideas Innovation platform to sign up, propose ideas, secure funding and sponsorship, progress to the proof of product — proof of market — proof of scale and then finally be in a position to assess possible investments once it hit a series A or B funding round. The access to our open API’s, micro-services and sandboxes will be enabled during the next 12 months to further streamline the ease of working with MTN”. (Singh, 2018)

7.3.4 Facilitate Co-Value Creation

Strategic alliances among large, international firms and SMEs are on the rise, especially in ICT industry in Africa. In China, the combination of SME know-how with a larger international giant marketing leads to the success that can contribute to both parties’ a competitive advantage. But few of these partnerships result in tangible benefits in Africa. In contrast, strategic alliances often end in fines of

governments, capital withdrawn and business failure, with nothing left but waste resources, and possibly even a lawsuit.

The digital economy is centred on the needs of customers and order-led to conduct business operations and resource allocation. Consequently, service providers must segment target customers, provide products and services to different customers, attach importance to service innovation, and gradually meet the development of customer needs. The business model innovation of African carriers is fundamentally about rethinking the business based on the needs of the customer. As an interviewee indicates, Africa carriers must focus on providing services to fulfil the needs of the market against their accustomed approaches(Int8)

The value creation system is not only a management issue within carriers, but a macroeconomic issue within Africa Union. Indicated in chapters 2 and 5, Africa carriers have been seen to maintain conservatism and be closed - off when it comes to the adoption of specific digital services. As a sovereign country, Africans have the right to develop its own industrial policies in accordance with its own national conditions. In my experience, "Market for technology" is a policy that China has implemented at the central level in 1990s. It is a general industrial policy developed in accordance with the comparative advantages of the country. According to this policy principle, China usually requires foreign companies to transfer technology to Chinese joint ventures after entering the Chinese market in the form of contracts when introducing foreign capital. There is no doubt that the policy of "market for technology" has effectively promoted China's technological progress. Furthermore, "market for technology" is voluntary. The development of any technological enterprise is a long process, during which it may require government policy and market support. If foreign-funded enterprises have a dominant position with advanced technology, creating competitive pressure on the budding local companies, African technological enterprises will not be able to rely on the huge domestic market to develop and grow themselves. “Nationalist ideology is being developed into a resistance to multinational companies' investment behaviour and even hostility”(Int6) African countries have adopted policies to open and encourage foreign investment, and even “compete to lower the threshold” to attract foreign investment. The result is naturally beneficial to multinational companies, and it also greatly increased the flow of foreign direct investment. However, it is not easy to assess whether the benefits of implementing preferential policies for foreign investment can make up for their costs. Some critics even believe that African countries are competing to adopt preferential policies to attract foreign investment is "Winner's Curse" because the competition for investment not only led to the loss of government revenue, but more importantly, it gave up some policy options necessary for a dynamic long-term development path. The top-level design of a strategic alliance towards tech spill-over effect is the key success factor. “Borrowed knowledge instead of absorbed or original knowledge inhibits knowledge creation. The transformation is strongly related to the culture of organisations, and endogenous factors within”(Int10)

The project based cooperate learning creates a tight collaborative structure and are critical to the success of co-value creation. Indicated as coaches, multinational ICT enablers are expected to transfer

the experience in Africa. But with such a loosely structured network, knowledge innovation will never occur. “Openness in knowledge leads to accelerated knowledge flow and spill-over, the cost of knowledge acquisition is reduced, and the efficiency of knowledge innovation will undoubtedly increase”(Int10) Another interviewee admits that “knowledge, understanding and leadership of management influence the result of building a strategic alliance. Strategic alliance has increased the level of personnel mobility and openness. Sharing ideas cross-culturally, exchanging staff in ongoing projects benefit both parties”(Int11) Carriers occupying the position of structural nodes in the value net have an advantage in knowledge acquisition, which is beneficial for the synthesis of heterogeneous knowledge and realise knowledge innovation. Knowledge sharing is the core function of value net in Africa. It is very difficult to keep long-term cooperation as different organisations have virous goals, but “there is a need for a vision to establish a relationship of trust” (Int 8) Within the network organisation, companies have established a long-term trusted cooperation relationship. This relationship breaks the originally closed boundary of a single company and forms two-way or multi-directional information sharing channel among companies based on the network structure. It contributes to a comparative advantage in innovation. Additionally, the flexibility of the network organisation structure can give full play to the tentacles of each node enterprise, expand the scope of information acquisition and increase the market opportunities.

Datafying the necessary process enhance team capabilities and facilitate co-value creation. Rapid deployment of new services should quickly meet the requirements of customers in different market segments, especially in the mid-range market in Africa. From my experience, large carrier like China Mobile use machine learning and data analysis services for delivering IoT solutions on next-generation mobile networks and software-defined network functions, while small carriers in Africa believe that vertical cloud platforms have higher priority than data analysis capabilities and software-defined network ability. Responding quickly to customer needs is essentially an end-to-end operational transformation and a process transformation at the IT, organisational, and business levels. Africa carriers are paying more attention to the transformation of back-end systems. Many projects were established to simplify the explosive growth of IT systems and improve interoperability and data consistency between systems. This is the first step to be done. The lack of cooperation between different teams is the source of the digital crisis. Carriers should encourage employees to establish a trust-based relationships among different teams, identify candidates who are competent for the next generation of digitalisation and provide them with growth opportunities to lead. The programmability of services, the decoupling of bearer and control, the centralised management of applications and content will all be realised through business enabling platforms. In value net, enabling platforms are not only driving internal team collaboration, but create and enrich the external value synergies.

7.4 Chapter Summary

In Africa, if we follow the literature with presumed conditions of free market without considering the historical formation among carriers, it is difficult to understand the process of organisations entering the digital ecosystem, and driving forces behind.

Firstly, the concept of value net is adopted. In telecom, the network is a "net" structure formed by connecting nodes and fibre lines, metal wires and other similar objects in communication lines. "Social network is a relatively stable system composed of social relations between certain individuals or organisations as a series of social ties that connect actors". (Wellman and Berkowitz, 1988) The most important motive of carriers for establishing a network organisation is to obtain resources that cannot be independently obtained from individual vendors. Africa carriers have achieved continuous growth by integrating equipment providers, terminals manufactures and content providers. In the traditional value chain, equipment suppliers provide network equipment when operators construct and maintain switching networks providing voice services, realising the customer's telephone switching function. Then, the intelligent network system attached to the basic telephone network came into being. Finally, a future-oriented value system has been gradually formed. The goal of this value system is to develop new business concepts.

The presence and supply of affordable technology from China increases of smartphone and technology penetration. However, the high cost and low construction efficiency have always been obstacles difficult to overcome in the construction of rural power grids. MTN cooperates with Huawei to innovate and adopt the latest RuralStar 2.0 rural network solution. In 2020, the partnership between AWS and Safaricom (Kenya's largest telco) started a collaboration of could computing in Kenya. Although carriers have the local enterprise customer resources and the network advantage, they themselves do not own the technologies of cloud nor have know-how of the business as professional company like AWS does. The new value net breaks the previous development model of low interdependence, maximising the use of external resources based on complementary advantages and sharing. To sum up, the value net of carriers inherits the advantages of flexibility, innovation, quick response, and risk reduction advantages of network organisations. Meanwhile, I conclude the value net has 4 following unique characteristics in Africa: Extremely Various Needs of Customers, Cross-industry, Locally Adopted Business Model and High Sensitivity in Costs.

Next, the study leads to a converged study on building a value-creating system, managing the failure risk, clarifying local strategy and deep insight into collaboration with complementor. Four aspects are examined in value proposition, core competence, incubation and co-value creation to enable value net synergies. Pursuing high business efficiency is the only way for Africa carriers to get out of the homogeneous competition. The strategy is an inevitable result of the carriers continuously adjusting the organisational structure, making changes, and adapting to the organisational structure to make right business choices. Since 2004, global telecom industry has embarked on the road of transformation to mobilisation, broadbandisation, intelligence, integration, and internationalisation. (Xu, 2012) African carriers are seeking global cooperation to extend their value proposition and

differentiate. In my opinion, the rapid development of digital media, wireless broadband, IDC, CDN, cloud computing and OTT applications expanded the transmission pipelines to be a comprehensive pipeline.

Expanding business scope extends the value proposition and necessitates adaptive organisations. Expanding the bit transmission function to the network function of various resources forms a comprehensive resource advantage of carriers. Opening up services to customers regardless of their network provider is fundamental for Africa carrier. New revenue of MTN, Vodacom in Africa has been found within servicing partnership agreements not in standalone services. Therefore, successful digital strategy makers scan the objective environment to discover opportunities and threats, and find the best strategic plan that matches this environmental fact. The value proposition should be extended from internal to value net towards symbiotic value. Digital services do not need to be provided 100% by carriers. Carriers can open up cooperation on the basis of focussing and strengthening the core modules, and use the world's most advanced platforms and services. Carriers are being criticised as they have failed in innovation compared with the OTT players, and “the predominant mistake that Telcos did was not focus on their core competences”.(Aumann et al., 2014,p 129)

The combined infrastructure and network advantages differentiate Africa carriers in the competition. I believe that to construct a comprehensive pipeline, the foundation is the communication transmission channel, backbone network, its related sales network and formed customer billing behaviour. As I proposed, the aggregation function of network forms a comprehensive resource advantage and realises the extension from the transmission pipeline to the application pipeline. Locally adopted ecosystem facilitates a value-creating system in Africa. The scope of technology capacity of local talent pool of Africa carriers has been extended from wireless access, wired access, bearer network, core network to cloud computing, Internet of Things, Software-defined Network and other new fields. Africa carriers should focus on incubation efforts on clear strategic goals. MTN’s new business development and diversification strategy for the last decade has focused on mega start-ups. It is an approach to focus on broad-based need using digital technology where carrier’s assets in Network, customer base, brand, go to market capability, distribution, identity and payment capability to be leveraged to assist the start up to scale fast. MTN incubation success relies on that start-up be able to join a soon-to-be-launched process where Ideas Innovation platform facilitates star-ups to sign up, propose ideas, secure funding and sponsorship, progress to the proof of product — proof of market — proof of scale.

The digital economy is a customer economy. The value creation system is not only a management issue within carriers, but a macroeconomic issue within Africa Union. However, it is not easy to assess whether the benefits of implementing preferential policies for foreign investment can make up for their costs. Borrowed knowledge instead of absorbed or original knowledge inhibits knowledge creation. The transformation is strongly related to the culture of organisations, and endogenous factors within. The project based cooperate learning creates a tight collaborative structure and are

critical to the success of co-value creation. Additionally, the flexibility of the network organisation structure can give full play to the tentacles of each node enterprise, expand the scope of enterprise information acquisition and increase the market opportunities. Datafying the necessary process enhancing team capabilities and facilitate co-value creation. In value net, enabling platforms are not only driving internal team collaboration, but create and enrich the external value synergies.

8. The Thesis Summary

My thesis explores the cultural, social and management context of digital transformation for African carriers, and discusses the correlated elements of social-cultural barriers, obstacles of digital adoption, innovation condition, organisation change, ecosystem and their influences. Existing studies are mainly based on the presumed conditions in developed markets, including free market, rule by law, human capital without considering the social and historical obstacles, absorptive capacities of organisations and the influences of foreign ICT enablers.

The literature review is different from the current framework like digital maturity and transformation. This process reminds me of theory of Development Economics, studying the development process of undeveloped countries or world economic exploration. The similarity comes from the realities of development where the digitalisation is limited by conditions including a late mover, high transaction costs and weak organisational capacity with restricted absorptive capacities. Using a qualitative research paradigm, which privileges the insiders' perspective, the paper examined the different backgrounds of digital transformation in Africa. The social-cultural elements from culture, knowledge to the reactive innovation were examined in a unique cultural and historical context. I found that path dependence is a negative consequence of post-colonial social net and western knowledge dominant environment. As a result, the scope of knowledge is limited by the accumulation of previous experience which is created for the interests of colonists, foreigners instead of local citizens. Vested interest slowed down the process of digital adoption while arbitrary administration causes unnecessary concerns and uncertain environment for players in digitalisation. Legacy IT fails to provide seamless experience to users and create segregation within organisations. Historical negativity bias in innovation also inhibits organisation's ability to change.

Traditionalism of Africa is a trade-off between customs of originally ethnicity tribe and influence of colonial power. Obedience culture adopts an inside-out approach, causing ineffective empowering practices, decreases overall innovation capacity of organisation in the digital transformation. Infrastructure worsens and depresses the strong demand of digital services in Africa. The universality of technology shall not produce spill-over effects unless the transaction costs are greatly reduced.

To achieve transformation, core resource endowments must be identified. Technology is less important compared to other endowment resources with its originality in Africa. Carriers not only provide capital in the form of currency, but also in the form of trust about social capital. The priority for carriers is not creating a new organisation, but on reshaping the organisation to take advantage of existing strategic assets. Meanwhile, a new business enabling system has carried out a new

reconstruction from the dimensions of customers and experience, products and commodities, marketing and promotion, services and transactions, cooperation and openness.

Knowledge is the main resource of individuals. The relationship between the organisation and its members is on equality and cooperation. Improvement of value creation efficiency is carried out by activating the ability of individuals. Therefore, they can quickly make a coordination strategy and consider the feasibility of collaboration along with practical problems. The decentralization of decision-making power, especially for traditional carriers in Africa, is an effective way to escalate from traditional organisation to digital. Tolerance to mistakes is another key factor of culture against innovation fair and fatigue of Africa.

The concept of value net is adopted. I find the business integration of telecom and other industries as well as the uncertainty of the value activities both increase. The presence and supply of affordable technology from China increase of smartphone and technology penetration. The new value net breaks the previous development model of low interdependence, maximising the use of external resources based on complementary advantages and sharing. I conclude, the value net of carriers inherits the advantages of flexibility, innovation, quick response, and risk reduction advantages of network organisations. Meanwhile, the value net has 4 following unique characteristics in Africa: Extremely Various Needs of Customers, Cross-industry, Locally Adopted Business Model and High Sensitivity in Costs.

Four aspects were examined in the value proposition, core competence, incubation and co-value creation to enable the value net synergies. Pursuing high business efficiency is the only way for Africa carriers to get out of the homogeneous competition. Expanding business scope extends the value proposition and necessitates adaptive organisations. Responding to changes in the competitive environment necessitates the organisation capacity with the mutual adaptability of the special advantages of a local area and the talent elements. The combined infrastructure and network advantages differentiate Africa carriers in the competition. I conclude that to construct a comprehensive pipeline, the foundation is the communication transmission channel, backbone network, its related sales network and formed customer billing behaviour. The transformation is strongly related to the culture of organisations, and endogenous factors within. Additionally, the flexibility of the network organisation structure can give full play to the tentacles of each node enterprise, expand the scope of enterprise information acquisition and increase the market opportunities that can be selected.

9. Reflection

The doctorate study is quite challenging as a Chinese candidate in the recent 7 years. I got enrolled in this doctoral program thanks to the interview by Professor Paul Gibbs in Hong Kong in 2015. His encouragement in transdisciplinary studies inspired me to pursue the academic programme since then. Although I have a good IELTS score of 7, it is far from enough to systematically use a foreign language to write well in 2016. At that time, I under-estimated the workload and challenges of transdisciplinary research conducted in Africa by a Chinese student.

Besides the doctoral study itself, the 7-year continuous work at one project itself is first to hone my own mentality and cultivated a rigorous habit of reading, thinking and writing. From the time-consuming reading of the literature, to the nervousness and discomfort in the interview process, and to the fact that the descriptive records of loose viewpoints are unable to form a theory and a story line, the learning process never went by leaps and bounds. To get started from the English version of Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory by Juliet Corbin I bought in Kindle, I even bought the same paper book in Chinese translation to better understand the original ideas at the very beginning due to the difficulties in comprehension of foreign language. Now, reading and writing in English never worry me any more thanks to the practices in literature reading, interviews, reflections and continuous writing.

Gradually, the definition of knowledge turns into a broader scope, “knowledge = understanding of participants' aims, perspectives, assumptions: the terms in which their everyday life is grasped; plus articulation of the local social context of interaction”. (Hathaway, 1995) I realise that this knowledge I am pursuing is different from the objective ones of measured dimensions of the phenomenon, but is live and dynamic among people. I also keep in mind several suggestions from a respectful Chinese scholar, to understand the subject, we should “be aware of possible ways other actors understand this action, pay attention to the reciprocal shaping relationship between individual actions and structures and be mindful of your relationship with the researcher”. (Chen, 2000) Therefore, I would never say I know, until the knowledge comes from human experience when its reality is constructed by those participating in it. I believe it is a revolution in my personal cognitive habits.

One of the greatest benefits of transdisciplinary is that it is integrated and applied. In interdisciplinary learning, my own creativity and innovative thinking are also nurtured and developed. Interdisciplinary learning really breaks the boundaries of learning subjects, allowing me to actively search for clues in an unrestricted environment, sort out the context, explore knowledge, and experience a more complete knowledge structure. Transdisciplinary research has far-reaching significance for thinking and solving problems, which has strengthened my courage and innovative spirit to think boldly and explore.

I hope that my research will contribute to knowledge by exploring the insiders' view of digital transformation for Africa carriers. This study might contribute to the theory of a culturally distinctive digital transformation in undeveloped countries. This research also has implications for carriers on solving the organisational challenges, which impede the business transformation to digital services. The proposals for carriers on establishment of digital ecosystem locally to set up a distinctive competence are given in Africa context. Exploratory findings may yield new insights in a digital ecosystem in Emerging Markets or lead to other research in the change of social and digital economy. There is also potential impact on policy making for African governments.

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11. Appendix

Part 2, Initial coding of the digital transformation of this research

	Theme	Concept	Category	Property of Category	Dimension of Category
b1	core business synergy	business driven transformation	Value Proposition	Value Net Synergies	Value Net
b2	infrastructure as dump pipe	threat from external competition	Value Proposition	Value Net Synergies	Value Net
b3	scepticism towards data revenue	enhance profit structure	Value Proposition	Value Net Synergies	Value Net
b4	service adopted on a need basis	long tail market	Depressed Demand	Characterises of Digital Transformation	Social-Cultural
b5	increase customer loyalty	customer retention	Value Proposition	Value Net Synergies	Value Net
b6	hard to reach the saturation status	potential growth of emerging market	Depressed Demand	Characterises of Digital Transformation	Social-Cultural
b7	growth lies in partnership	ecosystem as a strategy	Value Proposition	Value Net Synergies	Value Net
b8	high consumer switching costs from OTT	user acquisition from OTT	Value Proposition	Value Net Synergies	Value Net
b9	user trust	dependence in user trust	Education and Trust	Innovation	Innovation
b10	adoption price	adoption price	Responsiveness Agility	Reshape the Organisation	Organisational
b11	internal different KPI	executive leadership	Responsiveness Agility	Reshape the Organisation	Organisational
b12	disconnect between investment and growth	leveraging key assets	Value Proposition	Value Net Synergies	Value Net
b13	executive leadership	executive leadership	Individual Empowerment	Reshape the Organisation	Organisational
b14	vision from traditional to digital	digital ambition	Value Proposition	Value Net Synergies	Value Net
b15	openness to other carrier users	open ecosystem	Openness Culture	Reshape the Organisation	Organisational
b16	upgrading business model	align operating model to digital	Core Competences	Value Net Synergies	Value Net

b17	network improvement	align capabilities to digital	Core Competences	Value Net Synergies	Value Net
b18	openness in ecosystem	open ecosystem	Openness Culture	Reshape the Organisation	Organisational
b19	validated learning	learning organisation	Absorptive Capacity	Innovation	Innovation
b20	Organisation agility	organisation agility	Responsiveness Agility	Reshape the Organisation	Organisational
b21	delegation and autonomy	delegation and autonomy	Responsiveness Agility	Reshape the Organisation	Organisational
b22	tolerance to mistakes	tolerance to mistakes	Openness Culture	Reshape the Organisation	Organisational
b23	localization of developers	localization of developers	Absorptive Capacity	Innovation	Innovation
b24	internal synergy	internal collaboration	Responsiveness Agility	Reshape the Organisation	Organisational
b25	level of localization	increase localization	Digital Spill-over	Innovation	Innovation
b26	digital education to society	digital education	Education and Trust	Innovation	Innovation
b27	primary education	primary education	Education and Trust	Innovation	Innovation
b28	culture understanding	cross culture communication	Collaboration	Reshape the Organisation	Organisational
b29	market demand response	quick to market	Responsiveness Agility	Reshape the Organisation	Organisational
b30	early entrance into a confirmed area of demand	acquire early entrance	Responsiveness Agility	Reshape the Organisation	Organisational
b31	integration of services	Service integration	Collaboration	Reshape the Organisation	Organisational
b32	mobile device as foundation	mobile device as foundation	Costs of Institution	Innovation	Innovation
b33	complementary stakeholders	value-creating from complementary capacities	Core Competences	Innovation	Innovation
b34	cost of data	cost of data as barrier	Costs of Institution	Innovation	Innovation
b35	business and organisation collaboration	align operating model to digital	Collaboration	Reshape the Organisation	Organisational
b36	untapped markets	potential growth	Depressed Demand	Characterises of Digital Transformation	Social-Cultural
b37	interlink of trust	interlink of trust	Collaboration	Reshape the Organisation	Organisational

b38	delivering value	delivering value	Africa Value Net	Value Net Synergies	Value Net
b39	access to information	limitation of information access	Collaboration	Reshape the Organisation	Organisational
b40	Quite unknown	uncertainty in business	Africa Value Net	Value Net Synergies	Value Net
b41	standardisation of doing business	uncertainty in operation	Africa Value Net	Value Net Synergies	Value Net
b42	lack of regulation	non-arbitrary regulation	Confluence of Business and Policy	Characterises of Digital Transformation	Social-Cultural
b43	increase in knowledge	learning organisation	Individual Empowerment	Reshape the Organisation	Organisational
b44	technology and knowledge providers	technology and knowledge providers	Absorptive Capacity	Innovation	Innovation
b45	enabler for traditional industries	The industry transformer	Digital Spill-over	Innovation	Innovation
b46	Investor to invest locally	investor	Digital Spill-over	Innovation	Innovation
b47	SME facilitator	SME facilitator	Absorptive Capacity	Innovation	Innovation
b48	infrastructure builder	infrastructure builder	Costs of Institution	Innovation	Innovation
b49	monopolised platform	antitrust governance	Confluence of Business and Policy	Characterises of Digital Transformation	Social-Cultural
b50	trust in Africa	gained trust	Costs of Institution	Characterises of Digital Transformation	
b51	economic colonisation	economic colonisation	Costs of Institution	Innovation	Innovation
b52	impact of Infrastructure	infrastructure builder	Costs of Institution	Innovation	Innovation
b53	impact on technology transfer	technology enabler	Absorptive Capacity	Innovation	Innovation
b54	honesty	dishonesty	Costs of Institution	Innovation	Innovation
b55	trust from partners	decreased trust	Collaboration	Reshape the Organisation	Organisational
b56	advisors rather than collaborators	advisors other rather collaborators	Africa Value Net	Value Net Synergies	Value Net
b57	exploitation to local labours	labour exploitation	Responsiveness Agility	Reshape the Organisation	Organisational

b58	Government run business	Government run business	Confluence of Business and Policy	Characterises of Digital Transformation	Social-Cultural
b59	workaholic culture	workaholic culture	Collaboration	Reshape the Organisation	Organisational

Table 11 Part 2 Initial coding of the digital transformation of this research

Part 3, Initial coding of the digital transformation of this research

Theme	Concept	Category	Property of Category	Dimension of Category
enlightenment of people	enlightening people	Digital Spill-over	Innovation	Social-Cultural
incubator of SME	incubator of SME	Incubation	Value Net Synergies	Value Net
localization of service development	Service localization	Absorptive Capacity	Innovation	Social-Cultural
building digital ecosystem	building digital ecosystem	Africa Value Net	Value Net Synergies	Value Net
maintain fairness in the ecosystem	maintain fairness in the ecosystem	Collaboration	Reshape the Organisation	Organisational
expanding business by enriching existing services	expanding business	Value Proposition	Value Net Synergies	Value Net
BI in Marketing	smart marketing	Individual Empowerment	Reshape the Organisation	Organisational
viability	correct positioning	Value Proposition	Value Net Synergies	Value Net
digital services priority	focus on one digital services	Core Competences	Value Net Synergies	Value Net
user experience improvement	Constant user experience improvement	Value Proposition	Value Net Synergies	Value Net
consistent investment	consistent investment	Core Competences	Value Net Synergies	Value Net
identify the greatest need	correct positioning	Value Proposition	Value Net Synergies	Value Net
pointless to use global strategy if unaligned to local strategy	local strategy first	Core Competences	Value Net Synergies	Value Net

solve organisational problem	digital organisation	Responsiveness Agility	Reshape the Organisation	Organisational
align human resources with the key strategies	align human resources with the key strategies	Responsiveness Agility	Reshape the Organisation	Organisational
leadership is the path to success	digital leadership	Responsiveness Agility	Reshape the Organisation	Organisational
innovation by market leading	innovation by market leading	Core Competences	Value Net Synergies	Value Net
understanding of the business completely	understanding business	Value Proposition	Value Net Synergies	Value Net
fill the knowledge gap	fill the knowledge gap	Absorptive Capacity	Innovation	Social-Cultural
relevant to the cultural perspective of Africa	Africa cultural perspective	Core Competences	Value Net Synergies	Value Net
doing business with Integrity and accountability	Integrity and accountability	Costs of Institution	Innovation	Social-Cultural
move with the times	move with the times	Core Competences	Value Net Synergies	Value Net
transition between different service providers to access a broader range of market capability	a broader range of market capability	Co-Value Creation	Innovation	Social-Cultural
increased demand for mobile digital services	adapt to demand	Depressed Demand	Characterises of Digital Transformation	Social-Cultural
Integration, understanding, trust	Integration, understanding, trust	Core Competences	Value Net Synergies	Value Net
enabler within the company	internal enabling	Collaboration	Reshape the Organisation	Organisational
leverage the resources and help build strategic partnerships	leverage resources	Collaboration	Reshape the Organisation	Organisational
comply with the law	comply with the law	Costs of Institution	Innovation	Social-Cultural
integrated marketing with different stakeholders	integrated marketing	Collaboration	Reshape the Organisation	Organisational
guide and coach the locals	coach	Incubation	Value Net Synergies	Value Net
create value for the ecosystem	value-creating system	Co-Value Creation	Value Net Synergies	Value Net
monetise intellectual properties by personal resources	monetization	Incubation	Value Net Synergies	Value Net

see where the market is going	market prediction	Incubation	Value Net Synergies	Value Net
add value generally because of personal diverse background	value of organisational diversity	Collaboration	Reshape the Organisation	Organisational
observer of trends	observer of trends	Collaboration	Reshape the Organisation	Organisational
knowledge sharing	knowledge sharing	Incubation	Value Net Synergies	Value Net
revenue, team and reputation	relationship between reputation and revenue	Core Competences	Value Net Synergies	Value Net
investments, resource and partnership building	resource facilitator	Collaboration	Reshape the Organisation	Organisational
Global companies must help localise for the sake of sustainability.	localization	Incubation	Value Net Synergies	Value Net
bring marketing strategy to carriers instead of support	value-creating system	Co-Value Creation	Value Net Synergies	Value Net
carriers change their mindset in knowing not owning subscribers	externality in culture	Co-Value Creation	Value Net Synergies	Value Net
facilitate the value chain by discovery, the access to subscribers and monetisation	shift from the traditional linear value chain to the complex value network	Co-Value Creation	Value Net Synergies	Value Net
assist in maximising core services	reconfiguring value consumption by enabling new forms of consumer behaviour	Co-Value Creation	Value Net Synergies	Value Net
enable players to grow	enabling value creation for all participants	Co-Value Creation	Value Net Synergies	Value Net
build trust with partners	consistent transparency and integrity	Co-Value Creation	Value Net Synergies	Value Net
localisation of service	localisation of service	Absorptive Capacity	Innovation	Social-Cultural
localisation of human resources	HR localization	Individual Empowerment	Reshape the Organisation	Organisational
flexible and innovate	being highly flexible and responsive	Openness Culture	Reshape the Organisation	Organisational

create fair competition under business ethics	fair competition	Costs of Institution	Innovation	Social-Cultural
remove internal discrimination	equality in the workplace	Individual Empowerment	Reshape the Organisation	Organisational
bring learning into Africa from the experience in mature Area	platform expertise	Individual Empowerment	Reshape the Organisation	Organisational
tight partnership with various players	build alliance based on complementary capacities	Collaboration	Reshape the Organisation	Organisational
being first to market		Value Proposition	Value Net Synergies	Value Net
managing relationship	manage network relationship	Collaboration	Reshape the Organisation	Organisational
advanced R&D	advanced R&D	Co-Value Creation	Value Net Synergies	Value Net
bridge the gap between the functional delivery and the marketplace	quick to market	Responsiveness Agility	Reshape the Organisation	Organisational
overcome Cultural Barriers	overcome Cultural Barriers	Collaboration	Reshape the Organisation	Organisational
reach mutual goal of revenue	enabling value creation for all participants	Collaboration	Reshape the Organisation	Organisational
Revenue share of various players	enabling value creation for all participants	Co-Value Creation	Value Net Synergies	Value Net
flexible business model with new technologies and platforms	provide centralised markets to serve widely dispersed individuals and organisations	Co-Value Creation	Value Net Synergies	Value Net
improvement in business model focussing on value creation	upgrade business model	Co-Value Creation	Value Net Synergies	Value Net
build key partnerships with local enterprises	build alliance based on complementary capacities	Co-Value Creation	Value Net Synergies	Value Net
Understanding ecosystem	Understanding ecosystem	Co-Value Creation	Value Net Synergies	Value Net
clear vision, mission and goal	clear vision, mission and goal	Value Proposition	Value Net Synergies	Value Net

fair collaboration among different players	fair collaboration	Collaboration	Reshape the Organisation	Organisational
value efforts of value network players	enabling value creation for all participants	Collaboration	Reshape the Organisation	Organisational
investment in research for better R&D	advanced R&D	Collaboration	Reshape the Organisation	Organisational
better structure : macro, industry and personal leadership	better structure : macro, industry and personal leadership	Individual Empowerment	Reshape the Organisation	Organisational
navigate culture and language in local ways	speak locally	Absorptive Capacity	Innovation	Social-Cultural
be consistent,reliable show Integrity	show Integrity	Education and Trust	Innovation	Social-Cultural

Table 12 Part 3 Initial coding of the digital transformation of this research