

**A CONTEXTUAL DESIGN ARTEFACT FOR THE DYNAMIC CAPABILITIES
OF SMEs IN NIGERIA: A CRITICAL REALIST STUDY**

by

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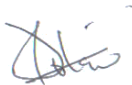
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A Contextual Design Artefact for the Dynamic Capabilities of SMEs in Nigeria: A Critical Realist Study

by

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ABSTRACT

The tendency of SMEs to focus on their core business activities often results in them overlooking competences to maximise ICT usage which, in turn, leads to the escalation of costs and the diminishing of investment returns. This study, situated within a critical realist philosophy, seeks to explore and design a new ICT artefact for SMEs using the dynamic capabilities framework and mixed method approach. Dynamic capabilities (DCs) refer to an organisation's ability to continuously renew internal resources towards ensuring business success and market competitiveness.

The use of content analysis and retrodution enabled the initial qualitative study to analyse the interview responses gained from 16 SMEs situated in five of the most economically active states in Nigeria. The study then developed and evaluated the ICT artefact amongst 20 SMEs in similar contexts using the elaborated action design research method.

The key findings revealed how SMEs in Nigeria use ICTs (in the *real* domain) to carry out their business processes (in the *actual* domain) using their DCs (in the *empirical* domain). The findings suggest that, despite the existence of government support for SMEs across Nigeria, these programmes are generally inaccessible using ICTs. This study identified a critical need for the creation and evaluation of a contextual ICT artefact (i.e. mobile app) suited to Nigeria and in probably other SMEs operating in similar low-income contexts. The evaluation results confirmed the usefulness of the artefact as a suitable tool which would assist SMEs in enhancing their DCs and thus maximise opportunities.

This thesis presents a *theoretical* contribution to IS theory through the identification of absorptive, adaptive and innovative DCs which enhance the competences of SMEs to seize business opportunities. The other theoretical contribution to IS lies in using critical realism to reveal the causal powers of mobile apps and the events generated in SMEs. The findings also contribute to *practice* by outlining a way in which SME owners can effectively use ICTs to maximise their business capabilities.

The thesis recommends that contextually designed ICTs should serve as the bedrock for policy development. Policy makers should continuously sensitise SME owners as to the benefits of ICTs by reinforcing ICT education and creating environments which enable ICT growth.

KEYWORDS: Dynamic Capabilities (DCs); Small and Medium sized Enterprises (SMEs); Information and Communications Technology (ICTs); Critical Realism; Mobile Apps; SME Owners; Mechanisms; Events; Seize Business Opportunities

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Abbreviations

ADR	Action Design Research
CBN	Central Bank of Nigeria
CR	Critical Realism
DCs	Dynamic Capabilities
DSR	Design Science Research
GDP	Gross Domestic Product
ICT	Information and Communications Technology
IoT	Internet of Things
IS	Information Systems
IT	Information Technology
LSETF	Lagos State Employment Trust Fund
Mobile Apps	Mobile Applications
MSME	Micro, Small and Medium Sized Enterprises
NCC	Nigeria Communications Commission
NDE	National Directorate of Employment
NEDEP	National Enterprises Development Programme
NIDB	Nigerian Industrial Development Bank
NOAS	National Open Apprenticeship Scheme
OLOP	One Local Government One Project
SAAPP	SME Accounting Application
SMEDAN	Small and Medium Enterprises Development Agency of Nigeria
SMEs	Small and Medium Sized Enterprises
US	United States
VAS	Value Added Services

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CHAPTER 1

Introduction

1.1 Introduction and background

Small and medium sized enterprises (SMEs) are worldwide playing a critical role in the social and economic development of countries. In this era, characterised by an open, globalised economy, Information and Communications Technologies (ICTs) are pivotal in enabling SMEs to assume their role as significant growth drivers in the economies of developing countries (Lloyd & Kroeze, 2011). While many large organisations are intentionally prioritising efforts to make the most of technological advancements, there is little research which shows that SMEs are included in these deliberate efforts, especially in developing countries. ICT is integral to enhancing the capabilities of SMEs as it empowers them to make effective decisions and embark on planned and strategic risks (Lu *et al.*, 2019). SMEs can use ICT to design, analyse, process and indeed *transform* information, thus creating seamless business operations and facilitating the taking of new opportunities in rapidly changing environments. ICTs have enabled SMEs, through the use of smartphones equipped with mobile apps, to service their customers and win prospective business through mobilising their desk-based operations. This has, in turn, increased business productivity and has resulted in the securing of market advantage (O'Halloran, 2009; Mwila & Ngoyi, 2019).

This research study investigates the role which ICTs could play in enabling SMEs to function optimally within their contexts. In particular, the role that ICTs can play in enabling SMEs to grow through the adoption of the dynamic capability framework is examined. Dynamic capabilities (DCs) are the ability of SMEs to achieve a competitive advantage by renewing their competencies and, in this way, address the needs of rapidly evolving environments (Teece, Shuen & Pisano, 1997). DCs are change-oriented capabilities which identify the ways in which SMEs modify and recombine their resource base to meet changing customer needs and strategies of business competitors (Zahra & George, 2002; Skokic, Coh & Torkkeli, 2015). This study selected the DC framework since it considers ICT as one of the essential organisational resources.

The research argues that it is essential for SME owners to obtain a better understanding as to the value of ICTs as they tend to focus on their core business only and, in doing so, they often

neglect those resources necessary to manage their operations (Devos, 2010). This core business focus carries a high-risk profile which can result in negative returns on business investments and substantial financial losses (Burtscher, Manwani & Remenyi, 2009). ICT adoption, and the alignment of dynamic capabilities to SME operational and business strategies, could aid effective decision making and so facilitate business growth, adaptability, innovation as well as flexibility in SME operations thus yielding high-quality products. This research draws on the theory of dynamic capabilities in an effort to examine the relationships between ICTs, entrepreneurship and SMEs from a critical realist point of view. The study further investigates how the use of ICTs, and their dynamic capabilities, could aid SME owners in making more appropriate decisions towards identifying business opportunities in Nigeria.

1.2 Problem statement and research questions

SMEs tend to focus on their core business activities resulting in them overlooking competences to maximise ICT usage which, in turn, leads to the increased cost of operations and dwindling return on investments. The elusiveness of ICTs usage by SMEs in Nigeria contexts requires the investigation of the underlying mechanisms that explain how ICTs enhance the DCs of SMEs .

This study aims to critically examine the use of ICTs in SMEs and to design an ICT artefact “*Mobile Apps*” that could be used to enhance dynamic capabilities of SMEs.

The result of this research endeavour is a knowledge and practical contribution which could, if implemented, enable SME owners to effectively use ICTs to enhance their dynamic capabilities and thus seize new business opportunities.

The study’s main research question is:

How can mobile apps enhance the dynamic capabilities of SMEs to seize new business opportunities in Nigeria?

The study’s sub-research questions are:

1. *How does mobile app usage enhance entrepreneurship activities in SMEs?*
2. *What are the critical factors of mobile apps which drive dynamic capabilities in SMEs?*
3. *How does the implementation of mobile apps, driven by dynamic capabilities, enable SMEs to seize business opportunities?*

1.3 Overview of the methodological approach

This research adopted the philosophical assumptions of critical realism (CR) in an effort to understand the ways in which ICTs usage enhance the dynamic capabilities of SMEs to seize new business opportunities.

As per the critical realist viewpoint, the nature of the problem examined in this research influenced the selection of the methods to be used (McEvoy & Richards, 2006) and how the chosen research methods were adopted. The philosophical orientation of critical realism is essential because of its ontological stratification which allows the research to use qualitative and design science research (DSR) methods (Mingers, 2004; Wynn & Williams, 2012).

The design science research (DSR) approach is an emerging problem-solving approach which involves the development and evaluation of ICT artefacts whilst considering their practical significance (Weber, 2010; Mettler, Eurich & Winter, 2014).

The strength of qualitative methods lies in the fact that they allow findings, which could not have been predicted, to emerge from the context. This study can help to extract complex notions and relationships which may not have been captured by predetermined feedback (McEvoy & Richards, 2006).

The DSR approach focuses on presenting detailed descriptions of the artefacts' constructs as well as evaluating objects' efficacy and, to a certain extent, their validity and reliability. This approach emphasises an iterative development and evaluation of research mechanisms to ensure that the design of the mechanism is based on sound evidence (i.e. theoretical and empirical evidence), thus confirming the validity, consistency and practical usefulness of the mechanisms (McLaren & Buijs, 2011). Instead of employing statistical tests, this approach allows the research outcomes to be tested by domain experts using additional evidence to thus determine the reliability and validity of the research results (McLaren & Buijs, 2011).

An initial qualitative study was done to identify the role which ICTs play in the dynamic capabilities of SMEs. This process facilitated the creation of a new ICT artefact (i.e. mobile app) and the evaluation of its efficacy in SMEs.

This study used judgemental (purposive) sampling to identify and invite 16 SME owners from five states in Nigeria to participate and provide feedback to questionnaires. This data collection

method enabled the generation of data which was discussed and examined to address the research questions.

1.4 Research Significance

This study contributed to the improvement of dynamic capabilities and Information Systems (IS) knowledge domains and also enable SME owners to effectively use ICTs to seize business opportunities.

1.5 Thesis structure

The structure of this research study is as follows:

Chapter 1 presents the introduction, problem statement and research question/s, research approach and scope of this study.

Chapter 2 explains the research philosophy. This includes the critical realism paradigm and critical realist view of SME dynamic capabilities.

Chapter 3 presents the background to Nigeria and its SMEs, including their political and economic environments. This chapter further explains the social and technological challenges which impact upon SMEs.

Chapter 4 presents an overview of ICTs, entrepreneurship and the dynamic capabilities theory as well as an exploration of SME dynamic capabilities. The chapter further describes *how* SMEs use ICTs to seize business opportunities.

Chapter 5 describes the research approach, including the context of SMEs used in this study. Sampling strategies and data collection techniques are also discussed.

Chapter 6 explains how the data are analysed, including the critical realist rationale for the qualitative analysis. The formulation of research findings, using retroduction, is also presented.

Chapter 7 describes the design of a contextual ICT artefact and explains its functional requirements including the development and evaluation of a design prototype.

Chapter 8 elucidates the research outcome including the implications of the research findings and proposes further research based on this study's outcome.

In this chapter, this study introduced the research study, problem statement, methodology, research contributions and the structure of thesis. The next chapter will review the philosophical underpinnings that guided this research.

CHAPTER 2

Philosophical Underpinnings

2.1 Introduction

The previous chapter presented a summary of the research study touching on the introduction, problem statement, methodological approach, research contributions and thesis structure. In this chapter the philosophical orientation of critical realism, which greatly influenced the research, will be reviewed. This philosophy of science enabled the researcher to investigate the nature of the social world, as well as the fundamental assumptions which govern it, whilst providing guidance as to *how* the phenomena should be investigated.

2.2 Research paradigms

The dominant research paradigms adopted in research studies are *interpretivist, pragmatist, constructivist, positivist, and post-positivist* paradigms. These philosophies of science enable researchers to understand and study the nature of reality to attain knowledge (Abdul Rehman & Alharthi, 2016).

The interpretivist paradigm assumes that the social world should be studied in the natural world, through the eyes of the participants, without the intervention of the researcher. Interpretivists accept that knowledge is relative to particular circumstances - *historical, temporal, cultural, subjective* (Levers, 2013). Interpretivists acknowledge that objective reality can never be captured, and knowledge exists in multi-layered forms as abstract description of meanings produced through human experiences and actions (Zukauskas, Vveinhardt & Andriukaitienė, 2018).

The pragmatist paradigm assumes that reality is ambiguous, but based on the *language, history, and culture*. It claims that research knowledge is best determined by what the researcher deems appropriate to that particular study, and that there is no single reality and all individuals have their own and unique interpretations of reality (Kivunja & Kuyini, 2017). This paradigm also assumes that researchers can't be sure that; what they observe as "*reality*" is a perception that reflects their own principles (Zachariadis, Scott & Barrett, 2010).

The constructivist paradigm assumes that relativistic reality is socially or experimentally based and specific in nature. Knowledge is created through an interaction of the interpreter and the

interpreted. The interpreter, though not entirely objective, is separate from the phenomena to be observed and the knowledge-making interaction is strongly influenced by the phenomena and society, thus knowledge of the observed is constructed rather than discovered (Levers, 2013).

The positivist paradigm claims that the social world can only be understood in an objective way (Zukauskas, Vveinhardt & Andriukaitienė, 2018). It has been criticized for its “*naive realism*” which assumes that claims about knowledge are based directly on experience. Therefore, objective reality can only be established through principles of natural sciences and scientific methods (Kawulich, 2012).

The emergence of critical realism, as a post-positivist paradigm, addressed the ontological and epistemological flaws of the *interpretivist, pragmatist, constructivist, and positivist* paradigms which holds that there is a reality independent of our thinking that can be studied through scientific methods (Zachariadis, Scott & Barrett, 2010).

Critical realism enabled a comprehensive insight into the environments in which SMEs in Nigeria operate. It further aided the researcher in examining *how* the use of ICTs can enhance the capabilities of SME owners to sense new business opportunities, the phenomenon being investigated in this research (Burrell & Morgan, 1979). Critical realism is suited to practical applications and can offer guidance when attempting to make sense of *how* ICTs can enhance the dynamic capabilities of SMEs to sense business opportunities (Fox, 2009).

2.3 Critical realism

Critical realism is a realist meta-theoretical social paradigm developed by Bhaskar (1975) which is used when trying to illustrate the significance of distinguishing *knowledge* from *existence*. Critical realism also embeds the critical and emancipatory ethos to rational enquiry. This study ascribes to the main critical principles of critical realism of Bhaskar (1975); he agreed that an objective reality exists and describes three hierarchical strata of reality namely the *real, actual* and *empirical* domains.

Real

The *real* are social structures and causal mechanisms which generate the events uncovered by the study (Mingers, 2004). For example, this research noted that most SMEs in developing country contexts, like Nigeria, experience financial, administrative and human resource

limitations and lack the capabilities to stimulate growth and development. SMEs face additional challenges such as inadequate local market information, lack of funding and inaccessible government programmes. All of these impact negatively on their ability to sense business opportunities (Mohammad, 2014).

The research, therefore, sought answers to the following sub-research question:

SR₁: What are the *causal mechanisms* in Nigeria which influence SMEs' ability to seize business opportunities?

Actual

The *actual* are events which occur, whether observed or not, and which are generated by causal mechanisms, i.e. the real (Mingers, 2004). Similarly, in this research the creation of establishments, like NOAS and SMEDAN, enables entrepreneurs to develop necessary skills which can then be use to seize business opportunities and, consequently, stimulate economic development (Afolabi, 2015).

SR₂: What are the *observed* or *unobserved* events in Nigeria that influence SMEs' ability to sense business opportunities?

Empirical

The *empirical* are observable events identified through formal, analytical and theoretical approaches (Basden, 2013). For example, this research study will investigate the dynamic capabilities of SME owners using ICTs to seize business opportunities. The ideological perspective of CR illustrates that there is an independent world which exists, irrespective of human knowledge regarding it (Zachariadis, Scott & Barrett, 2010). The merging of realist ontology with relativist epistemology to evaluate the underlying mechanisms and structures behind phenomena leads to the creation of theories which do not only focus on data (Mats & Kaj, 2009).

SR₃: What are the *observable experiences* within SMEs in Nigeria which influence their ability to seize business opportunities?

2.4 Importance of Critical Realism

Critical realism maintains a strong focus on ontology to illustrate that reality exists and that it is possible to create new knowledge regarding it (Jeppesen, 2005). This philosophy also enables

researchers to become increasingly particular about ontological depths as it facilitates the identification of causal mechanisms and stimulates a reliance on interpretive forms of investigation in any research (Wikgren, 2004). Critical realism enabled this study to investigate the structures, mechanisms and events which enhance the capabilities of SME owners to seize new business opportunities.

This research assumes that, under certain circumstances, SME owners in Nigeria can enhance their capability to seize business opportunities by adopting ICTs. This study not only observed and documented the use of ICTs in SMEs, but identified the generative mechanisms which describe *how* and *why* the use of ICTs can influence the capabilities of SME owners by developing theories regarding those mechanisms.

2.5 Generative Mechanisms

Generative mechanisms are causal mechanisms which emerge from the social structures in the *real* domain of CR (Elder-Vass, 2007). Critical realism emphasises that the working of causal mechanisms, which produce the events, are contextually conditional. It is possible to gain knowledge of the causal mechanisms in the *real* domain through analytical methods and the development of theories which are firmly based on their empirical manifestation in events. CR shifts the emphasis from empirically observed events to generative mechanisms in the *real* (Björn & Morén, 2011) and thus enables this study to conclude how the use of mobile ICT can influence the capacity of SME owners to seize business opportunities in Nigeria. Figure 2.1 illustrates the relationship between the real, actual and empirical CR domains. It depicts the ways in which the structures and mechanisms in the *real* generate events in the *actual*, and how the generated events are experienced and observed through analytical methods in the empirical domains of CR in SMEs.

The real domain consists of composite interaction/s between dynamic open stratified systems and particular social structures, labelled *generative mechanisms*, which generate specific causal powers. The interaction amongst these generative mechanisms, where one often neutralises the other, causes events in the *actual* domain (Mingers, 2004).

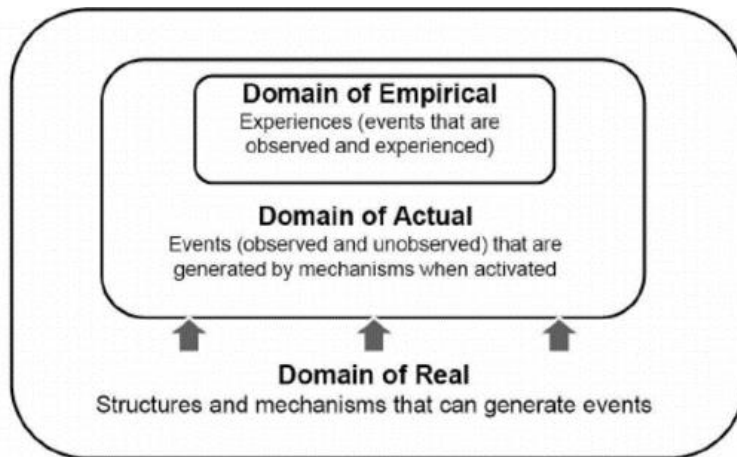


Figure 2.1: Domains of CR (Mingers, 2004)

SR₄: What are the generative mechanisms which influence the events that take place within SMEs in Nigeria?

2.6 Retroduction

Retroduction is the process of critically aligning the subjects of an investigation with a layered ontology in an effort to probe, describe or even understand the *real* (Eybers, 2011). This study views *retroduction* as an adopted method of inference to investigate the different stages of the reality strata and to uncover the mechanisms and events that exist in SMEs (Wuisman, 2005). This process will enable the researcher to critically investigate and uncover the ways in which mobile ICT usage influences the capabilities of SME owners to sense new business opportunities in Nigeria.

Retroduction suggests a process of working *backwards and forwards*, from the empirical to the underlying mechanisms in the real. In this way SMEs' structure and agency are critically aligned in the layered ontology in an effort to uncover and understand the effect of mobile ICT on the DCs of SMEs (Eybers, 2011). Based on the notion of retroduction, this research investigated the factors and conditions under which the research results may, or may not, be realised (Easton, 2010). Retroduction involves observing SME owners' experiences, as decision makers, as well as SMEs' real events while sensing new opportunities. Changing market needs in Nigeria have given rise to environmental forces which indirectly affect the way in which SME owners think, behave and execute their various activities.

To summarise, *critical realism* was well suited to this research which aimed to explore the dynamic capabilities of SME owners while using ICTs. The critical realism paradigm allows for the direct use of data related to the literature referenced in this study. The research will

uncover those mechanisms which have given rise to the phenomenon being studied, whether these be empirically observable or not. The researcher is encouraged to rigorously use his/her own experience to assist in the development of plausible and defensible explanations (Hobáin, 2012).

In this research, critical realism provides the philosophical foundation from which to uncover the underlying mechanisms that enhance the dynamic capabilities of SME owners in making appropriate decisions using ICTs. The next chapter will review existing literature on ICTs and the dynamic capabilities of SMEs.

CHAPTER 3

Background to Nigeria

3.1 Introduction

The previous two chapters provided a contextual foundation to the research as well as present critical realism as the philosophical point of departure. This chapter will present the background to Nigeria and its SMEs, with specific reference to those states which constitute the population group in which the research was carried out.

3.2 Nigeria

Nigeria, located in West Africa, has a population of almost 180 million people. The federal and commercial capitals are Abuja and Lagos, respectively. Lagos is the economic hub of Nigeria and the country's primary port (World Bank, 2017). Nigeria has one of the largest populations of young people in the world. It is a political federation made up of 36 states which encompasses a multi-cultural society with a rapidly growing population and one of the highest fertility rates in the world (UNICEF, 2017). The significant economic states are Lagos, Abuja and Oyo (in the southern region) and Kano and Kaduna (in the northern region). Globally, Nigeria is currently considered one of the fastest growing economies. The primary source of revenue is petroleum resources which play a significant role in the economic growth of Nigeria.

Ahead of Nigerian independence, organisations which imported finished products dominated the Nigerian economy and business sector. Consequently, these organisations possess vast business experience and strong capital bases. Shortly before independence in 1960, the Nigerian government established the Nigerian Industrial Development Bank (NIDB) which provides support to entrepreneurs who wish to access the abundant local natural resources (Ayozie et al., 2013).

Nigeria's SME industry experienced a significant bloom with indigenisation and Nigerian enterprises promotion legislations enabling the federal government to earmark SMEs as the foundation and training ground for entrepreneurship (Ayozie et al., 2013).

The Nigerian federal government established several incentives to motivate SME entrepreneurs. These incentives and strategies, referred to as the *entrepreneurship development*

programme, were adopted in an effort to absorb and develop the technical skills of unemployed graduates (Ayozie et al., 2013).

Recently, the decline in global oil prices, limited power supply, and lower foreign exchange has resulted in Nigeria's economic growth rate slowing down. The federal government has embarked on initiatives to achieve an efficient and ICT driven productive SME sector which will yield an increasingly skilled workforce and the delivery of improved products, thus offering a greater contribution to Nigeria's economy (Cassavamillers, 2017).

SMEs play a key role in Nigeria's socio-economic development and, as such, they are being repositioned by the federal government to promote entrepreneurship, improve employment generation and achieve reallocation of income (Ogbo, 2012).

Figure 3.1 illustrates the states in Nigeria where this research was carried out.

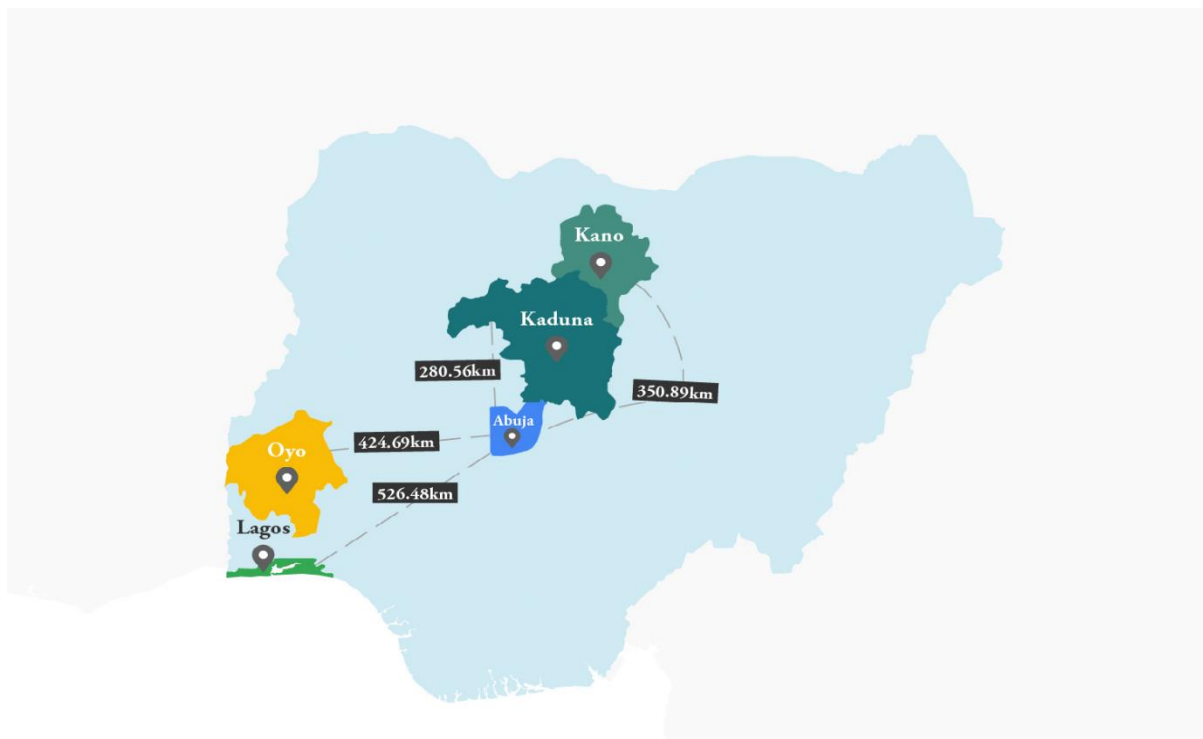


Figure 3.1: States in Nigeria where the research was conducted

Lagos

Lagos, located in the south-west region, is Nigeria's second largest state with a vibrant population of 9 013 534 people. The state contains 20 local government areas and the capital is Ikeja. Lagos accounts for more than 60% of manufacturing and business activities in Nigeria.

This state generates more than 75% of its income from oil revenues, and does not depend on federal government allocation from oil revenues (Nwagwu & Oni, 2015; Vanguard, 2017).

Lagos is a major hub which hosts the headquarters and support services of a multitude of local and global businesses. The primary sources of revenue generation, which account for the bulk of Lagos' GDP, include: food processing, trade, light manufacturing, transport as well as vocational and professional service providers (Nwagwu & Oni, 2015).

With more than 11 663 SME businesses, Lagos contains the largest concentration of SMEs in Nigeria and thus plays a significant role in the creation of sustainable entrepreneurship. Along with the promising and rapid economic growth in Lagos, SMEs also experience challenges which include: lack of skilled human resources, poor policy implementation, insufficient power supply, inadequate infrastructure, multiple tariffs and low industrial productivity.

SMEs, for example, encounter administrative challenges when attempting to navigate the various tariffs set by different government agencies. SMEs also brave a multitude of regulatory challenges which include delays in organisation and product registrations.

The state government of Lagos recently enacted the Lagos State Employment Trust Fund Law (2016) to establish the Lagos State Employment Trust Fund (LSETF). This was done in an effort to boost entrepreneurship and included, amongst others, the provision of ICT tools and skills training to stimulate SME growth in the state (Vanguard, 2017).

Oyo

Oyo is situated in south-western Nigeria. This state has a population of 5 591 589 people and is made up of 33 local government areas. The capital of Oyo is Ibadan, a city with a young population of 3.4 million people. It is considered an emerging economy.

Oyo has a total of 7 987 SMEs and serves as a strategic gateway to the northern and southern parts of the country (SMEDAN, 2013a). The state's primary source of revenue is wholesale and retail trade and it is the sixth most significant contributor to national output. The equatorial climate allows for sustainable cultivation of cash crops, poultry and aquaculture. Agriculture sustains the majority of Oyo's people (South West Investment Exhibition and Summit, 2013).

The state benefits from its strategic location which enables organisations to receive shipments from the seaports in Lagos and to transport produce to and from the markets in the northern and eastern parts of the country.

Some of the challenges faced by SMEs in Oyo include: infrastructure bottlenecks, lack of skilled human resources and regulatory complications. According to the subnational *Doing Business in Nigeria* report, published by the World Bank (2014), it takes 31 days to register an organisation in Oyo state.

The Oyo state government, in conjunction with federal programmes, has developed policies in order to establish initiatives which include: the *National Enterprises Development Programme* (NEDEP) and the *One Local Government, One project programme* (OLOP). The aim of these programmes is to incentivise SME business investments in the state through the provision of business and enterprise development as well as training opportunities (SMEDAN, 2014).

Abuja

Abuja, located in central Nigeria, is the country's official federal capital territory and the fourth largest urban area in Nigeria. In addition, Abuja is one of the fastest growing areas in Nigeria with a population of 3 540 000. It is made up of the Abuja municipal area and Gwagwalada, Abaji, Bwari, Kuje and Kwali councils. The indigenous peoples of Gwari, Koro, Gwandara, Ganagana, Afo and the Basa ethnic groups regard this territory as their home. Abuja has 3 022 SME businesses and is considered a significant economic hub. It is the centre of government activities and, with a savanna climate, ideally suited to the cultivation of crops like yam, beans, maize, millet and sorghum. Abuja is also rich in mineral resources such as clay, lead, marble, iron ore, feldspar, gold and talc.

Despite its status as the official capital and the great number of government activities, Abuja has a high rate of unemployment namely 21.1% of its population (Knoema, 2018). SMEs in Abuja face a variety of challenges including: inadequate access to finance, lack of skilled manpower, inadequate infrastructure, an unstable policy environment and tax regulatory problems (Ukwu, 2016). SMEDAN recently established the *One Local Government, One Product* (OLOP) initiative designed to provide interest-free loans and stimulate economic activities in Nigeria (SMEDAN, 2018).

Kaduna

With a population of 6 113 503, Kaduna is the third most populated state in Nigeria. The state is located in the north-western region of the country and is made up of 23 local government areas with Kaduna city as its capital (Kaduna, 2018).

The state of Kaduna has 2 882 SMEs and is considered a major economic hub in the northern region due to its rich, arable land and numerous industrial activities (SMEDAN, 2013a). The main occupation of Kaduna state's inhabitants is agriculture with more or less 80% actively engaged in farming. This includes the production of cash and food crops as well as poultry. Kaduna is rich in mineral resources such as clay, serpentine, asbestos, amethyst and gold (Kaduna, 2010, 2013).

The challenges faced by SME businesses in Kaduna include: limited educational opportunities, crude agricultural practices, a manufacturing sector characterised by poor infrastructure and a slow growth rate and unstable regulatory environment (Kaduna, 2010).

The government of Kaduna has developed the *Kaduna Start-up and Entrepreneurship Programme* in addition to partnering with the Bank of Industry in an effort to provide capital and support entrepreneurship activities in the state (Abuja Enterprise Agency, 2016).

Kano

With a population of 9 383 682 inhabitants, Kano is the most populated state in Nigeria. The state is located in the north-western region of the country with Kano city as capital. Kano state is made up of 44 local government areas (Kano, 2017).

Kano is regarded as northern Nigeria's economic and business hub and is home to the country's third largest non-oil and gas economy. Kano is also a regional nerve centre for trade servicing more than three hundred million people in northern Nigeria and other African countries which include Chad, Cameroon and Niger. Agriculture, commerce and manufacturing industries drive Kano's economy (Kano, 2013).

Kano state has a total of 8 286 SMEs which deal in textiles, plastic, rubber, paper, leather, beverages, fishery and livestock. The challenges faced by SMEs in Kano include: lack of funding support and access to credit facilities, inadequate skilled workforce, low commitment to capital investments and regulatory hitches (SMEDAN, 2013a).

In an effort to encourage and promote entrepreneurship and SME growth, the government of Kano launched a two billion Naira fund in partnership with the Bank of Industry (BOI, 2013).

3.3 SMEs in Nigeria

According to CBN, 96% of businesses in Nigeria are categorised as small and medium sized enterprises (Abdullahi et al., 2015). The Nigeria Act of 2003 established SMEDAN to promote the development of the MSME sector. The National Policy on MSMEs, created by SMEDAN (2013b), classifies SMEs as per Table 3.1. SMEs are businesses with a total asset of less than five hundred million Naira (13 820 in dollars), excluding land, and which employ less than two hundred (200) employees.

	Category	Employee Size	Asset (N)	Asset (\$)
1.	Micro	Less than 10	Less than 5 000 000	Less than 13 820
2.	Small	10 – 49	Less than 50 000 000	Less than 138 200
3.	Medium	50 – 199	Less than 500 000 000	Less than 1 382 000

Table 3.1: Classification adopted by National Policy on SMEs (SMEDAN, 2013b)

Characteristics of Nigeria SMEs

A significant characteristic of Nigeria's SMEs relates to their ownership structure which typically involves an individual or a family. Hence, a majority of the SMEs in Nigeria have either *sole proprietorship* or *partnership* as business structure. Even in cases where the SME is registered as a limited liability company, either an individual, family or partnership owns the business (Ogbo, 2012).

The ownership and management of a SME in Nigeria supposes that the owner is involved in the operational decision making and managing processes of the organisation. The chief executive would thus be known to his/her employees as the owner, founder and manager of the business. Despite the constraints faced by SMEs, they tend to endure financially and provide for families. These businesses are sustainable entities which survive as a result of their dynamism, product innovations, operational efficiency and smaller size which allows them to make decisions quickly (Bello, 2009).

SMEs operate in many different industries including food processing, fintech, ICT, furniture, plastic wares and tailoring. These make up a diverse group of home-grown businesses which signify technical know-how and present a valuable platform for the nurturing of entrepreneurship activities in Nigeria (Mohammed & Obeleagu-Nzelibe, 2014).

SMEs are valuable to the development of Nigeria's economy and provide valuable entrepreneurial and leadership development opportunities, the lack of which could hinder the growth of an economy. The long term and continuous development of these entrepreneurial resources to yield highly skilled individuals and, consequently, strong ICTs, is also key to sensing new business opportunities.

Oyelaran-Oyeyinka (2007) identified the enabling factors which drive SMEs in Nigeria as: fundamental knowledge of technologies, entrepreneurship, necessary physical and technological infrastructure as well as legal, regulatory and financial structures.

The role of SMEs in Nigeria

Globally SMEs play a highly significant role in socio-economic development. In Nigeria they have been identified as the fiscal growth engine that supports socio-economic development (Ogbo, 2012). SMEs help in the balancing of economic power which is beneficial to the relationship between large and small organisations. The latter being a significant source of employment (Rothwell & Zegveld, 1982).

SMEs are fundamental to the fulfilment of national economic objectives which include: job creation, poverty eradication, stimulating entrepreneurial competencies and developing locally built technologies.

SMEs are created within areas which are strategically designated as *economic trade zones*. These trade zones are distributed in clusters within states in Nigeria, thereby creating potential operational and cost synergies. SMEs contribute up to 1% of the GDP compared to 40 - 50% in the US, Europe and Asian countries (Oyelaran-Oyeyinka, 2007). This research study focuses on SMEs clustered in the states of Lagos, Oyo, Abuja, Kaduna and Kano in Nigeria.

As a result of their presence in specific locations, SMEs provide many benefits including access to infrastructures as well as the improvement of business activities. An example of this is the distribution of items produced, or required, by SMEs and items supplied by vendors. SMEs not only improve their employees' standard of living but also that of their children and relatives (Onugu, 2005; Ogbo, 2012).

To summarise, this chapter provided background to Nigeria and its SMEs with specific focus afforded to Nigerian states which constitute the population group for this research. This chapter also described SMEs in Nigeria and their role in socio-economic development.

CHAPTER 4

Literature Review

4.1 Introduction

The previous chapter presented the context of Nigeria in general as well as a focused discussion of those states included in this research. The research work seeks to investigate the ways in which the use of ICTs enhances the capabilities of SMEs in Nigeria towards sensing new business opportunities.

This chapter will review the relevant literature, focusing on ICTs, SMEs, entrepreneurship and dynamic capabilities. This will be done in an effort to define the main terms and theoretical foundation which govern the study and will be based on the real, empirical and actual stratification of critical realism as per Chapter 2.

This chapter is structured in accordance with the domains of Critical Realism: Real (ICTs), Empirical (Dynamic Capabilities) and Actual (Entrepreneurship).

4.2 Real

The *real* consists of mechanisms which produce the events that influence the capabilities of SMEs to sense new business opportunities.

Overview of ICTs

According to Ongori (2016), ICTs are computer-based tools which allow organisations to carry out information dissemination and retrieval.

ICTs are technologies used by individuals and organisations for information processing and communication purposes (Zuppo, 2012). These can include e-learning and video conferencing used in collaborations between persons and/or groups of people (Pandey & Pande, 2014). Organisations generally regard ICT as a crucial enabler for product development, market research and accessing information to achieve market advantage. ICTs range from software or hardware to mobile apps and devices (Ongori, 2016). Mobile apps enable SME owners to manage their entrepreneurial activities to better sense new business opportunities. This is discussed further in the next section.

According to Twinomurinzi et al. (2017), ICTs can be defined in accordance with three viewpoints: usage, domain impacts and contextual views.

1. For the *usage viewpoint* - ICTs are defined based on how organisations use them as a commodity, driver or enabler of business.
2. For the *domain impact viewpoint* - organisations can adopt ICTs in different domain areas. Domain impact is differentiated based on the influence ICTs have on the domains.
3. For the *contextual viewpoint* - ICTs are regarded as being based on the views described below:
 - a. The *tool view* defines ICTs in terms of a tool which is used to perform a function.
 - b. The *ensemble view* defines ICTs as part of a dynamic social network which includes people, their relationships and artefacts.
 - c. The *computational view* of ICTs focuses on the use of ICTs to present, modify, store, retrieve and disseminate information.

The competences and use of ICTs are crucial to the participation, engagement and empowerment of businesses in Nigeria. ICTs can be used by SMEs to discover, develop, analyse and present information as well as to solve problems (Ladokun, Osunwole & Olaoye, 2013). The use of ICTs can aid SME owners in the development of capabilities for information management, cost reduction, increased productivity and gaining access to quick information flow (Ladokun, Osunwole & Olaoye, 2013).

The usage of ICTs, such as mobile apps and devices, is integral to SMEs as it assists SME owners in making effective decisions in rapidly changing environments while developing, analysing, processing and transforming information.

Mobile Apps

Mobile apps refer to software programs that run on mobile devices and accomplish specific tasks for individuals and organisations (Islam & Mazumder, 2010). Mobile apps have been a driving force behind the successes of some of the most valuable organisations globally, allowing them to operate a unique business model driven by seamless global operations (Bezerra et al., 2015).

Driven by dynamic market needs, as exhibited in their operating environment/s, SMEs search for new approaches to differentiate their businesses and create seamless and unique business operations. Through the use of smartphones, mobile apps have enabled organisations to mobilise their desk-based operations. This has led to an increase in business productivity, the capturing of the market advantage, improved service to customers and the consequent gain of prospective business (O'Halloran, 2009; Kim, Lin & Sung, 2013).

According to Bezerra et al. (2015), the adoption of mobile apps can enable fast-growing SMEs to double their revenue growth and create jobs quicker than their competitors are able to do.

SMEs are gradually becoming more relevant and increasingly competitive in not only the Nigerian market space, but in the fast-moving global business environment as well. Large organisations are making the most of opportunities on offer for technological advancement but, for SMEs, the process takes longer.

Importance and usage of Mobile Apps

According to O'Halloran (2009), some decision makers in organisations are already using productivity related mobile applications, installed on their smartphones, to access information and systems. These include: accounting and payments, customer relationship management system, instant messaging and conference calling, e-mails, recruitment management system, human resources management system, project management system, travel and logistics system and business process automation systems.

Mobile apps also enable SME owners to make effective decisions seamlessly and take planned and strategic risks whilst carrying out their entrepreneurial activities (Bula, 2012). Mobile apps have changed the business landscape for SMEs by creating innovative communication channels, facilitating on-the-go customer engagement and promoting products and services, providing a point of purchase for products, launching customer service platforms and enabling and simplifying SME owners' multitasking whilst facilitating the making of effective decisions.

The mobility of operations has, in the case of SMEs, resulted in product-quality improvements as well as improved services (Esselaar et al., 2006; Johansson & Andersson, 2015). ICTs assist SME owners in the managing of data and information whilst carrying out their daily business

activities at the same time. This allows them time to figure out new opportunities and consequently improve their organisational processes.

ICT plays an integral part in SMEs as it facilitates the coordination of procurement activities as well as collaboration with vendors, customers and partners. In addition, ICT enables accurate and speedy communication, an essential prerequisite when negotiating commercial terms, keeping stocks secured and coordinating deliveries (Grace & Andrew, 2008). In rapid changing environments the use of mobile apps in SME operations (*i.e. productivity, collaboration, resourcing, interaction and participation, cost management, and efficiency & optimisation*) enables owners to sense new business opportunities and achieve a market advantage in Nigeria (Marius, 2012).

1. **Productivity:** The use of productivity tools has enabled SME owners to keep on working, even when they are moving around. This dynamic has changed their expectations regarding work quality and productivity.
2. **Collaboration:** If a SME owner is not physically present, for example in the office, mobile applications can enable him/her to stay in touch with the office using connectivity applications. This enhances seamless collaboration among team members.
3. **Resourcing:** Cloud computing and outsourcing have changed the way in which operating resources are deployed and managed. Mobile applications enable online access to the cloud infrastructure. This enables SME owners to outsource different parts of their businesses to third party providers whilst still ensuring connectivity to manage the core in-house processes.
4. **Interaction and participation:** The advent of social media mobile applications has increased the impact of social media in business providing SMEs with an alternative platform for sales, marketing and disseminating product information. These mobile applications enable SME owners to receive real-time feedback regarding their products and services.
5. **Cost management:** The use of cost management tools enabled SME owners with the capability of making useful decisions regarding procurement of cost-effective alternative solutions, thus improving the efficiency and performance of the organisation through introducing spending control and realising savings.
6. **Efficiency and optimisation:** The adoption of productivity and collaboration enhancing mobile applications, as well as the use of ICTs by SMEs, has resulted in the creation of a convergent technology platform. Here SME owners can focus on

investment, financing, human resource management as well as creating an efficient and optimal business operation which will enable the SME to sense new business opportunities to achieve market advantage.

Advances in ICTs have transformed various industries by linking businesses, education, logistics, transportation, medical, social and payment services via network platforms such as VAS services, mobile banking, Internet of Things (IoT), Voice over IP (VOIP) and business process automation systems. Mobile phones, with their functionalities to interact in text, voice and via the internet have facilitated this transformation.

Taking the previously discussed content into account, this research aims to provide answers to the following sub-research question:

SR₅: What mobile apps are predominantly used by SMEs in Nigeria?

In the following section a literature review which focuses on empirical stratification will be presented and the ways in which dynamic capabilities influence SMEs to sense business opportunities will be examined.

4.3 Empirical

These are events, i.e. dynamic capabilities within SMEs in Nigeria, that influence the sensing of business opportunities.

Overview of Dynamic Capabilities

The Dynamic Capability (DC) of an organisation is an extended concept that emerged from the resource based perspective. DCs are grounded in the ability of an organisation to renew its competencies in the form of intangible resources such as processes, skills and routines (Mohamad, Ahmad & Siti, 2014).

According to Kuuluvainen (2011), dynamic capabilities can be defined in terms of two key elements namely *dynamic* and *capabilities*. *Dynamic* refers to an organisation's ability to renew its competencies based on changes in the operational environment and in response to market forces (Kuuluvainen, 2011). *Capabilities* highlight the critical role of ICT strategic management in the adaptation, integration and recreation of internal and external skills, human resources and competition factors to adapt to the requirements of an ever changing operational environment (Kuuluvainen, 2011).

DCs are change-oriented capabilities that help organisations renew their resource base and, in so doing, they address the changing needs of the customer and respond to competitor strategies (Zahra & George, 2002). DCs are defined as the ability of organisations to achieve a competitive advantage by integrating, developing and renewing competencies to address changes in fast evolving business environments (Teece, Shuena & Pisano, 1997). They are processes carried out in organisations as specific routines, embedded in the organisation over a period, which enable work teams to enhance, modify and renew their existing operational capabilities to so meet the requirements of the changing environment (Helfat et al., 2007; Pavlou & El Sawy, 2011).

DCs comprise a patterned set of learned and stable collective activities which enable an organisation to develop and reconfigure its operational routines in a systematic way to achieve and maximise effectiveness (Zollo & Winter, 2002). DCs also refer to the behavioural orientations of an organisation which are regularly carried out to integrate, renew and recreate its human resources and competencies to achieve a competitive advantage in response to the evolving business environment (Wang & Ahmed, 2007).

DCs enable organisations to identify and understand new sources which, in turn, helps them to evolve and renew their resources over time and gain a competitive advantage. Organisations need to focus on developing organisation-specific capabilities and renewing their competencies in response to shifts in the business environment. It is essential for organisations to reflect on the role of IT strategic management and the evolving nature of business environments (Ambrosini, Bowman & Collier, 2009). This process should be done while reconfiguring and renewing organisational skills, human resources and operational competencies in response to the evolving business environment (Kitenga & Thuo, 2014).

Dynamic capabilities help organisations to steer clear of core rigidities which could hinder business activities and suppress innovation. These organisations are thus freed to sense new business opportunities and, in this way, they achieve a continuous competitive advantage (Leonard-Barton, 1992). SMEs can utilise dynamic capabilities to continuously strategise and renew their products and services, ICTs, resource allocation, organisational structure and marketing approaches. In doing so these SMEs gain and maintain a competitive edge (Ruuskanen & Kankainen, 2011).

Teece, Shuena and Pisano (1997) defined DCs as organisational and strategic routines by which SME owners can modify an organisation's resource base and renew competencies to create new

cutting-edge sources of competitive drive. Dynamic capabilities involve: the renewal of business processes, the allocation of human resources, knowledge development and transfer and SMEs' decisions *regarding* and direct responses *to* new business needs (Easterby-Smith, Lyles & Peteraf, 2009).

Dynamic Capability Manifestations

There are three principal manifestations of dynamic capabilities which form the basis of an organisation's ability to create, improve or adapt its resources and capabilities in response to changing business needs and the market environment. These principal manifestations are: adaptive, innovative and absorptive capabilities.

4.3.1.1 Adaptive Capabilities

This type of DC manifestation involves identifying and taking advantage of business opportunities. These capabilities include the ability of SME owners to identify market changes and respond to these identified market changes (Wang & Ahmed, 2007). The need exists to understand how SME owners use mobile apps as a mechanism to adapt to their environment. This research will provide answers to the following sub-research questions:

SR_{6a}: How do SME owners identify market changes and respond to changing market needs?

SR_{6b}: What role do Mobile apps play in the adaptive capability of SMEs?

4.3.1.2 Absorptive Capabilities

This type of DCs manifestation combines newly acquired knowledge with existing internal knowledge to create new knowledge. This capability includes the ability of SME owners to improve their know-how and transform, through continuous learning, their newly acquired knowledge into new products (Wang & Ahmed, 2007). The need exists to understand how SME owners employ mobile apps as a mechanism to continuously create new knowledge through learning.

SR_{7a}: How do SME owners acquire new knowledge to create products?

SR_{7b}: What role do mobile apps play in the absorptive capability of SMEs?

4.3.1.3 Innovative Capabilities

This type of DC manifestation involves developing new products through strategic alignment with innovative business activities and processes (Wang & Ahmed, 2007). These DCs include the generating of innovations by SME owners to refine and transform existing products. The

need thus exists to understand the way in which SME owners use mobile apps as the underlying mechanism to develop new products.

SR_{8a}: How do SME owners make changes in their organisation to create new products/services?

SR_{8b}: What role do mobile apps play in the innovative capability of SMEs?

Hagedoorn and Geert (2002) emphasised that innovative capability focuses on specific knowhow and competencies associated with the development of new processes and products.

Micro-foundations of Dynamic Capabilities

Dynamic capabilities develop in two stages: the *enhancement* of the organisation's ordinary capabilities and the *renewal* of market and technology competencies (Rindova & Taylor, 2002). Ordinary capabilities include operational, administrative and governance competencies which enable the production and sale of products but which are inadequate to sustain the long term growth of the business (Teece, Shuena & Feiler, 2014).

Dynamic capabilities organise groups of ordinary capabilities, standard practices and skills to achieve a competitive advantage i.e. capturing opportunities and managing strategic risks (Teece, Shuena & Feiler, 2014). DCs also regulate the frequency at which changes occur in ordinary capabilities (Winter, 2003) by allowing organisations to manage activities correctly and so achieve a competitive market advantage (Teece, Shuena & Feiler, 2014).

The micro-foundations of SME dynamic capabilities include the specific skills of SME owners, business processes and organisational structures which enable the sensing, seizing and renewal of SME capabilities (Teece, 2007; Lene et al., 2012).

This research views dynamic capabilities as a SME's capacity to decisively establish, improve and/or renew its resources, in response to changing business needs and market environments, to thus achieve a sustainable market advantage. The DC model further explains the notion that SMEs' competitive advantage lies in their business processes which leads to the development and deployment of DCs in SMEs (Helfat et al., 2007), as described in the next section.

The dynamic capacity framework, according to Teece (2014), is an entrepreneurial approach which highlights the importance of internal and external business processes in the organisation along with organisational strategy and critical resources. It is critical that SME owners review

organisational routines, which develop their dynamic capabilities, in order to renew them from time to time.

The vision, skills and past experiences of SME owners are key factors in directing organisations' DC development. This highlights the need for sound management of ideology and the creation of a future business growth plan in those areas where the organisation wishes to compete (Zahra, Sapienza & Davidsson, 2006). Dynamic capabilities form part of the entrepreneurial competencies of SMEs and reflect their ability to develop, deploy and modify these routines (Teece, 2014).

Teece (2007) categorised dynamic capabilities into three micro process stages and entrepreneurial organisational activities:

1. Sourcing and evaluation of business opportunities.
2. Deploying resources to address new business opportunities which deliver value.
3. Continuous improvement of resources and competencies.

These activities directly affect organisational performance and enable SMEs to keep up with changes in the market and technology.

Zahra et al. (2006) argue that entrepreneurial activities influence the choice of resources and competencies, thus helping organisations to embrace accelerated learning development. This, in turn, facilitates the capture of external knowledge as market and/or operational changes occur, the creation of new substantive capabilities as well as the renewal of the organisation's knowledge base, as described in Figure 4.1.

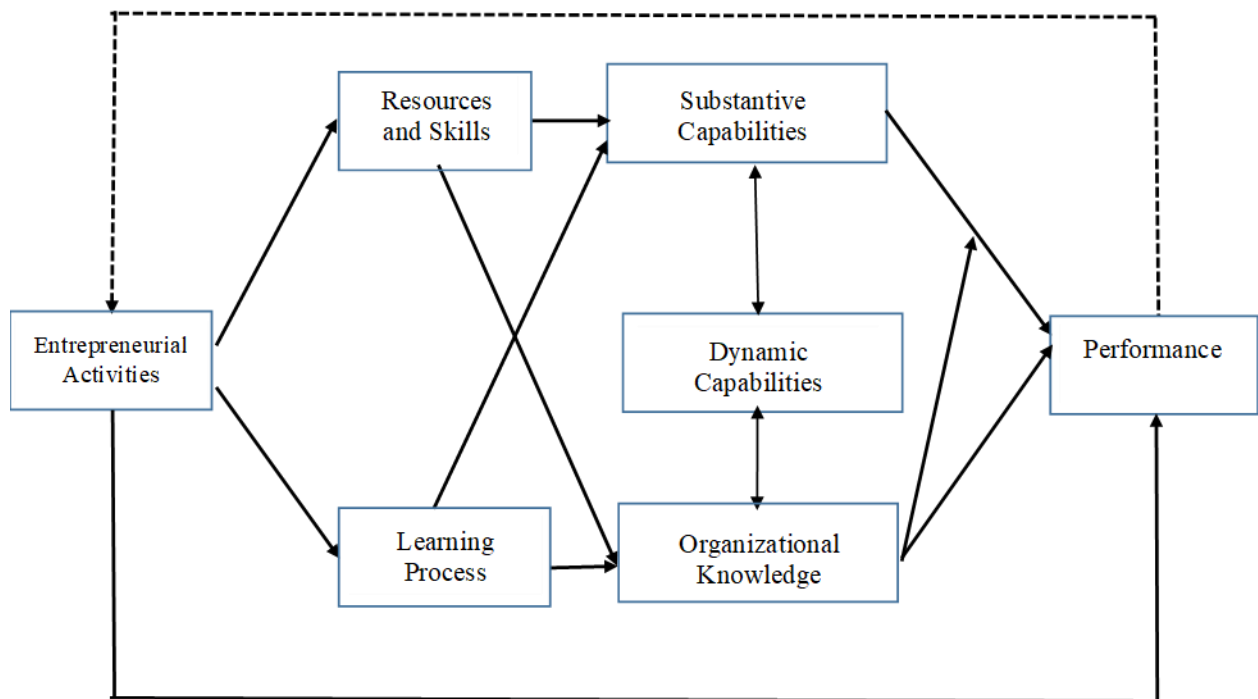


Figure 4.1: Capability Formation and Performance Model (Zahra, Sapienza & Davidsson, 2006)

Organisational knowledge and substantive capabilities determine which DCs are required by SMEs when attempting to adapt to the evolving conditions inherent to changing market needs and fluctuating operating environments (Zahra, Sapienza & Davidsson, 2006).

The literature regarding dynamic capabilities, as described in the previous section, serves as the theoretical lens of this research allowing us to provide answers to the following sub-research questions:

SR_{9a}: How do SME owners sense new business opportunities?

SR_{9b}: What role do mobile apps plays in SMEs to sense new business opportunities?

Given the dynamic nature of resources and capabilities, it is difficult for SMEs to preserve their competitive advantage in an ever changing operating environment (Mohamad, Ahmad & Siti, 2014).

According to Teece et al. (1997), the provision of reliable and quality services by organisations add value and provide a solid foundation which enable successful innovation and superior long term financial performance.

Sustainable advantage requires more than the ownership of assets, it requires knowledge which is difficult to replicate in fast changing business environments and which is vulnerable to global competition where different sources facilitate business innovation and growth. Sustainable advantage also incapsulates the difficult-to-replicate and unique dynamic capabilities of SME owners.

The capabilities possessed by an organisation reflect said organisation's competitiveness in the market as it closely links with the way in which organisations use their resources and knowledge (Mohamad, Ahmad & Siti, 2014). An organisation's capabilities continuously change over time through the processes of accumulation and depletion. Organisations need to acquire capabilities (such as know-how, learning process, strategy execution and reputation) to achieve competitive advantages (Mohamad, Ahmad & Siti, 2014). The dynamic capabilities of SME owners are influenced by: their previous management experience, entrepreneurial processes, adopted technologies and organisational structures created to manage their businesses (Teece, 2007).

In the present global economy, SME owners play a crucial role in enabling SMEs to adapt to changing business environments, as their strategic and/or organisational decisions are at the heart of organisations' performance. The success of a small and medium sized organisation requires that the SME owner exhibits entrepreneurial abilities and builds competencies to sense and seize opportunities and then renew them as new opportunities, market changes and competitors' strategies are identified (Kuuluvainen, 2011).

The dynamic capabilities of a SME can be used to continually create, enhance and maintain the enterprise's unique asset base by aligning its resources with market needs through the following competencies:

- Sense business opportunities,
- Seize business opportunities, and
- Reconfiguration.

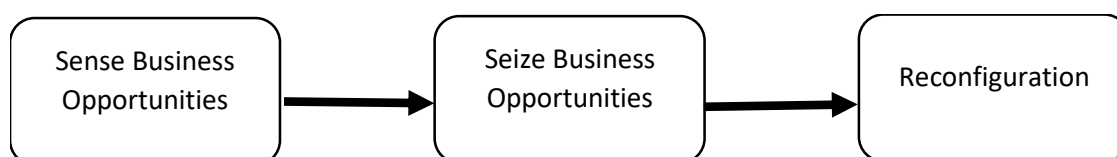


Figure 4.2: Dynamic Capabilities Competencies

4.3.1.4 Sense Business Opportunities

The rate at which customer needs are addressed, technological advancements embraced and competitive activities dealt with is continually changing in the fast-paced global economy in which SMEs compete. There are opportunities for both new and existing business enterprises, which places the revenue, profit and cash flow of existing business enterprises at risk (Teece, 2007).

Scanning, creating, learning and interpreting activities are key to the sensing of new business opportunities. Opportunities involve the ability of SMEs to: interpret new events, identify target market segments and select which technologies to implement (Teece, 2007).

SME owners must continually work at their ability to create new business and to generate product development opportunities. ICTs should be appropriately designed and implemented to achieve ease of access and information dissemination to people who can make sense of it. These activities enable SMEs to assess market and technological developments and sense new opportunities (Clara & Elin, 2010). For example, in the case of a mobile commerce service, SMEs need to consider two key capabilities: an understanding of the technological opportunities and customer behavioural changes which enable the sensing of opportunities and achieve market advantage (Arto, 2013).

In instances where SME owners consistently develop and renew capabilities in response to new goals and opportunities, SMEs will continue to gain a competitive advantage in dynamic environments (Mohamad, Ahmad & Siti, 2014).

4.3.1.5 Seize Business Opportunities

Organisations can improve their performance by making strategic and timely investment decisions.

The likelihood of an organisation succeeding improves with its ability to: analyse multiple alternatives, acquire an in-depth understanding of customers' needs, understand how to deliver specific customer requirements in a cost-effective and timely manner and adopt a productivity-based viewpoint which enables the outsourcing of business activity decisions (Teece, 2007). As for the sensing of new business opportunities, the SME owner must contemplate new business processes and products which, in turn, call for the execution of sound investment decisions at appropriate times.

Organisations need to address sensed business opportunities and improve technological competences. When the suitable opportunity for investment arises, the SME owner should make appropriate business decisions regarding a particular technology and/or product to achieve market acceptance (Teece, 2007). The dynamic capability of the SME lies in the owner's ability to address inefficient decision processes governing the allocation of resources (Teece, 2007).

Some organisations sense a new business opportunity, but do not invest (Teece, 2007). These organisations tend to focus on incremental improvements which enhance competencies but avoid innovations which impact on competencies. When making decisions the presence of structurally layered organisational routines, well known capabilities and standard procedures could aggravate biases against innovation (Teece, 2007).

As far as their processes are concerned, SMEs need to adopt an innovative mindset which will enable them to sense business opportunities and, in so doing, maintain a continuous market advantage. A gap often exists, as a result of the continuous flux in business environments, between organisations' current capabilities and the market reality - SMEs should attempt to pro-actively address this gap (Mohamad, Ahmad & Siti, 2014). If they wish to reduce the time it takes to introduce new products and/or services to the market, organisations must simultaneously execute cross-functional activities and address associated investments (Teece, 2007).

SME owners need to develop their functional competencies in an effort to attain a deeper understanding of market needs and relevant technologies. This will aid them in making the correct investment decisions at the right time.

Based on the literature previously described, this research study seeks to address the following qualitative sub-research questions:

SR_{10a}: What role do Mobile apps play in the adaptive capabilities of SME owners to sense new opportunities?

SR_{10b}: What role do Mobile apps play in the absorptive capabilities of SME owners to sense new opportunities?

SR_{10c}: What role do Mobile apps play in the innovative capabilities of SME owners to sense new opportunities?

4.3.1.6 Reconfiguration

The capability to renew organisational structures and competencies as business activities grow and change along with market needs and technologies remains a crucial factor which enables organisations to achieve sustainable growth in the globally competitive market (Teece, 2007).

Reconfiguration in organisations is necessary in order to maintain operational stability and to avoid unfavourable organisational skills (Teece, 2007). In dynamic business environments SME owners must continuously improve and adapt to changing customer needs and evolving technology by reviewing existing procedures and defining new ones.

SME owners require entrepreneurial and managerial skills in order to sustain dynamic capabilities. One of the SME owner's key management tasks is to facilitate continuous adaptation of assets through the renewal of organisational structure and routines.

Where product and/or process innovations are done incrementally, organisational routines and structures may evolve gradually (Kuuluvainen, 2011). In order to sustain dynamic capabilities, organisations must be open to decentralised decision-making as this enables the SME owner to familiarise himself/herself with new ICTs as well as customer and market related changes (Teece, 2007). The practice of reconfiguration, as applied by SME owners, will result in the efficient and timely sensing of opportunities and enable management decisions to be more accountable (Teece, 2007).

The following section will discuss actual events created as a result of ICTs' causal mechanism which influence SMEs to sense business opportunities, as described in the preceding section.

The Need for ICTs to Develop Dynamic Capabilities of SMEs

SMEs are becoming gradually and increasingly relevant to Nigeria's economy as they adopt more competitive strategies in order to survive in an increasingly fast-moving and global business environment. While large organisations are making the most of the technological advancements, the transition has been slower for SMEs.

The underlying assumption underpinning the dynamic capability framework is that short-term competitive goals can be renewed using core functional competencies and, in doing so, a long-term competitive advantage can be sustained. The entrepreneurial characteristics of SME owners, while using ICTs to develop their dynamic capabilities and sense new business

opportunities, are shaped by competencies such as: values, need to achieve, locus of control, tolerance for ambiguity, taking risks, innovative and problem solving skills and perception.

SME owners are crucial to the development of DCs in SMEs as they provide the necessary vision to guide processes. SME owners continually reshape, renew, reallocate and redeploy resources and competencies which enable them to create capabilities. These resources include: SME owners, employees, technology capital (including technology assets and products) and knowledge-based capital (including equipment and building assets) (Easterby-Smith, Lyles & Peteraf, 2009).

In emerging markets (like Brazil, Russia, Nigeria, China and Turkey), innovative processes are central to organisations' long-term success (Ritam & Kalyan, 2014). The ability to create ICTs and transform organisational innovations into new products and business processes enable SMEs to sense new business opportunities.

SMEs need to adopt an ICT artefact, driven by dynamic capabilities, to effectively use ICT for growth, utilise resources and provide seamless service support and delivery which will enable the sensing of business opportunities.

The SMEs in Nigeria are surrounded by rapidly growing and dynamic markets including those of Kenya, Ghana and South Africa. Nigerian SMEs are evolving in an African context where markets are becoming increasingly open and, consequently, competitive (Habra et al., 2008).

According to Hobáin (2012), the dynamic capability of SMEs lies in the capacity of the SME owner to recognise, adapt and develop new competencies based on the "real domain" of the strata of reality. SMEs must use their dynamic capabilities to sense, seize and reconfigure resources, thus enabling them to align their resources to the changing market needs (Teece, 2007). SMEs constantly experience changing customer needs and operating environments. The continuous sensing and seizing of opportunities, as well as resource reconfiguration by SMEs, could facilitate the adoption of dynamic capabilities.

In Nigeria, 96% of organisations are SMEs (Abdullahi et al., 2015). It is therefore essential that these businesses adopt an archetypal operating system which enables the sensing of new business opportunities in line with changing market needs.

4.4 Actual

These are the observed and unobserved *events* in Nigeria which influence SMEs' ability to sense business opportunities.

Entrepreneurship

Entrepreneurship is a multidimensional concept which can be defined from an economic, social, psychological and/or management point of view (Bula, 2012). Entrepreneurship also refers to the practice of starting a new business, particularly a new business created in response to sensed business opportunities (Onuoha, 2007).

Entrepreneurship is the ability and readiness of autonomous individuals, internal and external to organisations, to discover and create new business opportunities in order to introduce their ideas to the market. This is done by making decisions regarding organisational processes and structures as well as resource allocation in the face of uncertainty and other impediments (Afolabi, 2015). Entrepreneurship is a complex phenomenon and, as such, involves activities which require a diverse set of technical, human, managerial and entrepreneurial skills (Filion, 2011). The entrepreneurial process involves discovering, implementing, evaluating and exploiting opportunities to create new products and services (Gutterman, 2012).

Entrepreneurship involves the *conception* of a previously undiscovered profitable business opportunity. This is followed by an *awareness* of said undiscovered opportunity which gives rise to the *implementation* of appropriate actions to *realise* the business opportunity (Bula, 2012).

Entrepreneurship can be used to denote various activities, from individual, small projects to significantly larger projects which create many other business opportunities. Entrepreneurship is vital to Nigeria's economic growth and development (Shri Achintya Kr., 2018) and refers to purposefully executed activities which include the initiation, promotion and distribution of wealth and/or services. SME owners, or individuals who establish and/or manage an organisation, often engage in entrepreneurship (Afolabi, 2015).

Entrepreneurial activities are regularly characterised by SME owners taking planned and strategic risks while carrying out decision-making activities (Bula, 2012). This is done in an effort to seize opportunities and, in so doing, attain a competitive advantage and stimulate economic growth (Afolabi, 2015).

Key Features of Entrepreneurship

The key features that drive entrepreneurship are: business setup, self-employment, small-scale businesses, venture capital as well as research and development (Godin, Jason & Veldhuis, 2008).

- i. Business setup: The process of establishing a new SME business which enables individuals to create innovative services for the market.
- ii. Self-employment: This denotes a career choice where an individual decides to become an entrepreneur and accepts the risk of working for himself/herself, as SME owner, rather than working for an employer.
- iii. Small-scale businesses: SMEs in this study are organisations with 50 to 199 employees with assets of not more than five hundred million Naira. These businesses represent the vehicle through which SME owners introduce innovations to the market.
- iv. Venture capital (VC): This refers to capital raised by SMEs to invest in potential high-growth businesses.
- v. Research and development (R&D): This enable SME owners to pursue and generate a breakthrough in product ideas in the face of an unknown outcome.

This research will provide answers to the following questions based on the previously discussed literature:

SR_{11a}: How does the creation of SME government agencies (SMEDAN, NOAS, NDE) influence the sensing of business opportunities?

SR_{11b}: What role do Mobile apps play in enabling SMEs to sense business opportunities through SME government agencies?

Entrepreneurs

An entrepreneur is an individual who exhibits creative thinking competencies and who takes initiative. This individual can organise mechanisms which, in turn, transform resources *and* situations into practical accounts, he/she is not risk adverse (Hisrich, 1990). An entrepreneur is responsible for the mechanisms of change and economic development. Innovations are considered the new ideas and/or combination of ideas which characterise entrepreneurship (Schumpeter, 1934). Entrepreneurs are individuals who sense business opportunities through their technical skills and innovative management capabilities.

Factors Which Shape Entrepreneurs

The factors which shape and enable entrepreneurs, or SME owners, to sense business opportunities whilst carrying out entrepreneurship activities include: values, need to achieve, locus of control, tolerance of ambiguity, taking risks, innovative and problem solving skills and perception (Wolfgang, 2014).

Wolfgang (2014) describes the factors which shape entrepreneurs as follows:

- i. *Values*: This involves the entrepreneur and/or manager's idea regarding persons and things, an understanding and appreciation of his/her place in society. Values reflect the need for achievement and independence and anchors effective leadership in entrepreneurship.
- ii. *Need to achieve*: This is an entrepreneurial characteristic which enables the entrepreneur to assume responsibility for finding solutions to problems. It also involves the ability to manage setbacks and is closely associated with perseverance and persistence.
- iii. *Locus of control*: This refers to an entrepreneur, or SME owner's self-confidence and his/her belief that he/she can control the events which affect him/her.
- iv. *Tolerance of ambiguity*: Entrepreneurs who embark upon uncertain initiatives often need to face a great discrepancy between *desired* and *unwanted* outcomes without being able to quantify their chances and/or anticipate possible outcomes.
- v. *Taking risks*: This refer to entrepreneurs, or SME owners' ability to take moderate and calculated risks whilst making decisions to gain the competitive advantage. Risk taking is an entrepreneurial competence which drives a business towards growth and innovation, and possibly towards ultimate success as well (Bula, 2012).
- vi. *Innovative and problem-solving skills*: This critical entrepreneurial capability enables entrepreneurs, or SME owners, to sense business opportunities.
- vii. *Perception*: This refers to the ability of an entrepreneur, or SME owner, to execute a target behaviour by being sensitive to the situation surrounding him/her, listening thoughtfully, to sense new opportunities.

All these factors enable entrepreneurs, and thus SMEs, to effectively deliver organisational and managerial capabilities by: establishing or doing things differently; sensing new business opportunities; developing innovative products and/or services and organising the way in which products are made and/or supplied (Oyelola et al., 2013).

Bula (2012) further explained Mises's (1949) solution to entrepreneurial tasks by referring to human action and noting that there are abundant opportunities in an imbalanced situation and every entrepreneur has the ability to act as an economic agent .

In summary, this chapter facilitated an understanding of ICTs and their usage, SMEs, entrepreneurship, and the DCs manifestations of SMEs. This was done in an effort to define the main terms and identify the significant theoretical underpinnings - *the real, empirical and actual*.

CHAPTER 5

Research Methodology

5.1 Introduction

The previous chapter provided a review of the relevant literature regarding ICTs, SMEs, entrepreneurship and dynamic capabilities in an effort to define the main terms and outline the significant theoretical underpinnings.

This chapter will present the research methodology in response to the research questions presented in Chapter 1. It will also provide a summary of the research design, paradigm and approach as well as underlying data collection, assumptions and ethical considerations. The chapter will also include a discussion as to the validity and reliability of this research work.

5.2 Research design

A mixed research approach (*i.e. qualitative and design science research*) was adopted in the design of this research study. The philosophical assumptions of critical realism were used to evaluate the interplay between actual events and the detected causal mechanisms which produced these events as well as their underlying structures (Sisse & Hans, 2014).

5.3 Research paradigm

This study relies on the fundamental philosophical assumption that a valid research study should adopt suitable research methods in order to generate new knowledge (Kwadwo & Hamza, 2015). The research paradigm is the underlying epistemology which guides this research.

The philosophical approach of critical realism (CR) emphasises that *causes* determine *effects* or *outcomes* (Creswell, 2013). CR holds forth that observation and reasoning are means to understanding human behaviour (Dash, 2005). CR also asserts that true knowledge can be acquired through observation and experimentation and is based on the experience of the researcher (Trochim, 2006). CR highlights the need for researchers to identify and evaluate those factors influencing the results of research experiments.

In this research, critical realism enabled the development and evaluation of theoretical constructs, and their interpretation, to critically review and analyse the relationship between dynamic capabilities, entrepreneurship and SMEs' ICT usage. This process allowed the

researcher to understand *how* mobile ICT usage enhances the dynamic capabilities of SMEs to seize new market opportunities. CR allowed for the adoption of multiple paradigms in this research study including the positivist, interpretive critical and design science paradigms.

5.4 Research approach

The nature of the research problem determined the selection of research approaches in this study (McEvoy & Richards, 2006). The adoption of *critical realism* in this research is important because the philosophy's stratified ontology allowed for the use of multiple research approaches such as quantitative, qualitative and/or design science research approaches (Zachariadis, Scott & Barrett, 2010). This research adopted the mixed method approach by combining the qualitative and design science research methods. The mixed method allows for the integration of a more complete and collaborative use of data collected; strengthening the rigor and enriching the research findings, and supporting knowledge creation (McKim, 2017; Wisdom & Creswell, 2013).

The quantitative method is not suitable for this research because of its limitations in: developing an understanding of human experiences and describing its meanings (Hughes, 2013).

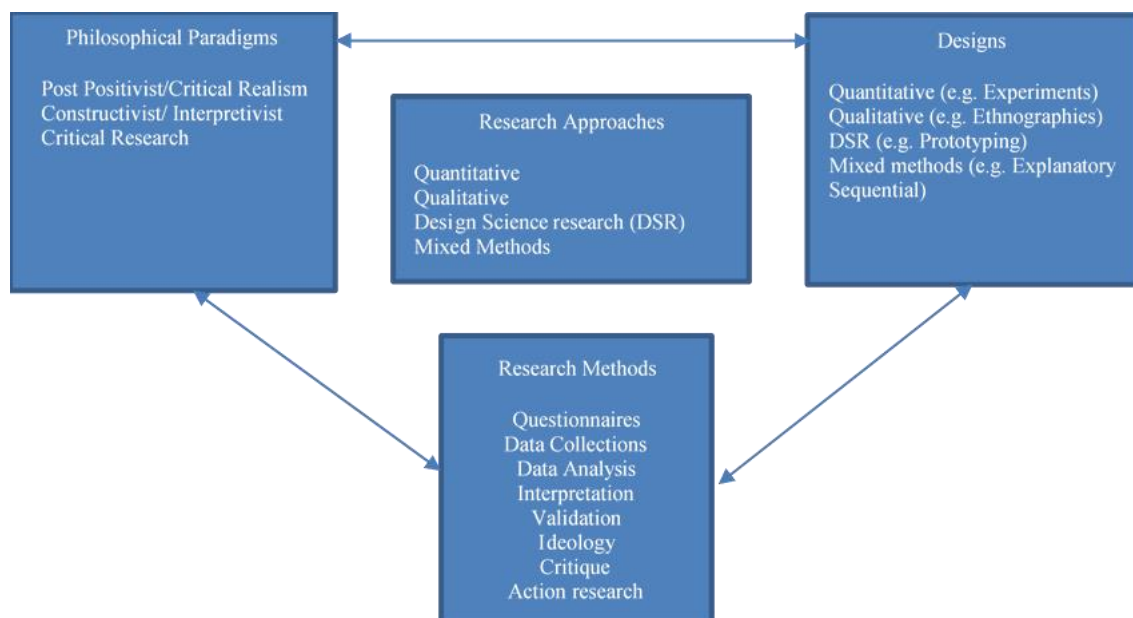


Figure 5.1: Diagram illustrating the interconnection of research philosophical views, approaches and methods. Adapted from Creswell (2013).

Qualitative research

The qualitative research approach focuses on exploring and understanding the meanings attributed to a social or human problem which, in turn, enables the researcher to generate theories through observation. This research approach involves: the collection of data by the participant, the formulation of questions and procedures, the inductive analysis of data (working from *particular to general* themes) and the interpretation of the research data by the researcher.

In an effort to thoroughly describe the phenomena being studied, qualitative researchers carry out data collection through case studies and fieldwork. The stance employed is primarily *inductive*, meaning that the researcher draws generalisations from specific findings.

The strength of the qualitative method lies in that it is open-ended and allows for new subject matter, which could not have been predicted in advance, to emerge during the investigation. This can help to reveal complex concepts and relationships which might not have been captured by predetermined categories of responses (McEvoy & Richards, 2006).

Case study

Case study is a qualitative research method which investigates a single individual, group or event to explore and unearth complex issues. It is used to investigate an existing phenomenon, in a real-life context, especially when the boundaries between the phenomenon and context are not clearly demarkated (Soy, 2006). Intrinsic case studies allow for a deeper understanding of a particular phenomenon (Suryani, 2013).

Case studies allow for context-sensitive, holistic and comprehensive interpretation of facts to develop a suitable hypothesis regarding the domain being studied. They enable researchers to collect data using interviews, participant observations, questionnaires, checklists and analyses of recorded data (Balaraju, 2014).

Design science research (DSR)

DSR is an emerging problem solving approach which aids in the development of ICT research artefacts and which fosters a consideration for their significance in the business domain (Weber, 2010). DSR denotes an inquiry driven approach which provides specific guidance to research design procedures.

The DSR approach focuses on elucidating the objectives of the artefacts (i.e. constructs, methods, models or instantiations). This is followed by ascertaining and evaluating their development and usefulness as well as, to a lesser extent, their reliability and validity. The DSR approach emphasises iterative development and assessment of research mechanisms to ensure that the mechanism design is based on good evidence (both theoretical and empirical) to thus establish the validity, reliability and practical usefulness of the mechanisms (McLaren & Buijs, 2011). This study adopted the action design research (ADR) method of DSR to create and evaluate the ICT artefact.

Action design research (ADR)

Action design research is a DSR method which entails the close linking and simultaneous evaluation of activities specific to the creation of an ICT artefact relevant to SMEs (Sein et al., 2011). ADR enabled the concurrent development and evaluation of an ICT artefact to resolve a particular problem in a SME context. ADR, a problem-driven method, guided this study to develop design knowledge through the building of design principles. The product of this process is an ICT artefact based on iterative cycles in the SME context (Pettersson & Lundberg, 2016).

ADR focuses on the development, intervention and assessment of an ICT artefact which reflects the researcher's intent, pre-existing knowledge and feedback from on-going usage in SMEs (Sein et al., 2011).

This study adopted the elaborated ADR model, proposed by Mullarkey and Hevner (2018), as it allows for more than one ADR cycle. The ADR cycle is made up of the following stages: diagnosis, design, implementation and evolution.

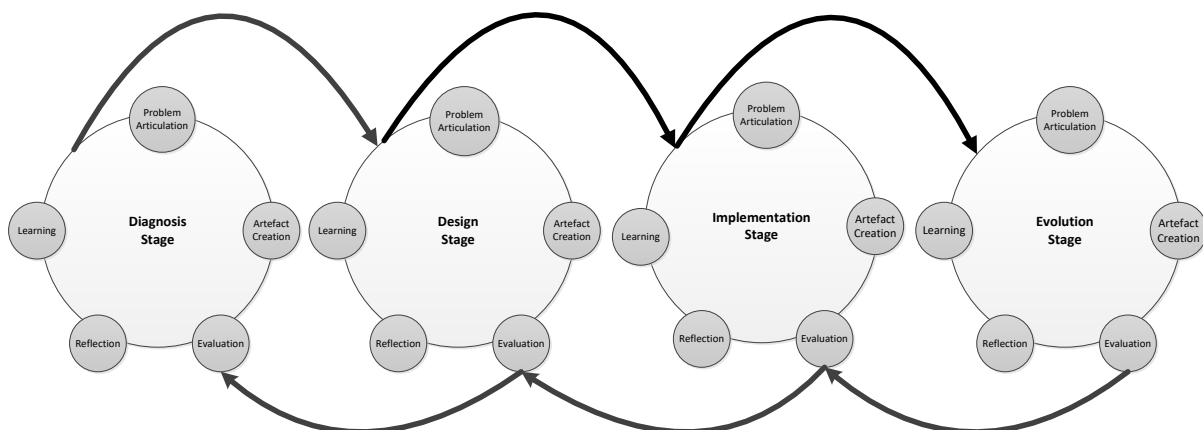


Figure 5.2: Stages of ADR. Adapted from Mullarkey and Hevner (2018).

Each stage of elaborated ADR includes the following activities: problem articulation, creation of artefact, artefact evaluation, new knowledge creation through reflection and learning formalisation (Mullarkey & Hevner, 2018). These activities are carried out iteratively, as a sequence of specific tasks, based on certain principles to create new knowledge through learning formalisation. This study will use the elaborated ADR model to discuss the development and evaluation of the proposed ICT artefact.

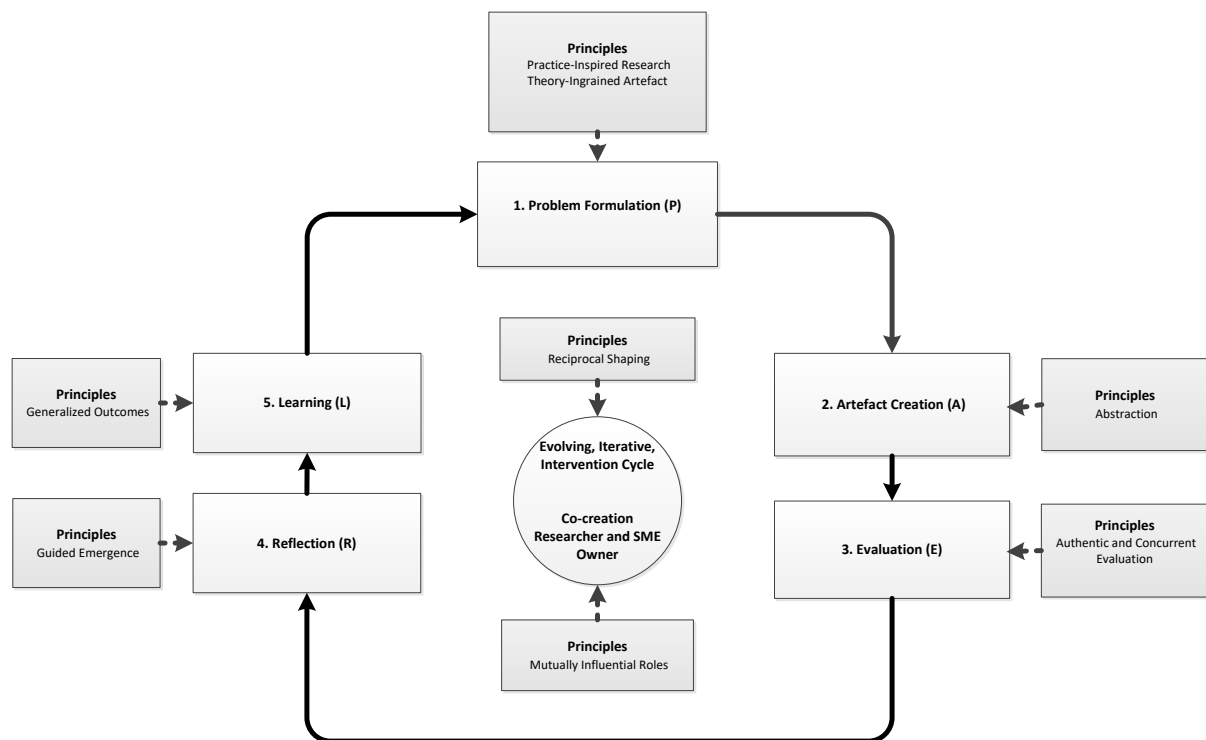


Figure 5.3: Activities and Principles of ADR Method. Adapted from Mullarkey and Hevner (2018).

The research design of the ICT artefact in this study was influenced by the ICT intervention approach of ADR which underscored the creation of a novel ICT design.

Each stage of ADR applied the ICT intervention approach through the principles of reciprocal shaping and mutually influential roles to support all the ADR activities, from problem articulation to learning formalisation. The reciprocal shaping principle emphasises that increased knowledge regarding SMEs influences the overall ICT artefact design. This results in a newly created artefact which impacts upon the business processes in SMEs. The principle of *mutually influential roles* underscores the importance of: mutual learning amongst SME owners, the researcher's theoretical knowledge and ICT level, the SME owner's knowledge of

ICTs and business processes. These knowledge domains can compete with *or* complement one another (Sein et al., 2011)

5.4.1.1 Diagnosis Stage

This research study conducted a thorough investigation into a SME context in the diagnosis stage. This was done in an effort to ascertain the significance of the problem domain and identify possible solutions within SMEs, with inputs from the researcher and SME owners. This allowed the study to identify existing ICTs, generate design theories and define the goals of the proposed ICT artefact. The principle of *practice* inspired the identification and scoping of problems, as per section 6.10 in the next chapter. The creation of new knowledge opportunities in the SME context in this study were influenced by the ICTs and SME domains. The principle of the *theory-ingrained artefact* emphasised that the theories generated in this study, in turn, influenced the creation and evaluation of the ensembled ICT artefact.

This stage of ADR describes the existing knowledge, which was discovered empirically, or through the researcher's reflection on the SME context, to identify and conceptualise a research opportunity based on existing theories and ICTs.

The diagnostic stage allowed this study to structure the problem, identify possible solutions and guide the design of the ICT artefact in the SME context. This study is problem-centred and, as such, generated new knowledge which can be useful to SME owners when sensing new business opportunities. The ADR process views the diagnosis stage as *problem centred* in that it enables the researcher to identify and gain an in-depth understanding of the problem and possible solutions within a SME context. The artefacts created during this stage are the formulation of requirement specifications and the conceptualisation of the problem and possible solutions within the SME context (Mullarkey & Hevner, 2018).

In this study, the iterative activities in the diagnostic stage enabled the definition of the problem domain and aided in the design and evaluation of the ICT artefact.

The researcher ensured that the research findings represented the information extracted from the data collected and were a correct interpretation of the participants' views (Guba & Lincoln, 1994).

In the next section the study will provide answers to the following sub-research question:

SR₁₂: *How should an ICT artefact be designed to allow SMEs to do business socially and to access information on local markets, SME programmes and funding?*

5.4.1.2 Design Stage

To enable the creation of the ICT artefact prototype, the iterative activities in the design stage facilitated the identification and conceptualisation of the ICT artefact prototype design which, in turn, lead to the emergence of principles which addressed problems identified in the diagnosis stage. The principle of *abstraction* enabled the study to create an explicit artefact construct based on the identified problems and solution possibilities in SME context.

The iterations carried out in the design stage lead to the creation of artefacts, including principles, which elucidated the design, set-up and features of the artefact, data flow diagram and system architecture.

In this study, the design of the ICT artefact was shaped by new knowledge garnered by the researcher regarding: SMEs and their DCs, the business processes of SMEs and the application of ICTs. The ICT artefact was designed from a collective viewpoint in which SME owners and their relationships, existing ICT artefacts as well as SME business processes were organised in accordance with a social structure (Owoseni & Twinomurinzi, 2017). During the design cycle of the ICT artefact, ADR allowed for the closely linked collaboration of design efforts and SME business processes (Sein et al., 2011).

The ADR process views the design stage as objectively centred, thus enabling the study to explore the solution design options and generate design knowledge as solution possibilities within a SME context.

5.4.1.3 Implementation Stage

In this stage, the implementation activities involve the creation and evaluation of the ICT artefact prototype. The authentic and concurrent evaluation principle underscores the need for continuous evaluation which is simultaneously linked with other ADR activities during this stage. The creation and evaluation of the ICT artefact in this study is carried out using an iterative process. The artefacts abstracted and evaluated in this stage include: systems, algorithms, programmes, databases and processes.

Evaluation of the artefact is developmental and may give rise to significant functional and stability issues and/or changes which may further enhance the ICT artefact. The evaluation was conducted using observational design evaluation methods through field study (Hevner et al.,

2004). This process was conducted through administering questionnaires to a small group of SME owners taking part in the research as well as qualified individuals with adequate ICT and business process knowledge. This evaluation method allowed the research study to: evaluate the efficacy of the ICT artefact, obtain feedback from participants and implement changes.

The ADR process views the implementation stage as *development centred* as it enables the development and evaluation of an ensembled ICT artefact prototype within a SME context.

The aim of this study was to create and evaluate an ICT artefact for SMEs, namely *SMEAPP*, an ICT intervention which ensembles SMEs' relationships, business processes and other ICTs to do business socially and sense new business opportunities.

5.4.1.4 Evolution Stage

In the evolution stage, the ICT artefact undergoes enhancements over time to reflect changes in the SME context. This involves recurring iterations of conceptualisation, assessment, renewal of theories, creation of artefacts and evaluation of impacts. A clear starting point is required as researchers wish to generate and communicate their research contributions successfully (Mullarkey & Hevner, 2018).

The ADR process views the evolution stage as observation centred in that it enables the observation of the existing ICT artefact in order to identify possible changes and/or opportunities for enhancement within the SME context.

In this research, a mixed method approach consisting of both qualitative and design science methods was used to identify the dynamic capabilities of SME owners, and thereafter to create a new ICT artefact (i.e. mobile application). The artefact will be evaluated to determine its efficacy in the SME domain.

5.5 Research Process

The adoption of CR allows this research study to iteratively describe the evolving cause and effect relationships using *retroduction*. The researcher could thus better reflect on the patterns of cause and effect as identified in SMEs in this study (Heeks & Wall, 2017).

In addition, CR's methodological pluralism and triangulation allow this study to combine various viewpoints, data sources and methods. The reflexivity of CR allows for the formulation of deep introspective insights regarding the nature of the research. The research rigour reflects upon individual respondents, context, researcher and method biases. CR enables the researcher

to achieve consistency by guiding the research methodology to the conclusion of the research. CR also enhances neutrality by ensuring that the research is bias free (Heeks & Wall, 2017).

The adopted research methodology enabled this study to identify the structures and mechanisms found in the *real*, the generative mechanisms and those events generated in the *actual* and *empirical*.

In this study, the researcher followed the following steps:

1. Critical review of existing subjects
2. Design of a research instrument
3. Approval and ethical clearance received from the University of South Africa
4. Adoption of consistent coding and categorisation methods
5. Review of identified codes and categories
6. Identification of events and entities
7. Description of events
8. Description of entities
9. Generalisation of entities
10. Identification of generative mechanisms using retroduction
11. Review of underlying mechanisms identified to reveal problems of SMEs in low-income context
12. Generation of possible solutions (i.e. theories) to address problems identified in SMEs
13. Development of requirements to enable design of an artefact suited for SMEs in low-income context
14. Design of ICT artefact including features and functionalities, data flow diagram, system architecture, and user interface designs
15. Evaluation of artefact to assess its efficacy in SMEs

5.6 Population Group

SMEs defined by SMEDAN (2013a) in the states of Lagos, Oyo, Abuja, Kano and Kaduna in Nigeria make up the population group of this research study.

5.7 Unit of Analysis

SMEs are the unit of analysis used in this study.

5.8 Sampling Strategy

This study used purposive (judgemental) sampling to identify 16 SMEs in the population group in order to participate and provide feedback for interviews. This sampling strategy allowed the researcher to deliberately select SMEs because of the researcher's belief that they should be included as participants in this study; and cannot obtain such feedback from other options (Taherdoost, 2016).

5.9 Data Collection

The data generated by SME owners were collected via interviews for the qualitative research. This enabled the researcher to explore the views, experiences and beliefs of SME owners regarding the research subject. The responses received from participants were transcribed into text and analysed using thematic analysis method (Atlas.ti™). This data collection strategy enabled the generating of data to provide answers to the sub-research questions and, as such, will be discussed and examined in Chapter 6.

For design science research, this study generated data through 5-point Likert-scaled responses to questionnaires which elicited feedback for the artefact's functionality. This enabled the researcher to evaluate the usefulness of the designed artefact in this study. The responses received were analysed using descriptive statistics analysis method (Minitab 18) to execute the statistical tests for each of the artefact's functionality. This data collection strategy enabled this study to provide answers to the sub-research questions which will be discussed and examined in Chapter 7.

Research reliability and validity are essential criteria whereby the quality of research can be assessed. This qualitative research approach is based on credibility, neutrality, consistency and trustworthiness (Bashir, Afzal & Azeem, 2008).

The researcher should ensure that the research findings represent the information extracted from the collected data and that the correct interpretation of participants' views are included (Guba & Lincoln, 1994). The credibility of this research contributes to the trustworthiness of the data collected for the research. Credibility is achieved through the prolonged engagement of participants, persistent observations, referential adequacy and member checks (Myburgh & Poggenpoel, 2007).

CHAPTER 6

Analysis and Discussion of Findings

6.1 Introduction

Chapters 1 to 5 presented and discussed: the introduction to the study, philosophical orientation influencing the research, background to Nigeria, relevant literature related to this study and the research methodology which guided the formulation of answers to the research questions.

This chapter will analyse the data and discuss the results and findings yielded by Nigeria's significant economic states (Lagos, Oyo, Abuja, Kano and Kaduna) which constitute the population group of this research study. In addition, this chapter will identify and discuss events and entities in the CR domain, extracted from the analysed data and generative mechanisms, through the process of retroduction.

6.2 Data analysis

In this study the method of content analysis was adopted to extrapolate meaning from the collected qualitative data. Content analysis enables the research to suggest guidelines in the coding of the text and to draw inferences from the collected data (Prasad, 2008).

The researcher used thematic analysis to extract data which allowed the determining of broad patterns (i.e. themes) and facilitated a more granular research and analysis. This study adopted the thematic analysis method, as used in qualitative research, to examine data.

Thematic analysis involves the identification, investigation and reporting of patterns within data. This method facilitates the analysis of qualitative data to methodically gain new knowledge and understanding about a person, group or organisation. The flexibility of this research method yields a comprehensive and elaborate description of the data collected (Braun & Clarke, 2006). This research used thematic analysis to extract data allowing the researcher to determine broad patterns (i.e. themes) and consequently conduct more granular research and analysis. The thematic analysis involves: the collection of data, data coding, code validation, themes/framework identification, information consolidation and theme name finalisation (Komori, 2014).

Thematic analysis is *inductive*, and the researcher does not impose or predetermine the research findings. DSR will build on the results of the thematic analysis to create an ICT artefact.

The thematic analysis carried out in this research involved the following steps (Delahunt & Maguire, 2017):

- Extract data from feedback received from participants by thoroughly reading through the interview transcripts.
- Generate initial codes and categorise codes by organising the collected data in a meaningful and systematic way.
- Search for themes by observing patterns which capture something significant about the data and research questions.
- Review the themes and then modify and develop preliminary themes identified during the analysis.
- Define themes by identifying the essence of each theme and deciding how these themes interact and relate to each other.

The descriptive and in vivo coding methods were adopted to assign codes to text. The codes were quantified, or counted, based on the code frequencies. Coding was carried out by categorising assigned codes based on their relationships to the research question.

6.3 Content Analysis: Demography

Interviews were conducted with SME owners in the states of Lagos, Oyo, Kaduna, Kano and Abuja in Nigeria. The SME owners' average age was 34.5 years and their educational background ranged from a national diploma to master's degree, as per Table 6.1.

SME Owner	Location	Gender	Age (Years)	Educational Background
1	Abuja	Male	31	Bachelor's degree
2	Abuja	Male	38	Bachelor's degree
3	Kaduna	Male	37	Bachelor's degree
4	Kaduna	Male	38	Master's degree
5	Kaduna	Male	38	Bachelor's degree
6	Kaduna	Male	43	Bachelor's degree

7	Kano	Male	38	Bachelor's degree
8	Lagos	Female	27	Bachelor's degree
9	Lagos	Male	40	Master's degree
10	Lagos	Female	33	Bachelor's degree
11	Lagos	Female	36	Master's degree
12	Oyo	Female	25	Bachelor's degree
13	Oyo	Female	27	Bachelor's degree
14	Oyo	Male	42	Bachelor's degree
15	Oyo	Female	28	National Diploma
16	Oyo	Female	32	Bachelor's degree

Table 6.1: Demography of Respondent SMEs in the study

The SMEs participating in this study reflected the SME population, as defined by SMEDAN (SMEDAN, 2013b). The SMEs in this study included 16 business types which cut across 7 industries. The size of the SMEs ranged from 2 to 50 employees with the average business age being 7.5 years, as per Table 6.2.

SME	Location	Business type	Industry	Size	Age of business (in years)
1	Abuja	Farming business	Agriculture	9	13
2	Abuja	Bottle production and packaging	Manufacturing	21	11
3	Kaduna	Restaurant and event planning	Food, event planning	31	3
4	Kaduna	Medical books and equipment sales	Medical	6	9
5	Kaduna	Food processing	Food	16	6
6	Kaduna	Medical equipment supplies	Medical	12	9

7	Kano	Industrial chemical and soap production	Manufacturing	15	6
8	Lagos	Cakes and confectionaries	Food	2	4
9	Lagos	Information security consulting and advisory services	Information technology	15	6
10	Lagos	Luxury and bespoke services	Gift packaging	2	3
11	Lagos	Palm oil processing	Food	3	1
12	Oyo	Cardigan making	Clothing	3	1.5
13	Oyo	Bags and leather goods production	Manufacturing	2	0.3
14	Oyo	Computer training services	Information technology	14	18
15	Oyo	Computer sales, repair and training services	Information technology	50	25
16	Oyo	Pharmaceutical	Medical	12	4

Table 6.2: Demography of SMEs in the study

This study introspects that SMEs in Nigeria are run by well-qualified individuals with specialised educational backgrounds.

6.4 Content Analysis: Mobile Apps Used by Nigeria SMEs

The 16 SME owners who participated in this study used a total of 27 mobile apps with a total usage frequency of 65 and an average of 2 mobile apps per SME. This study classified the mobile apps into five categories: payment apps (4), e-commerce apps (3), social media apps (42), productivity apps (15) and custom apps (1). The code categorisation suggests that SME owners mainly use social media apps to sense business opportunities. The top three mobile apps used by SMEs are Facebook at 18.4% adoption, Instagram at 15.4% adoption and WhatsApp at 15.4% adoption. This study noted that these apps are clearly *social apps* highlighting the fact that business is increasingly being transacted on a *social platform* and less on a *productivity platform*. The researcher noted evidence as to the *socially structured nature*

of business in not only Nigeria, but also the whole of Africa. This means that the designed ICT artefact needs to mimic this social nature.

Code categories	Mobile apps codes	Frequency
Payment apps (4)	Access Bank app	1
	Diamond Bank app	2
	FCMB mobile app	1
E-commerce apps (3)	Alibaba app	1
	jumia app	1
	konga app	1
Custom apps (1)	Omak app	1
Social media apps (42)	Facebook	12
	Twitter	4
	Google app	2
	Instagram	10
	Linkedin app	1
	Pinterest	1
	Whatsapp	10
	YouTube	2
Productivity apps (15)	Booking app	1
	Direct to Me	2
	Chrome	1
	Lipix	1
	Microsoft office	3
	Photoeditor pro	1
	Invoice making app	1
	Quick books app	1
	Sendcall	1
	Smart app	1
	Wave app	1
	Caver app	1
	Total Aggregate Usage	65

Table 6.3: Mobile Apps used by Nigerian SMEs

The following section presents some excerpts from participants' feedback regarding their use of mobile apps:

"...yes, we do that through our Facebook and Instagram pages and few sponsored ads online through Facebook and Instagram sponsored ad, it is relatively okay in terms of price and it is readily available at any time..."

"...diamond bank app, I use them for transferring funds to my suppliers..."

"...sometimes we use a software called QuickBooks. It does our stock in and stock out, virtually tells us our sales figures, margin figures and expenses"

"We also have an instagram account where we post pictures of our works for people to see. About 30% of our customers come from Instagram while the remaining 70 is by referral"

"Yes, I use LinkedIn mainly to get industry trends, hmmm... to get information from other people in the business..."

6.5 Content Analysis: Critical Realist Constructs of SMEs in Nigeria

The analysis is structured using the Critical Realism constructs namely: *real* (causal mechanisms), *empirical* and *actual*. We identified 414 unique codes in total. The codes were categorised using their anchor codes and frequencies and grouped into 112 Real, 41 Actual, and 261 Empirical responses.

Real (causal mechanisms) Constructs of SMEs in Nigeria

The *real* describes social structures, objects and causative powers which exist independently of our perception regarding them.

There were 112 unique codes identified as *real* and these were categorised into three groups based on the relationships of the unique codes namely: ICTs (mobile apps) (65), market limitations (5) and organisational constraints (42), as presented in Table 6.4.

Code Categories	Unique Codes	Frequency
Mobile Apps (65)	Payment apps	4
	E-commerce apps	3
	Custom apps	1
	Social media apps	42

	Productivity apps	15
Market Limitations (5)	REA - Competitor pricing	1
	REA - Competitors' experience in the market	1
	REA - Declining customer demand	1
	REA - Low industrial productivity	1
	REA - No market changes	1
Organisational Constraints (42)	REA - Climatic issues	1
	REA - Finance issues	10
	REA - Human resources constraint	7
	REA - Infrastructure issues	3
	REA - Logistics issues	3
	REA - Power issues	6
	REA - Production issues	2
	REA - Regulatory issues	7
	REA - Taxation issues	3

Table 6.4: Real (causal mechanisms) Constructs of SMEs in Nigeria

The frequency of codes suggests that *mobile app objects* exist as causal mechanisms within SMEs. The 16 SMEs that participated in this study used 27 mobile apps with a total usage frequency of 65 and an average of 2 mobile apps per SME which can be categorised into 5 categories: payment apps (4), e-commerce apps (3), social media apps (42), productivity apps (15) and custom apps (1). The code categorisation suggests that SMEs use social media apps to sense business opportunities. The top three mobile apps used by SMEs are: Facebook at 18.4% adoption, Instagram at 15.4% adoption and WhatsApp at 15.4% adoption. Some SMEs use custom-built mobile apps for sales and marketing and productivity apps for accounting, communications and documentation purposes. Others use e-commerce apps for online sales.

The previous discussion provides answers to the sub research question: *What mobile apps are predominantly used by SMEs in Nigeria?*

Excerpt from participants' feedback regarding their usage of mobile apps include:

"I use the WhatsApp for the WhatsApp status for posting my work and I use it for to interact with my clients my customer..."

“Ok. As regards the major limitation, based on the state of the country, number one is electricity, we have to spend a lot on fuel to generate power supply.”

“We also have issue of taxation as a new company”

“and most at times access to finance especially working capital is quite difficult and the interest rate is high.”

“I use invoice making app to prepare invoice, quotation and proformas for customers on the go. I can use it anywhere I am, within outside the country or when I travel or anywhere. So Its so easy to use.”

“The major limitations we face are around regulatory changes and affects us mostly from our side and the client side and an example would be when you are thinking of planning to build managed services located outside the country and the government comes up there and said no data can reside outside the country and tomorrow the same government changes and says ok we can have data to reside back in the country so regulations is one of the major challenges and limitation we face.”

“Another thing is government policy, policy that just bring up any how without having to inform.”

The code categorisations confirm that SMEs use mobile apps to run business processes but encounter organisational constraints and market limitations which affect their capabilities to sense business opportunities. This is because the orientation of SMEs leans towards a social structure, hence suggesting technical solutions to a real business are a problem.

SMEs need to implement mobile apps to enhance their capabilities and overcome the *market limitations* and *organisational constraints* in Nigeria.

Actual (observed/unobserved events) Constructs of SMEs in Nigeria

The *actual* refers to events which occur whether observed, or not, as a result of the causal mechanisms previously identified. Forty-one unique codes were identified as Actual, as per Table 6.5.

Unique Codes	Frequency
ACT - Administrative operations	9

ACT - Expenditure monitoring	10
ACT - Financial management	3
ACT - Business reporting	2
ACT - Create organisational policies	1
ACT - Outsourcing services	1
ACT - Project management	2
ACT - Sales and marketing	5
ACT - Knowledge development	8

Table 6.5: Actual (observed/unobserved events) Constructs of SMEs in Nigeria

The frequency of the codes illustrates that various business processes exist in SMEs. These processes include: administrative operations, expenditure monitoring, financial management, business reporting, creation of organisational policies, outsourcing services, project management, sales and marketing as well as knowledge development. This research study suggests that these business processes are influenced by the DCs of SMEs to sense business opportunities as a result of mobile app usage.

One SME stated in the feedback:

“The finance being the backbone of the business is managed meticulously with respect to forecast and budget by increasing revenue (price and quality sold) and by judicious spending of expenses where necessary.”

“The human/personnel resources department are mainly the ones with the responsibility of knowledge development.”

The events identified and illustrated in the previous section provide answers to the sub-research question: *What are the ‘observed or unobserved’ events in Nigeria which influence SMEs’ ability to sense opportunities using mobile apps?*

Empirical (observed) Constructs of SMEs in Nigeria

These are observed events discovered through formal, analytical and theoretical approaches (Basden, 2013). This study identified 261 unique codes and categorised them into ten groups, as per Table 6.6.

Code Categories	Unique Codes	Frequency
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Training and capacity development	ABS - Through e-learning	3
	ABS - Through knowledge development	23
	ABS - Through online training	6
	ABS - Learning from other business owners	6
	ABS - Attends ICT and entrepreneurship training	9
	INN - Employ skilled human resources	2
	INN - Train employees on new product ideas	3
Sales and marketing	ABS - Generate market leads	2
	ABS - Manage sales records and reporting	4
	ABS - Product and services advertising	10
	ABS - Generate invoices	5
	ABS - Carry out electronic payments	5
Carrying out market research	ABS - Market research and analysis	16
Interaction and participation	ADA - Customer and partner interaction	47
	ADA - Team member collaboration	5
	ADA - Collaborating with other business owners	1
	ADA - Generate product ideas	9
	ADA - Through customer education	1
Product marketing and research	ADA - Market product and services	5

	ADA - Product promotion and branding	9
	ADA - Through social and print media	12
	ADA - Product research and development	19
Review operations	INN - Modify company structure	1
	INN - Review product development and operations	11
	INN - Review terms with manufacturers	1
Create new products ideas	INN – Carry out product planning	1
	INN - Create new product variety	3
	INN - Create unique products for target market	6
	INN - Implement feedback received from customers	1
Marketing strategy	INN - Adopt creative approach	1
	INN – Carry out pricing Adjustment	1
	INN - Implement new business strategies	5
	INN - Implement price differentiation	3
	INN - Improve product quality	3
	INN - Innovate to get new business	1
	INN - Monitor sales performance	1
	INN - Review market needs	2
Product branding	INN - Carry out photo editing	1

	INN - Product branding and publicity	9
	INN - Repackage products	1
Access government SME programmes	ADA - Access market information through government agencies	5
	ADA - Receives support from government agencies	2

Table 6.6: Empirical (observed) Constructs of SMEs in Nigeria

The frequency of code categorisation illustrates that SMEs have various dynamic capabilities: training and capacity development (52), sales and marketing (26), carrying out market research (16), interaction and participation (63), product marketing and research (45), reviewing operations (13), creating new products ideas (11), carrying out marketing strategy (17), accessing government SME programmes (7) as well as product branding (11). This study suggests that SMEs possess the necessary capabilities to run their business operations using mobile apps.

Extracts from some SMEs' feedback are:

“...yes, we do that through our Facebook and Instagram page and few sponsored ads online through Facebook and Instagram sponsored ad, it is relatively okay in terms of price and it is readily available at any time.”

“We also attend professional exhibition like next month there will be a privately organized health care exhibition in Abuja”

“....www.jakesbooksmed.com you can also go on konga and jumia and still have us there as part of our online, you click on jakes books medical equipment on konga, if you google it, it will bring out our shop. The same thing with jumia.”

“Twitter and instagram are actually the moving vehicles now for more market strategies”

“...and social media of recent which we delve into. So, ICT has helped to showcase our new offering and to reach out to people who we think will need our services...”

Other SMEs added:

“No, because I have not heard of such program organized by government agencies...”

“...they are not fully up to task and it is a challenge to them even finding most of us and I will actually say they are not up and doing with their responsibility in terms of identifying the right SMEs and providing certain solutions to that problem. So, they are not helping boost ability to grab new opportunity...”

This study reveals that events generated through observation in the empirical domain of CR in SMEs in Nigeria are their *dynamic capabilities* which identify their existing competencies to gain a competitive advantage. The events, identified in Table 6.6, provide answers to the sub-research question: *What are the ‘events’ within SMEs in Nigeria that influence their ability to sense opportunities using mobile apps?*

6.6 Content Analysis: DC Manifestations of SMEs in Nigeria

This research, through the use of the qualitative approach, identified the DC manifestations of SMEs to gain an understanding of the empirical events in SMEs which enhance their capabilities to obtain business. This study identified 39 unique codes; the codes were categorised based on their frequencies, relationships and anchor codes in: Absorptive (81), Adaptive (107) and Innovative (57).

This study reveals that Nigerian SMEs have high adaptive capabilities, as illustrated in Figure 6.1, but lack the proper mobile apps usage to effectively optimise their operations in the sensing of business opportunities.

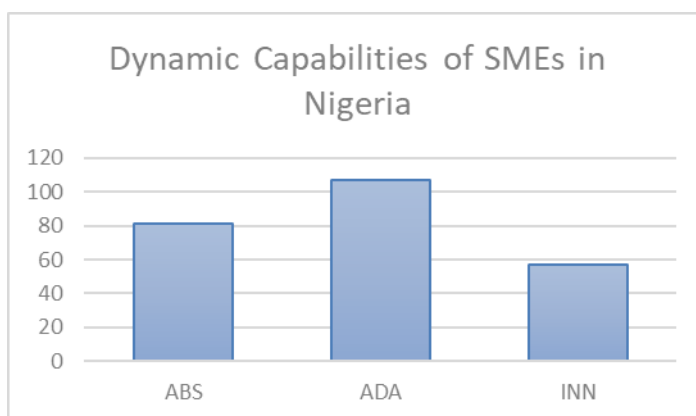


Figure 6.1: DCs of SMEs in Nigeria

Absorptive Capability Constructs of SMEs in Nigeria

This capability includes SME owners' abilities to improve their know-how and transform newly acquired knowledge into new products through continuous learning. This study identified 11 unique absorptive capabilities which were grouped into categories based on their relationship to the research subject. The code categories and frequencies are ABS – Knowledge and Development (44), ABS – Sales and Marketing (21), and ABS – Carrying out Market Research (16). The information extracted from this study shows that SME owners in Nigeria ensure continuous knowledge acquisition regarding products and services through collaborating with customers and other business forums, partaking in online and offline training sessions and attending conferences and workshops. The results also show that SMEs in Nigeria execute market research which enables effective decision making in the sensing of business opportunities. This is done while simultaneously investigating new market possibilities and managing product sales.

Some interview extracts suggest that SME owners use WhatsApp and LinkedIn mobile apps to advertise products and access information regarding market trends. The previous discussion provides answers to the research question: *What role do Mobile apps play in the absorptive capability of SMEs?*

“...we also have a Facebook page through which we update our customers that like us on the page with new information, discount and so many other information.”

“...we get new knowledge mostly online where we get to see other similar product from various firms”

“there is product presentation by companies and there are conferences on market trends of product and we have what we call forecast whether they will tell you this year the forecast for dialysis equipment is 7billion US dollars. The important of that forecast is it enables you direct resources and the trends.”

“Yes, I use LinkedIn mainly to get industry trends, hmmm to get information from other people in the business...”

Code Categories	Unique Codes	Frequency
	ABS - Through e-learning	3

ABS - Knowledge and Development (44)	ABS - Through knowledge development	23
	ABS - Through online training	6
	ABS - Collaborating with other business owners	1
	ABS - Learning from other business owners	6
	ABS - Carrying out electronic payments	5
ABS - Sales and Marketing (21)	ABS - Generate market leads	2
	ABS - Manage sales records and reporting	4
	ABS - Product and services advertising	10
	ABS - Generate invoices	5
ABS - Carrying out Market Research (16)	ABS - Market research and analysis	16

Table 6.7: Absorptive Capability Constructs of SMEs in Nigeria

The absorptive DCs in SMEs in Nigeria identified in this study are:

1. Training and development
2. Managing sales operations

Adaptive Capability Constructs of SMEs in Nigeria

These capabilities describe the abilities of SME owners to identify market changes and respond to these identified market changes. It enables SME owners in Nigeria to identify and take advantage of business opportunities. This study identified eight unique codes which were grouped, based on their relationships, into two code categories. The code categories and frequency are ADA - Interaction and Participation (62) and ADA - Product Marketing and Research (45). The results of this research suggest that SME owners exhibit the capabilities to identify changes in the market by interacting with and obtaining feedback from customers. It also shows that SME owners carry out product research and marketing through promotions, branding and advertising.

The feedback received from SME owners indicates that Facebook, WhatsApp, Twitter and Instagram mobile apps and websites are used to interact with customers and market products. The previous discussions have enabled this study to answer the research question: *What role do Mobile apps play in the adaptive capability of SMEs?*

Some excerpts from the feedback received from participants are as follows:

“I access market information through supplier’s clients, customer relation program...”

“...there are some web pages that can give significant ideas on developing new products and what are the necessary marketing tools you can employ in promotion that product example YouTube video channel and other food processing social web pages...”

“...social media platform we have Facebook, WhatsApp, twitter, Instagram...”

“And then the second one that I use is. I use chrome I use chrome to access a particular site. So, if I use the chrome it bring money for me it brings money for me a lot. And then hmmm... through the chrome I can also access some other sites like the probably I want to know what’s going on in the world maybe to read news...”

Code Categories	Unique Codes	Frequency
ADA - Interaction and Participation (62)	ADA - Customer and partner interaction	47
	ADA - Team member collaboration	5
	ADA - Generate product ideas	9
	ADA - Through customer education	1
ADA - Product Marketing and Research (45)	ADA - Market product and services	5
	ADA - Product promotion and branding	9
	ADA - Through social and print media	12
	ADA - Product research and development	19

Table 6.8: Adaptive Capability Constructs of SMEs in Nigeria

The adaptive DCs in SMEs in Nigeria identified in this study are:

1. Interaction and participation
2. Product marketing and research

Innovative Capability Constructs of SMEs in Nigeria

This capability enables SMEs to demonstrate their creative behaviour and processes towards refining and transforming existing products and creating new products. This study identified 20 unique codes and categorised them into five groups.

Excerpts from participants' feedback as well as code frequency suggest that SME owners in Nigeria adopt creative thinking processes and formulate strategies to develop and market new products whilst also ensuring continuous internal knowledge development.

“Supposing we are changing a product, we let the users know and we give them the product to use so that they can give us feedback before we finally change the product. We also make changes if we have a feedback from an existing product that we have been selling before...”

“I seize new market opportunities via innovation and thinking...”

“...you know that you have to just make a little change and adjustment in prices because occasionally we negotiate with the manufacturers or else, we change the product all together. But in all our changes, we make sure that we don't compromise in the quality of the product.”

Code Categories	Unique Codes	Frequency
INN - Review Operations (13)	INN - Modify company structure	1
	INN - Review product development and operations	11
	INN - Review terms with manufacturers	1
INN - Create New Products Ideas (11)	INN - Carry out product planning	1
	INN - Create new product variety	3
	INN - Create unique products for target market	6

	INN - Implement feedback received from customers	1
INN - Marketing Strategy (17)	INN - Adopt creative approach	1
	INN – Carry out price adjustment	1
	INN - Implement new business strategies	5
	INN - Implement price differentiation	3
	INN - Improve product quality	3
	INN - Innovate to obtain new business	1
	INN - Monitor sales performance	1
	INN - Review market needs	2
INN - Knowledge and Capacity Development (5)	INN - Employ skilled human resources	2
	INN - Train employees regarding new product ideas	3
INN - Product Branding (11)	INN - Carry out photo editing	1
	INN - Product branding and publicity	9
	INN - Repackage products	1

Table 6.9: Innovative Capability Constructs of SMEs in Nigeria

The study shows that SME owners utilise social media apps to execute product branding and initialise marketing strategies. This answers the research question: *What role do Mobile apps play in the innovative capability of SMEs?*

The innovative DCs in SMEs in Nigeria identified in this study are:

1. Review operations
2. Generate new product ideas
3. Marketing strategy
4. Product branding

	Abuja	Kaduna	Kano	Lagos	Oyo
ABS	13	14	2	27	25
ADA	12	27	6	29	33
INN	10	15	3	17	12

Table 6.10: Dynamic Capabilities across States in Nigeria

The results of this study suggest that SMEs in Lagos have higher DCs than SMEs in other states in Nigeria. SMEs in Lagos are highly flexible in their operations and easily gain access to market information. Government agencies need to review policies focused on SMEs' development to enable the provision of ICT tools to acquire new skills, carry out business processes and enable easy access to localised market information and trends. The adoption of ICT tools by the SMEs in other states will enhance their dynamic capabilities.

6.7 Description of Events

This study sought to identify the generated events in SMEs' actual and empirical domain. These events enabled this research to understand how ICTs influence the dynamic capabilities of SMEs. This study identified two events in SMEs: *business processes* (actual) and *dynamic capabilities* (empirical) as per Figure 6.2. These events were identified through analysing data generated by interviews held with SME owners in Nigeria.

The business processes of SMEs are: administrative operations, monitoring expenditure, financial management, business reporting, creating organisational policies, outsourcing services, project management, sales and marketing as well as knowledge development.

The dynamic capabilities of SMEs are: absorptive DCs (training and development, managing sales operations), adaptive DCs (interaction and participation, product marketing and research), and innovative DCs (review operations, generate new product ideas, marketing strategy, product branding).

6.8 Description of Entities

This study revealed that SMEs in Nigeria use different ICTs (i.e. mobile apps), with unique functionalities, for various purposes including sales and marketing, training, research, customer interaction and branding. These mobile apps include payment apps, e-commerce apps, social media apps, productivity apps and custom-built apps, as discussed in section 6.4.

The most widely used ICTs (i.e. mobile apps) in SMEs are social media apps (Facebook, Instagram and WhatsApp). This highlights the phenomenon that the nature of doing business in Nigeria is, in essence, socially structured. The study also revealed that SMEs are inhibited by organisational constraints and market limitations which affect their capabilities to sense new business opportunities.

In this study ICTs are identified as the causal mechanism and structures in the real domain of SMEs.

6.9 Generalisation of Entities

This study adopted interpretivism to generalise and analyse the interconnected group of structures and mechanisms. These include the SME owner, ICTs, government and other stakeholders within the SME business environment.

ICTs exist in the real domain of CR and have causative powers emerging from their fundamental functionalities. The mechanisms in ICTs depend on how the functionalities are scoped and how the underlying ICTs are implemented to enable causal powers to emerge (Smith, 2018).

The real domain consists of an interaction between dynamic, open and stratified systems where particular structures give rise to certain causal powers or *generative mechanisms*. ICTs (i.e. mobile apps) are comprised of functionalities and other ICTs which, when combined, create these generative mechanisms.

This research deduces that mobile apps most commonly used by SMEs in Nigeria (Facebook, Instagram and WhatsApp) do not have causative powers to enable the socially structured nature of doing business in Nigeria, except when connected to the internet through a mobile data network. In this case, SME owners are the source of those mechanisms which create the causative power of transacting business socially to sense new business opportunities. This happens as a result of interlinked structures which exist between the mobile app and the data network.

The interaction of these generative mechanisms gives rise to the actual events. Administrative operations, expenditure monitoring, financial management, business reporting, creating organisational policies, outsourcing services, project management, sales and marketing as well as knowledge development are all identified as SME business processes (Mingers, 2004).

This study also revealed the DC manifestations of SMEs (i.e. absorptive, adaptive and innovative DCs) as the events generated through observation in the empirical domain of CR in SMEs in Nigeria.

The presence of market restrictions and organisational constraints constitute limitations which affect SMEs. The ability of SMEs to sense new opportunities can be considered a result of their creativity to seek alternative ways of using ICTs (i.e. mobile apps) to sense new business opportunities.

The research provided better insight into limitations experienced by SMEs in Nigeria and the need of SME owners to maximally utilise mobile apps while carrying out their day to day activities. Mobile apps can also be used to gain access to the latest market information, government SME programmes and cost-effective vendors.

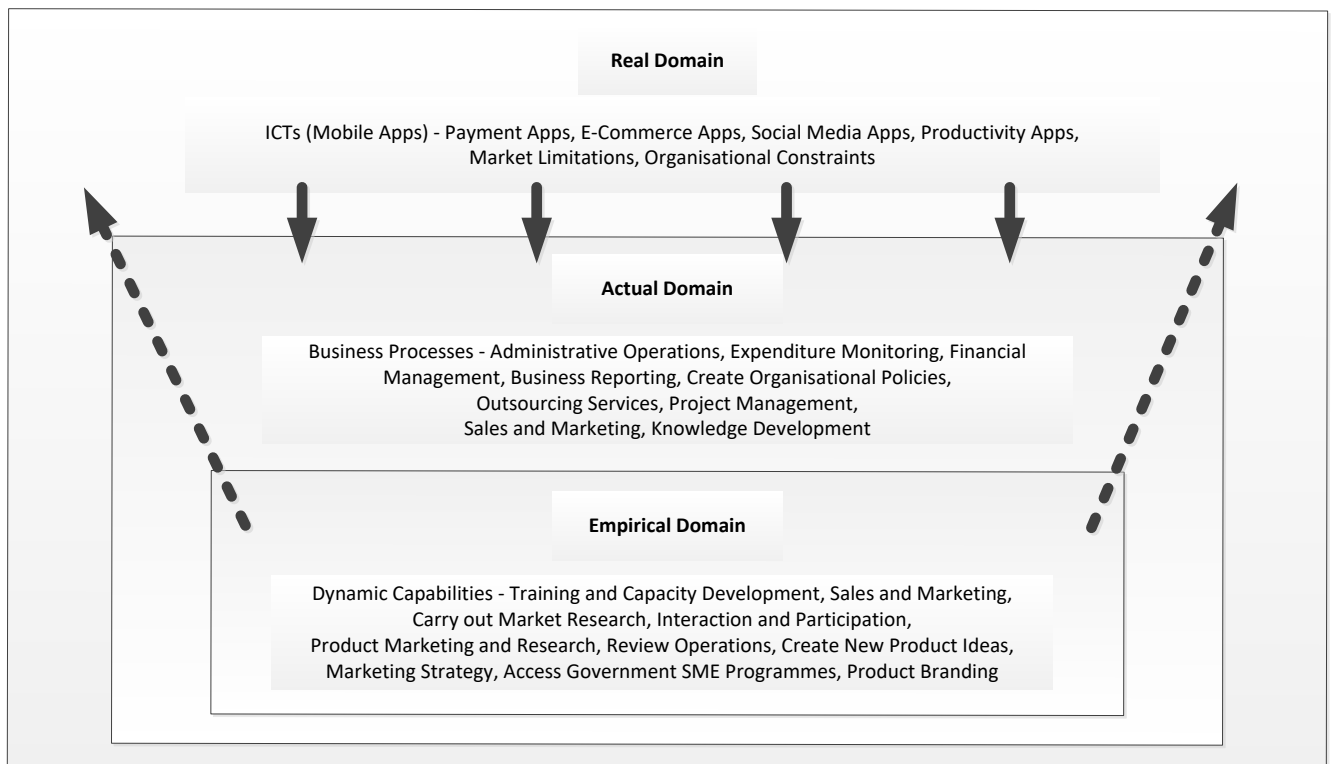


Figure 6.2: CR Domains of SMEs in Nigeria

6.10 Identification of Generative Mechanisms Using Retroduction

Retroduction is the process of working *backwards*, from the empirical to the real, in an attempt to describe the relationships which result from observable events. This iterative approach enabled the study to identify mechanisms emerging from interlinked structures and limitations in the *real*, in other words, that generate events (i.e. SME business processes and dynamic

capabilities) in the *actual* and *empirical*. These mechanisms are not usually observable and are created by ICTs. In the following section the mechanisms which were scoped-out in this study are discussed using retroduction (Thapa & Omland, 2018).

Productivity

This study's research findings confirmed that SMEs do possess DCs, despite having to use freely available social and productivity ICTs (mobile apps) to facilitate sales and marketing, training, research, customer interaction as well as for branding purposes. It is interesting to note that the most commonly used ICTs by SMEs are social apps. This phenomenon highlights the social nature of doing business in Nigeria. SMEs thus transact their daily affairs and obtain new business through referrals and connections as well as through accessing existing business relationships. This study also discovered that SMEs in Nigeria are run by well-qualified individuals who possess the requisite educational background. These individuals have learned how to use these ICTs in ways that work for them, thus limiting the impact of market limitations and organisational constraints which affect productivity. Also, SMEs leverage connections from existing business relationships and social media networks to sense new business opportunities.

The study revealed a need for the creation of an ICT artefact (i.e. mobile app) which mimics the socially structured way in which Nigerian SMEs do business and improve efficiency. The mobile app should enable SMEs to carry out sales, marketing, branding and market research through social media networks.

Access to Local Market Information

This study confirms that SMEs: action administrative operations, monitor expenditure, report on business, manage projects, sales and marketing as well as facilitate in-house training activities. These activities are identified as SME business processes as per Figure 6.3. SMEs revealed that their businesses are hampered by logistics, finance, human resources, taxation and regulatory issues. These issues were identified as organisational constraints. This study noted that, due to these constraints, SMEs do not have access to localised market information.

The need exists for the creation of a mobile app which enables SMEs to leverage the power of digital communications, thus overcoming organisational constraints and enabling access to information tailored to the local market.

Training

Despite the existence of social structures and the government's claim that they organise training to support skills development, SMEs maintain that this training is not accessible due to limited information. This study noted that training opportunities, organised by the government, are not delivered via digital platforms and this severely diminishes their impact. Training delivered through ICTs enables SMEs to easily access knowledge, enhance their learning capabilities and consequently improve the execution of their business processes. The government's inability to effectively deliver training impacts negatively upon continuous skills development and, consequently, on the productivity of SMEs.

This study suggests that a mobile app, which will enable SMEs to access training easily through digital channels and so enhance continuous skills development, is needed.

Access to SME Programmes

The government claimed to have established programmes especially designed to: foster entrepreneurship, promote an understanding of the local business environment and support the growth of SMEs in Nigeria. These programmes aid SMEs in accessing funding and obtaining local business information. Though the government has created agencies to oversee the running of these programmes, most SMEs complained that they had not participated in any SME government programmes. Also, SMEs referred to the lack of adequate information regarding funding which makes it all the more challenging to access these provisioned funds. This study posits that the presence of corruption in the government, ineffective implementation of policy as well as unpredictable policy environments have resulted in an unsuccessful system which insufficiently disseminates information regarding SME programmes and funding.

This study also revealed that SMEs use ICTs, via the Internet, to access general market information not specific to their area. This is not helping them sense new business opportunities and highlights their inability to acquire adequate information regarding SME programmes to enable capacity development and access funding support.

There is a need to develop an ICT artefact (i.e. mobile app) which enables the digital dissemination of information regarding SME programmes and funding. The mobile app should integrate with existing government portals to deliver information to SMEs.

These identified generated mechanisms, as discussed, provide answers to the sub-research question: *What are the generative mechanisms that influence the events that take place within SMEs in Nigeria?*

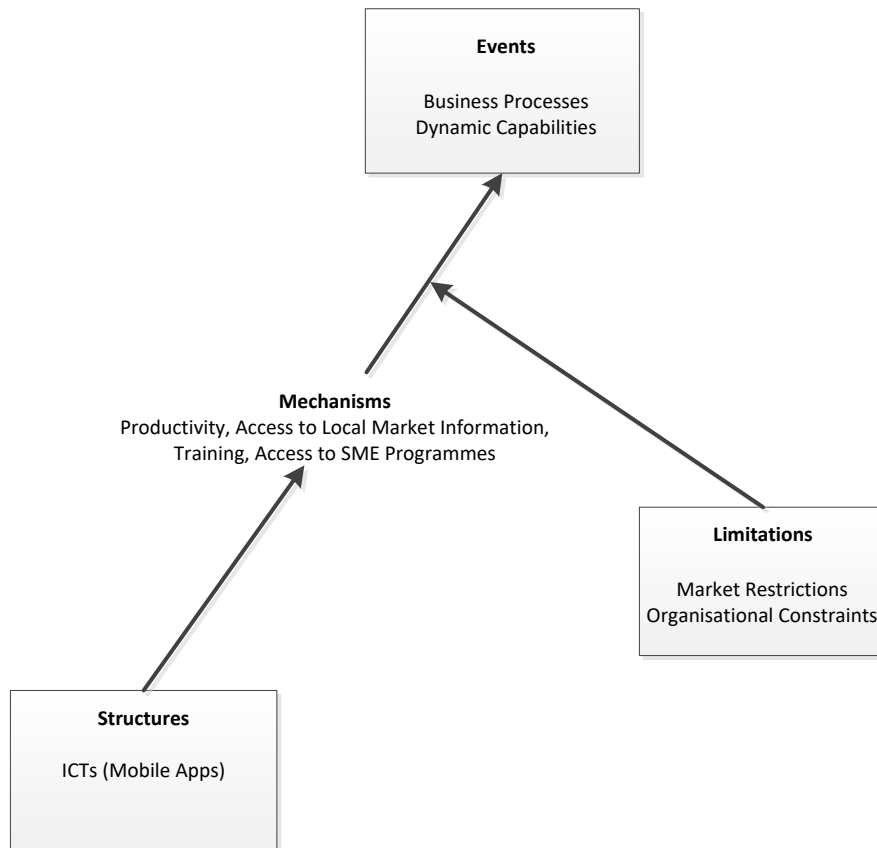


Figure 6.3: Structures, Limitations and Events in SMEs

This research study indicated that SMEs use different types of ICT tools. This presents a unique opportunity to create an ICT artefact, i.e. mobile app, which constitutes an integrated suite of apps possessing the following functions:

- SMEs should be able to access information regarding government established SME programmes and funding.
- SMEs should have access to localised information regarding market trends and training provided by the government and other organisations.
- SMEs should be able to carry out sales, marketing and branding as well as market research through social media networks.
- The ICT artefact should have machine learning functions which enable: the forecasting of sales, prediction of customer needs, identification of potential customers and automated sales communications.

- The ICT artefact should include user guidelines to assist SMEs in understanding how the app works.

The identified mechanisms illustrated in Figure 6.3 indicate the scope of the problem and provide an entry point to the design of a contextual ICT artefact for SMEs. This process will be described in the next chapter.

CHAPTER 7

Design of Contextual ICT Artefact

7.1 Introduction

The previous chapter presented the research findings and included a discussion of the events and entities identified, from analysed data, in the CR domains.

This chapter will present a discussion on the development of a contextual ICT artefact (i.e. mobile app).

7.2 The ICT Artefact: SMEAPP

SMEAPP is a mobile application that applies smartphone features (including phone contacts, push notifications and integration with social media networks) to allow SME owners to pursue business socially and to gain easy access to information regarding local markets and SME programmes.

System Functionalities

1. **Productivity:** The mobile app should mimic the socially structured way in which SMEs do business and improve efficiency. The mobile app should enable SMEs to carry out sales, marketing and branding as well as market research through social media networks.
2. **Access to local market information:** The mobile app should enable SMEs to leverage the power of digital communications to overcome the organisational constraints and gain access to information tailored to the local market.
3. **Training:** This mobile app should enable SMEs to easily access training through digital channels for continuous skills development.
4. **Access to SME programmes:** The mobile app should enable digital dissemination of information regarding SME programmes and funding. The mobile app should integrate into existing government portals to deliver information to SMEs.

Requirements Analysis of SMEAPP

This study used the Data Flow Diagram (DFD) technique to conduct an analysis as to the system functionalities and requirements of SMEAPP. DFD enabled the elicitation and analysis

of requirements by modelling the information flow in the ICT artefact, in this case SMEAPP (Larsen, Plat & Toetenel, 1998).

Data Flow Diagram of SMEAPP

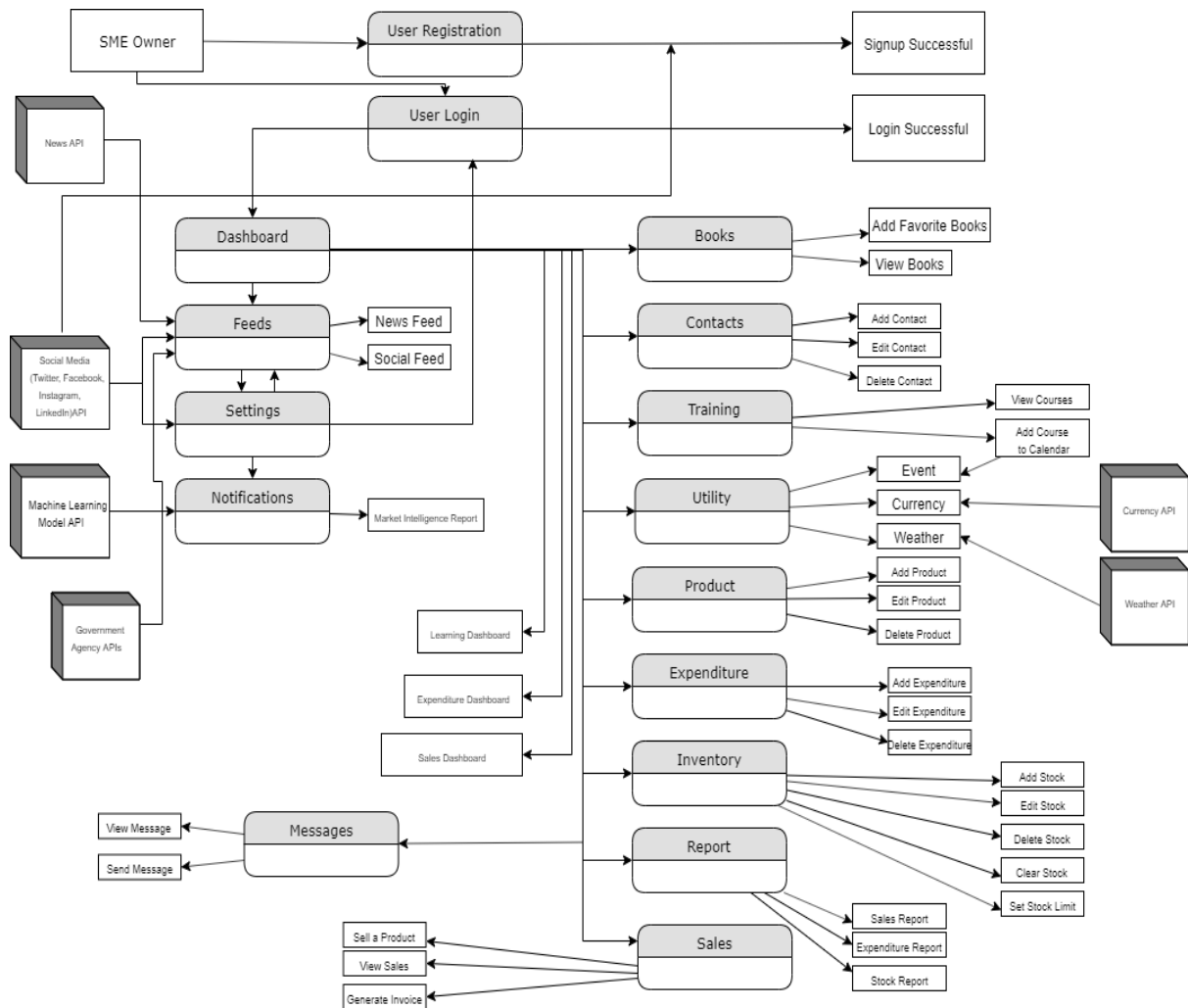


Figure 7.1: Dataflow Diagram of SMEAPP

Features and Dependencies

The SMEAPP features and dependencies were designed based on the SMEAPP dataflow diagram, as illustrated in Figure 7.3. The features and dependencies of SMEAPP illustrate the analysis of the system functionalities which are described in Table 7.1.

Feature	Function	Description	Dependencies
Registration	New user (signup with	This module manages the user setup process	<ul style="list-style-type: none"> • First name should be provided • Last name should be provided

	username and password)	on SMEAPP using their personal details	<ul style="list-style-type: none"> • Date of birth should be provided • Name of business should be provided • Business location should be provided • Preferred app language must be selected (i.e. English, Yoruba, Hausa, Igbo) • Terms and conditions must be agreed to • Users must not have been previously registered • All compulsory details should be provided
	New User (signup with Facebook, Twitter or Instagram accounts)	This module manages the user setup process on SMEAPP using their Facebook, Twitter or Instagram account details	<ul style="list-style-type: none"> • Date of birth should be provided • Name of business should be provided • Business location should be provided • Preferred app language must be selected (i.e. English, Yoruba, Hausa, Igbo) • Terms and conditions must be agreed to • Users must not have been previously registered • All compulsory details should be provided
User Verification	Log In	This module manages the login process for users on SMEAPP	<ul style="list-style-type: none"> • Correct login details are provided

			<ul style="list-style-type: none"> • User details are validated and logged in to SMEAPP
	Log in after session timeout	This process manages user log in into the app after session timeout	<ul style="list-style-type: none"> • Correct login details are provided • User details are validated and logged in to SMEAPP
	Log Out	This process manages the log out of users from app settings	<ul style="list-style-type: none"> • Users must be already logged in
Connection to Social Account	Connect to Facebook	This process manages user authorisation to connect to their Facebook account using their account details	<ul style="list-style-type: none"> • Correct login details are provided • Connection to Facebook authorised by user
	Connect to Instagram	This process manages user authorisation to connect to their Instagram account using their account details	<ul style="list-style-type: none"> • Correct login details are provided • Connection to Instagram authorised by user
	Connect to Twitter	This process manages user authorisation to connect to their Twitter account using their account details	<ul style="list-style-type: none"> • Correct login details are provided • Connection to Twitter authorised by user
	Connect to LinkedIn	This process manages user authorisation to connect to their LinkedIn account using their account details	<ul style="list-style-type: none"> • Correct login details are provided • Connection to LinkedIn authorised by user

Utility	Calendar	This process enables users to set up and view their scheduled events	<ul style="list-style-type: none"> • Users must already be logged in
	Currency	This process enables users to compute currency exchange	<ul style="list-style-type: none"> • Users must already be logged in
	Weather	This process enables users to view weather information for the day	<ul style="list-style-type: none"> • Users must be already logged in
	Regulator	This process enables users to view regulators' contact information	<ul style="list-style-type: none"> • Users must already be logged in
News Feed	SME News	This process enables users to view market news and trends from Nairametrics, SMEDAN, SME Blog, SME Connect, SME Digest, CBN, BOI	<ul style="list-style-type: none"> • Users must already be logged in
	SME Programme	This process enables users to view information on SME programmes organised by government and other organisations	<ul style="list-style-type: none"> • Users must already be logged in
Social Feed	User Feed	This process manages the feeds from the connected social networks viewed by the user	<ul style="list-style-type: none"> • Users must have authorised connection to their social accounts

	Share Post	This process allows users to share a feed post to SMEAPP contacts	<ul style="list-style-type: none"> • Users must have authorised connection to their social accounts
	Like Post	This process allows the users to like a post from feed	<ul style="list-style-type: none"> • Users must have authorised connection to their social accounts
	Post Sales to Social Feed	This process allows users to post sales information on social network feed	<ul style="list-style-type: none"> • Users must have authorised connection to their social accounts • All compulsory details should be provided • Social network's logo must appear on the social feed
	Post Advert to Social Feed	This process allows users to advertise products on social network feed	<ul style="list-style-type: none"> • Users must have authorised connection to their social accounts • All compulsory details should be provided • Social network's logo must appear on the social feed
Product	Add Product	This process allows users to add a product	<ul style="list-style-type: none"> • Product information must be provided (i.e. date, description, delivery options, image, contact details, minimum stock level, purchase cost, selling cost, vendor) • All compulsory details should be provided
	Edit Product	This process allows users to edit a product	<ul style="list-style-type: none"> • Product must have been previously created

	Delete Product	This process allows users to delete a product	<ul style="list-style-type: none"> Product must have been previously created
Inventory	Add Stock	This process allows users to add new stock to the product record	<ul style="list-style-type: none"> Product Stock In details must be provided (i.e. date, quantity, product) All compulsory details should be provided
	Edit Stock	This process allows users to edit the stock record of product	<ul style="list-style-type: none"> Product Stock details must be provided (i.e. date, product) All compulsory details should be provided
	Delete Stock	This process allows users to delete stock record of product	<ul style="list-style-type: none"> Product Stock details must be provided (i.e. date, product) All compulsory details should be provided
	Clear Stock	This process allows users to clear stock counts of product	<ul style="list-style-type: none"> All compulsory details should be provided
	Stock Limit	This process allows users to be notified when the product unit has reached its minimum stock level	<ul style="list-style-type: none"> Users must already be logged in
Expenditure	Add Expenditure	This process allows users to add an expenditure	<ul style="list-style-type: none"> Expenditure details must be provided (i.e. date, description, expenditure type, cost, vendor) Users must already be logged in All compulsory details should be provided

	Edit Expenditure	This process allows users to edit an expenditure	<ul style="list-style-type: none"> • Users must already be logged in • All compulsory details should be provided
	Delete Expenditure	This process allows users to delete an expenditure	<ul style="list-style-type: none"> • Users must already be logged in • All compulsory details should be provided
Contact	Add Contact	This process enables users to add contacts on SMEAPP	<ul style="list-style-type: none"> • Contact type (i.e. Customer, Vendor, Other Contacts) must be selected • All compulsory details should be provided
	View Contact	This process enables users to view contact details	<ul style="list-style-type: none"> • Contacts must have been previously created
	Edit Contact	This process allows users to edit a contact	<ul style="list-style-type: none"> • Contacts must have been previously created
	Delete Contact	This process allows users to delete a contact	<ul style="list-style-type: none"> • Contacts must have been previously created
Messages	View Message	This process allows users to view e-mail and SMS messages from contacts	<ul style="list-style-type: none"> • All compulsory details should be provided
	Send Message	This process allows users to send and reply e-mail and SMS messages to contacts	<ul style="list-style-type: none"> • All compulsory details should be provided
Books	Add Favourite Books	This process allows users to select their favourite books from the book catalogue	<ul style="list-style-type: none"> • Users must be already logged in • Books must be preloaded in SMEAPP

	View Books	This process allows users to view and read their favourite books	<ul style="list-style-type: none"> • Users must already be logged in
Training	View e-learning Courses	This process allows users to view e-learning courses	<ul style="list-style-type: none"> • Users must already be logged in
	Add Course to Calendar	This process allows users to add preferred e-learning courses to calendar	<ul style="list-style-type: none"> • Users must already be logged in
	Attend Course	This process allows users to participate in e-learning courses	<ul style="list-style-type: none"> • Users must already be logged in
Settings	Profile	This process allows users to view and edit their profile	<ul style="list-style-type: none"> • Users must already be logged in
	Password	This process allows users to change their password	<ul style="list-style-type: none"> • Users must already be logged in
	Invite SME	This process allows users to invite other SME owners to use SMEAPP	<ul style="list-style-type: none"> • Users must already be logged in
	Notification	This process allows users to enable or disable push notification	<ul style="list-style-type: none"> • Users must already be logged in
	Help	This process allows users to understand how to use SMEAPP	<ul style="list-style-type: none"> • Users must already be logged in
	Connect to Social Accounts	This process allows users to connect to social accounts	<ul style="list-style-type: none"> • Users must already be logged in

	Language	This process allows users to select preferred language for SMEAPP (i.e. English, Yoruba, Hausa, Igbo)	<ul style="list-style-type: none"> • Users must already be logged in
	About	This process allows users to view a brief summary about SMEAPP	<ul style="list-style-type: none"> • Users must already be logged in
	Log Out	This process allows users to sign out of SMEAPP	<ul style="list-style-type: none"> • Users must already be logged in
Search	Global Search	This process allows users to globally search for products, contacts, messages, books, courses and feeds	<ul style="list-style-type: none"> • Users must already be logged in
	Custom Search	This process allows users to search using keywords and select one or more criteria (date range, products, contacts, messages, books, courses and feeds)	<ul style="list-style-type: none"> • Users must already be logged in • Users must select one or more search criteria
Sales	Sell a Product	This process allows users to sell a product that is in stock	<ul style="list-style-type: none"> • Product sales information must be displayed (i.e. product name, description, quantity, unit cost, delivery options, image, total cost, contact details)

			<ul style="list-style-type: none"> • Available stock count should be displayed • Users must select quantity of product • All compulsory details should be provided
	View Sales	This process allows users to view completed product sales	<ul style="list-style-type: none"> • Users must select date range to display product sales • Users must already be logged in
	Generate Invoice	This process allows users to generate an invoice for a completed product sale	<ul style="list-style-type: none"> • Invoice details must be displayed (product, description, quantity, unit cost, delivery option, total cost, contact details) • Users must already be logged in
Market Intelligence Centre	Market Alerts	This process allows SMEAPP to use a machine learning model to predict sales forecasts, customer needs and identify new potential customers	<ul style="list-style-type: none"> • Users must already be logged in
Push Notification	Instant Alert	This process allows users to view notifications regarding market alerts, messages and low stock	<ul style="list-style-type: none"> • Users must already be logged in • Users must toggle push notification to “ON”
Dashboard	Sales Dashboard	This process allows users to view charts on the actual/forecast of	<ul style="list-style-type: none"> • Users must select the month or year view tab to display dashboard

		monthly/annual units sold, total revenue, gross profit, growth rate	<ul style="list-style-type: none"> • Users must already be logged in
	Expenditure Dashboard	This process allows users to view charts on monthly/annual expenditure summary	<ul style="list-style-type: none"> • Users must select the month or year view tab to display dashboard • Users must already be logged in
	Learning Dashboard	This process allows users to view a simple chart on book reading and training attendance rate	<ul style="list-style-type: none"> • Users must select the month or year view tab to display dashboard • Users must already be logged in
Report	Sales Report	This process allows users to view sales reports, the report should be exported to pdf and xls format	<ul style="list-style-type: none"> • Users must select date range to view report • All compulsory details should be provided
	Expenditure Report	This process allows users to view expenditure report, the report should be exported to pdf and xls format	<ul style="list-style-type: none"> • Users must select date range to view report • All compulsory details should be provided
	Stock Report	This process allows users to view reports concerning stocks, stock report should be exported to pdf and xls format	<ul style="list-style-type: none"> • Users must select date range to view report • All compulsory details should be provided

Home Screen	News Feed	This process allows users to view SME news feed	<ul style="list-style-type: none"> • Users must already be logged in
	Social Feed	This process allows users to view social networks feed	<ul style="list-style-type: none"> • Users must already be logged in
	Today's Weather	This process allows users to view weather information for the day	<ul style="list-style-type: none"> • Users must already be logged in

Table 7.1: Features and Dependencies of SMEAPP



Figure 7.2: SMEAPP Modules

User Characteristics

The users of SMEAPP are most likely SME owners who possess a basic knowledge of ICT and who can use a smart phone.

Assumptions and Dependencies

1. The SMEAPP was integrated to Facebook, Instagram, Twitter and LinkedIn social media networks.
2. The SMEAPP was integrated to currency and weather APIs to compute currency exchange and display of weather information.
3. The SMEAPP was integrated to machine learning model API to intelligently analyse SME conversions and activities and execute sales forecasts (i.e. annual units sold, annual total revenue, annual gross profit, annual growth rate) as well as predict customer needs and identify new potential customers.

User Interface Designs

The user design interfaces for SMEAPP illustrated the visual interpretation of the features and functionalities of the mobile app. See Appendix D.

Systems Architecture

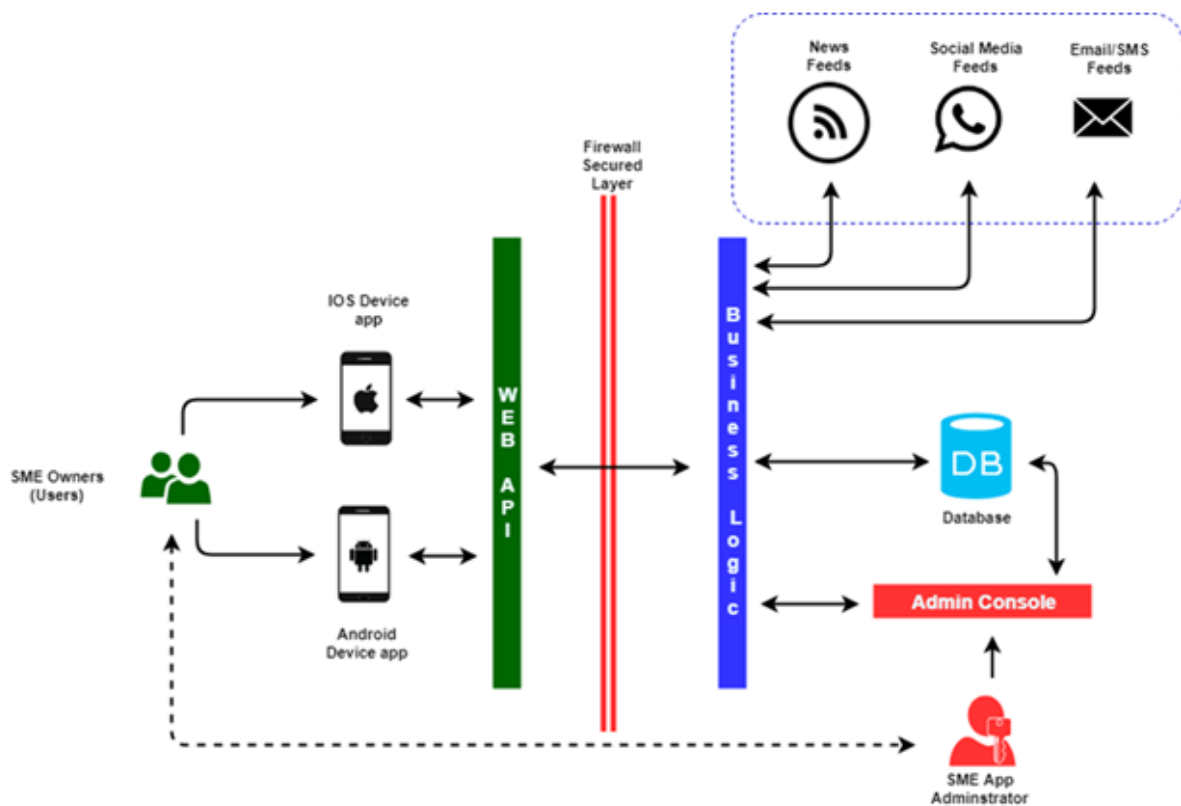


Figure 7.3: SMEAPP High-Level Systems Architecture

7.3 Evaluation of SMEAPP

The evaluation of SMEAPP involved 20 randomly selected SME owners. The SME owners gave feedback on the usefulness of SMEAPP at satisfying set DCs or CR structure elements. The respondents provided 5-point Likert-scaled responses ranging from (1) “Not At All” to (5) “A Great Deal” to nine questions (see Appendix B) and that elicited the feedback for SMEAPP functionalities construct (i.e. sales and marketing, strategic planning, expenditure management, trainings, communications, access to local market information, access to government programmes, market research and generate new product ideas). The study conducted only one evaluation cycle due to time and logistics constraints.

Using descriptive statistics, the data fulfilled validity and normal distribution requirements: data points are within ± 3 standard deviation from the mean, had kurtosis and skewness within an acceptable range of ± 2 , and close variances (George & Mallery, 2010). Minitab 18 statistical software was used to execute the statistical tests for each of the SMEAPP functionalities construct.

7.4 Outcome of SMEAPP Evaluation

SME owners rated SMEAPP as an “*effective tool*” according to the following scores: communications with customers (4.20), generating new product ideas (4.15), accessing local market information (3.95), market research (3.90), attending entrepreneurial and leadership training sessions (3.90), sales and marketing (3.85), expenditure management (3.75), strategic planning (3.65) and access to government programmes (3.60) as per Table 7.2.

The results suggest that the artefact (SMEAPP) is suitable for enhancing sales, marketing and strategic planning. In addition, findings indicate that SMEAPP will help SMEs gain improved access to government programmes. Although a few SME owners indicated the need for deeper integration of SMEAPP to government and market research content platforms to create a seamless interaction with SME owners and improve business insight.

The evaluation confirms the usefulness of SMEAPP as a suitable tool for SME owners to run their business. In addition, it serves as an entry point to implement the functional issues or changes indicated by the respondents to enhance the SMEAPP artefact. Despite creating a context suitable app, this study infers that SMEs still prefer to use what they know. This “*path dependency*” syndrome occurs in both SMEs and larger organisations.

Path dependency refers to a phenomenon whereby organisations channel their existing structures and activities along established paths. In the case of SMEs, these paths are determined by previous decisions which impact on the sensing of new business opportunities (Trouvé et al., 2010). This explains the continued use of certain ICTs, even if a better alternative is available. Path dependency can influence decision making as it pertains to the use of ICTs (i.e. mobile apps) in SMEs. This can be detrimental to the business as it often results in a reluctance to adapt to ICT evolution and/or reverse past decisions regarding ICT use.

SMEAPP Functionality Construct	Variable	N	Mean	StDev	Variance	CoefVar	Min	Max	Skewness	Kurtosis	Rank
Sales and Marketing	Q1	20	3.85	1.424	2.029	37.00	1	5	-1.17	0.24	5th
Strategic Planning	Q2	20	3.65	0.813	0.661	22.27	2	5	-0.54	0.19	7th
Expenditure Management	Q3	20	3.75	1.118	1.250	29.81	1	5	-0.71	0.30	6th
Trainings	Q4	20	3.90	1.373	1.884	35.20	1	5	-1.02	-0.04	4th
Communications	Q5	20	4.20	1.005	1.011	23.93	2	5	-0.79	-0.83	1st
Access to Local Market Information	Q6	20	3.95	0.887	0.787	22.46	2	5	-0.40	-0.53	3rd
Access to Government Programmes	Q7	20	3.60	1.046	1.095	29.06	1	5	-0.60	0.60	8th
Market Research	Q8	20	3.90	1.447	2.095	37.11	1	5	-1.08	-0.33	4th
Generate New Product Ideas	Q9	20	4.15	1.268	1.608	30.55	1	5	-1.34	0.68	2nd

Table 7.2: Analysis Summary for SMEAPP Evaluation

CHAPTER 8

Conclusion and Further Research

8.1 Introduction

The previous chapter presented and discussed the design and evaluation of a contextual ICT artefact (i.e. SMEAPP) using elaborated ADR. This chapter presents the research outcomes and a discussion of the research implications and contributions. The chapter will conclude with the limitations of the research and suggestions for further research.

The study investigated how the use of ICTs, and DCs, could aid SME owners in making more appropriate decisions towards identifying business opportunities in Nigeria. Specifically, the study critically investigated the role that ICTs could be playing in enabling SMEs in Nigeria to function optimally. The research aimed to examine how the use of ICTs in SMEs, and their DCs, could aid the seizing of new business opportunities in Nigeria.

The study discussed the philosophical orientation of critical realism, background on Nigeria and reviewed literatures on ICTs, SMEs, entrepreneurship and dynamic capabilities to understand how SMEs use mobile apps to run their businesses and adopted a mixed research approach (*qualitative and elaborated ADR methods*) to explore the influence of ICTs on SMEs from a critical realist viewpoint, to thus create a suitable ICT artefact to be used by SMEs in Nigeria.

8.2 Discussion of Research Outcomes

This final chapter begins by giving answers to the three research sub-questions listed in Chapter 1. This is done within the context of the research objective “to enable SME owners to effectively use ICTs to enhance their dynamic capabilities and thus seize new business opportunities.”

1. *How does mobile app usage enhance entrepreneurship activities in SMEs?*
2. *What are the critical factors of mobile apps which drive dynamic capabilities in SMEs?*
3. *How does the implementation of mobile apps, driven by dynamic capabilities, enable SMEs to seize business opportunities?*

How does mobile app usage enhance entrepreneurship activities in SMEs?

This study reviewed literatures on ICTs, SMEs, entrepreneurship and dynamic capabilities to understand how SMEs use mobile apps to run their businesses. The study also conducted a

qualitative analysis to identify what type of mobile apps are used in SMEs and their purposes.

SMEs use social and productivity mobile apps to facilitate sales and marketing, training, research, expenditure monitoring, customer interaction as well as for branding purposes.

Social apps are mostly used by SMEs which suggest the social nature of doing business in Nigeria and infers that SMEs establish relationships with customers, vendors, and regulators through a virtual network.

SME owners in Nigeria have learnt to use mobile apps in ways that suit them which affects how they manage their operations and their capacity to sense and seize business opportunities. This study introspects that the ineffective use of mobile apps by SMEs are as a result of their inability to access new knowledge on how to use mobile apps to manage business and operations in dynamic environments. Also, SMEs are not able to maximize the full potentials of mobile apps thereby affecting their ability to transact in the global economy.

The study found that SMEs use mobile apps to exercise their agency in carrying out entrepreneurship activities using their DCs: adaptive (*identify market changes and respond to them in order to seize new business opportunities*), absorptive (*improve know-how and transform newly acquired knowledge into new products*) and innovative (*generate innovations to refine and transform existing products*). These DCs were identified in the study using qualitative analysis method.

- Adaptive DCs - *Interaction and participation, product marketing and research*
- Absorptive DCs - *Training and development, managing sales operations*
- Innovative DCs - *Review operations, generate new product ideas, marketing strategy, product branding*

The study uncovered that SMEs can use mobile apps to aid the decision-making process to generate new product ideas and carry out marketing strategies as well as collaborating with partners and regulators to maximise new business opportunities.

What are the critical factors of mobile apps which drive dynamic capabilities in SMEs?

Using qualitative analysis and retrodution, the study explored the influence of ICTs on DCs of SMEs to identify the critical factors that enable SMEs to sense new business opportunities.

Mobile apps have causative powers that emerge from the socially structured nature of doing business in Nigeria, and their unique functionalities to generate events that enable SMEs to

carryout business activities using their DCs. This study infers that DCs (*adaptive, absorptive, and innovative*) exists as functionalities in mobile apps enabling SMEs to leverage on existing business relationships to transact socially and thus sense new business opportunities. The functionalities include sales and marketing, strategic planning, expenditure management, trainings, communications, access to local market information, and access to government programmes.

Mobile apps enable SMEs to manage business processes and access training through digital channels, thus enhancing the productivity of SMEs. The study found that mobile apps allow SMEs to easily access knowledge, enhance their learning capabilities and improve their business management skills within the dynamic Nigerian environment. This study identified the need for continuous sensitisation of SMEs by government agencies through mobile apps.

Mobile apps enable SMEs to gain access to localised market information and programmes created by government agencies. This critical factor supports SMEs in accessing capacity development and funding information tailored to the local market. This study ruminates that the seamless access to local market information empower SMEs to overcome market and organisational constraints thus enabling them to maximise new business opportunities.

This study identified productivity, access to market information as well as training and access to SME programmes as critical mobile app functionalities which drive the DCs of SMEs in Nigeria.

How does the implementation of mobile apps, driven by dynamic capabilities, enable SMEs to seize business opportunities?

Using elaborated ADR, the study diagnosed the problem domain of SMEs. This enabled the iterative design and evaluation of the SMEAPP mobile app.

The study designed SMEAPP to assist SMEs in enhancing their DCs and so maximise opportunities. The research, hinged upon the beliefs of critical realism, revealed social structural issues which helped to inform SMEs' use of mobile apps in Nigeria. The newly created knowledge in this study regarding SMEs and their DCs, the business processes of SMEs and the application of ICTs, shaped the implementation of the SMEAPP.

This research study designed a new artefact, the SMEAPP as an ICT intervention to enable SMEs to improve their capability to seize new business opportunities. SMEAPP drew from the

findings above and applied smartphone features, including phone contacts, push notifications as well as social media network integration, to facilitate SMEs' ability to conduct business socially. The mobile app also facilitated SMEs' easy access to information regarding local market/s and SME programmes.

This study combined absorptive, adaptive and innovative DCs as functionalities to construct SMEAPP (*i.e. sales and marketing, strategic planning, expenditure management, trainings, communications, access to local market information, access to government programmes, market research and to generate new product ideas*).

In addition, SMEAPP was evaluated to determine its efficacy when used by SMEs. The study conducted one evaluation cycle due to time and logistical constraints. The evaluation revealed some functional issues, or changes, raised by SME owners. The study implemented those changes to further enhance SMEAPP. The follow up evaluation results suggested that SMEAPP could be used for: enhancing sales, marketing purposes, strategic planning and gaining easy access to local market information and SME programmes, and thus this study infers that SMEAPP can assist in enhancing the capabilities of SMEs in seizing new business opportunities

This study also introspects that relevant government agencies can take advantage of SMEAPP functionalities to push contents (*market information, skills development, and funding*) to SMEs.

8.3 Implication of Research Findings

This study aligned itself with the perspective of critical realism in an effort to understand how ICTs influence the DCs of SMEs to better sense opportunities in Nigeria.

The real constructs of CR, as identified in SMEs during this study, suggest that the causal mechanisms and structures which affect SMEs' capabilities to sense business opportunities in Nigeria are ICTs (*i.e. mobile apps*), market limitations and organisational constraints. The actual constructs of CR in SMEs suggest that the observed, or unobserved, events in Nigeria which influence SMEs' ability to sense business opportunities are their "*business processes*." This study suggests that the empirical construct of CR in SMEs in Nigeria includes the "*dynamic capabilities*" events of SMEs which are generated as a result ICT usage.

This study identified that SMEs in Nigeria are run by well-qualified individuals (*i.e. entrepreneurs*) who possess the requisite educational background; and use ICTs (*i.e. mobile*

apps) to sense new opportunities through training and sales and/or marketing of products and services.

In Nigeria, an unstable policy environment and ineffective policy implementations by critical government agencies have impacted negatively on economic growth and development (Etuk, Etuk & Baghebo, 2014). Also, government support programmes are generally inaccessible to SMEs across Nigeria, as they are not delivered using ICTs (i.e. mobile apps). This has highlighted the fact that SMEs constantly need to search for alternative ways of exploring new business opportunities (Okello-Obura & Matovu, 2011).

The study also revealed that there exists a disproportionate development of DCs in different states of Nigeria as a result of low knowledge acquisition in business, people, and ICTs. This suggested the need for a digitally driven training programme for SMEs delivered through mobile apps. The contents for the training should focus on entrepreneurship, business, and ICTs and continuously updated to promote entrepreneurship, improve skilled population and achieve income reallocation in the economy.

This study infers that mobile app usage can enable SMEs to gain access to information and data about their business and operations - *latest market information, government SME programmes and cost-effective vendors*, thus allowing them to better sense new business opportunities, grow their revenue, and improve their organisational processes.

This study ruminates that mobile app can enable government agencies to inform SMEs about *product registration, tariffs, waivers, and funding opportunities* as well as *conduct financial viability assessment and provide funding* in order to support entrepreneurship activities.

Most mobile apps used by the Nigerian SMEs are free. SMEs adapt these mobile apps to meet their business requirements. The need thus exists to create an affordable mobile app which speaks to the Nigerian context.

The suggestions highlighted above enabled this research to draw conclusions regarding possible ways in which ICTs usage can influence the DCs of SMEs to sense opportunities in Nigeria. Based on the findings, this study created a contextual ICT artefact ("SMEAPP"), suited to Nigeria, which enables SMEs to: easily access government programmes, attend training sessions, manage projects, carry out research on markets and products, access market reports and facilitate customer support.

In addition, it is important for government agencies to digitally deliver their regulatory functions using ICTs to enable SMEs to overcome regulatory challenges encountered during *organisation/ product registrations and tariff payments*.

Despite the creation of the contextual ICT artefact, this study infers that SMEs are limited by “*path dependency*” syndrome which refers to their propensity to use ICTs familiar to them. Through continuous ICT awareness, SMEs could be exposed to the value of relevant ICTs; its applicability to their business operations and how to effectively use the ICTs to sense business opportunities.

8.4 Research Contribution

8.4.1 Theoretical Contribution

This study contributes to IS theory through investigating the real, actual and empirical domains of CR in SMEs in Nigeria from a critical realist viewpoint. This is done in an effort to understand *how* ICTs influence the DCs of SMEs in Nigeria.

This study also identified absorptive, adaptive and innovative DC manifestations which enhance the competences of SMEs to seize business opportunities. The contribution to the field of critical realism lies in revealing the causal powers of ICTs (i.e. mobile apps) and the events generated in SMEs.

8.4.2 Practical Contribution

The result of this study serves as a practical contribution which can be adopted by SMEs to effectively use ICTs (i.e. mobile apps) to sense new business opportunities in Nigeria.

This study designed a mobile app artefact; SMEAPP that is better suited for SMEs. The artefact will enable SME owners to access information regarding: government programmes, renewal of organisational processes, allocation of resources, knowledge development and transfer. Easier access to these areas will result in better and more effective decision making.

8.4.3 Contribution to Policy Making

This study identifies ICTs as the bedrock for policy development through enabling government agencies to provide SMEs with access to information on training, government programmes and funding.

This is done in an effort to continually sensitise SME owners to the benefits of ICTs through

ICT education and creating environments which enable ICT growth.

8.5 Limitations and Further Research

The focus of this study was limited to one iterative cycle for the evaluation of the ICT artefact (SMEAPP). This research area could benefit from future research. More iterations are needed before SMEs overcome “path dependency” and embrace the continuous enhancement of the artefact.

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Appendices

Appendix A – Interview Questions

Section A

1. Tell more about your company and the type of business you do
2. What is the size of your company?
3. How long (in years) have you been running your company?

Section B

4. What limitations does your company experience?
5. How do you access market information?
6. Describe the management capabilities of the firm.
7. How do you manage finance?
8. How do you manage reporting?

Section C

9. How does the creation of SME government agencies (SMEDAN, NOAS, NDE) influence the seizing of market opportunities?
10. Do you attend ICT and entrepreneurship trainings organized by government agencies?
11. Do you access market information through government agencies?

Section D

12. How do you seize new market opportunities?
13. Do you use ICTs to seize new market opportunities?

Section E

14. What mobile app do you use for business?
15. What are your top three mobile apps in their order and what do you use them for?

Section F

16. How do you identify market changes?
17. How do you respond to changing market needs?

Section G

18. How do you acquire new knowledge through learning?
19. How do you use newly acquired knowledge to create new products?

Section H

20. How do you make changes within your organization in order to create new products/services?

Appendix B – Survey Questions for SMEAPP Evaluation

Survey Questions	A Great Deal (5)	Considerably (4)	Moderately (3)	Slightly (2)	Not at All (1)
1. To what extent does SMEAPP allow you to sell and market your products?					
2. To what extent does SMEAPP allow to do strategic planning?					
3. To what extent does SMEAPP allow you to manage expenditures?					
4. To what extent does SMEAPP allow you to participate in entrepreneurship and leadership trainings?					
5. To what extent does SMEAPP allow you to communicate with customers?					
6. To what extent does SMEAPP allow you to access local information tailored to Nigeria market?					
7. To what extent does SMEAPP allow you to easily access information on					

Government SME programmes?					
8. To what extent does SMEAPP allow you to carryout market research?					
9. To what extent does SMEAPP allow you to generate new product ideas?					

Appendix C – Use of Atlas.ti Evidence

Appendix D – User Interface Designs for SMEAPP

Registration

SMEApp

What's your name?

Firstname

Lastname

Next

SMEApp

And, your Email?

Email Address

Next

SMEApp

Sign Up Successful

Go to App

SMEApp

What is your Bussiness Name?

Business Name

Business Location

Next

SMEApp

What is your Preferred App Language

Preferred language

By clicking Sign Up, you agree to our [Terms and Conditions](#) and that you have read our [Privacy Policy](#)

SIGN UP

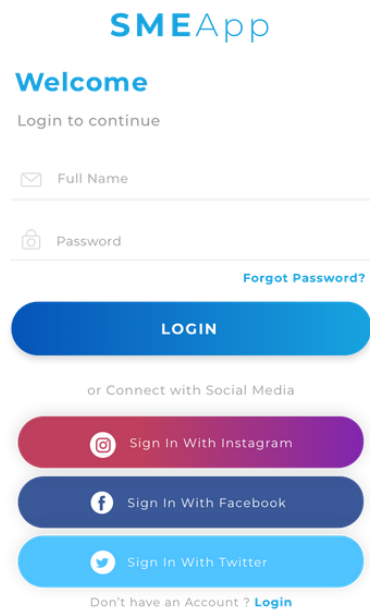
SMEApp

Create a password

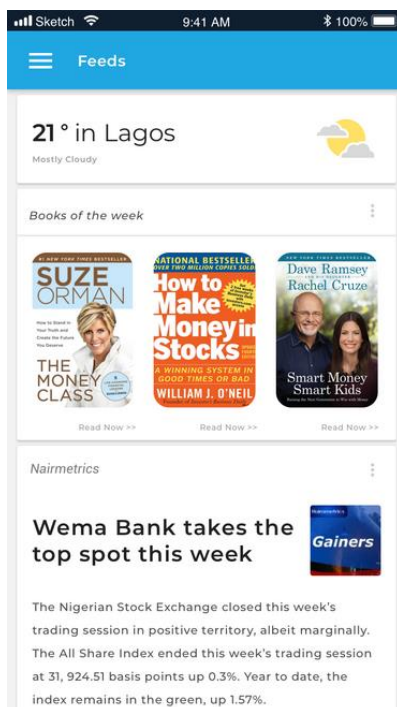
Password

Next

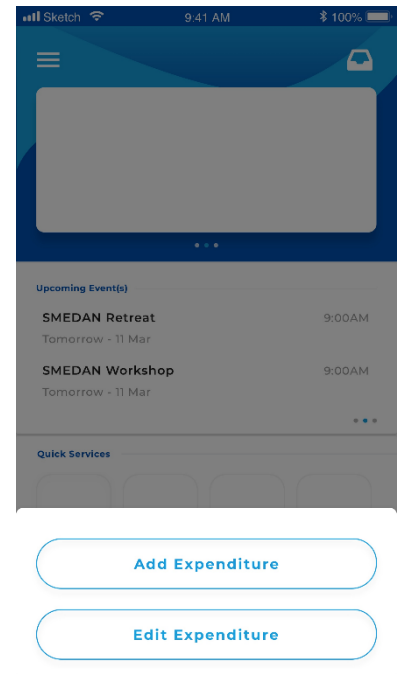
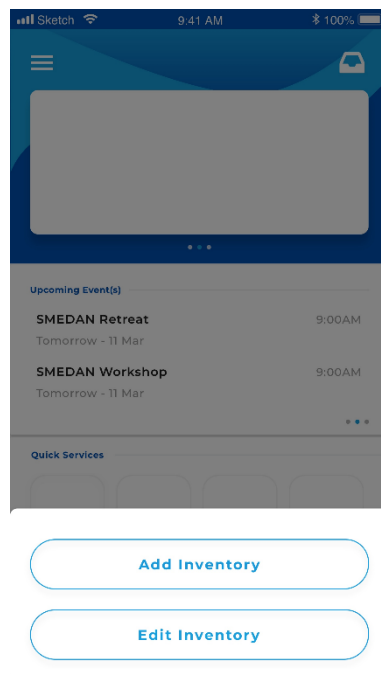
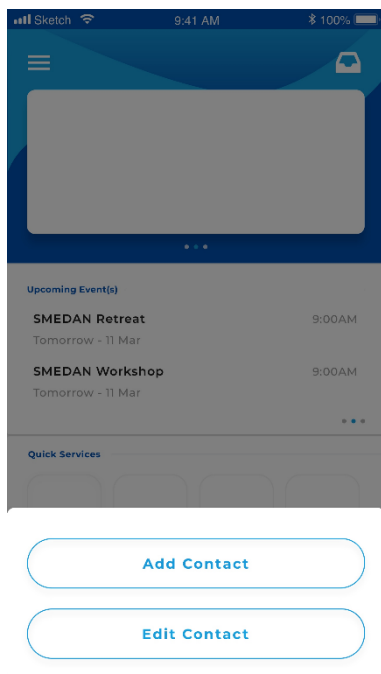
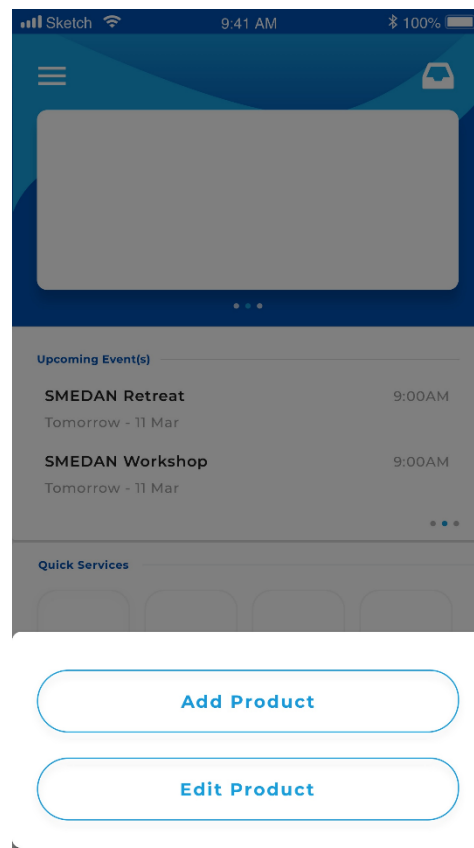
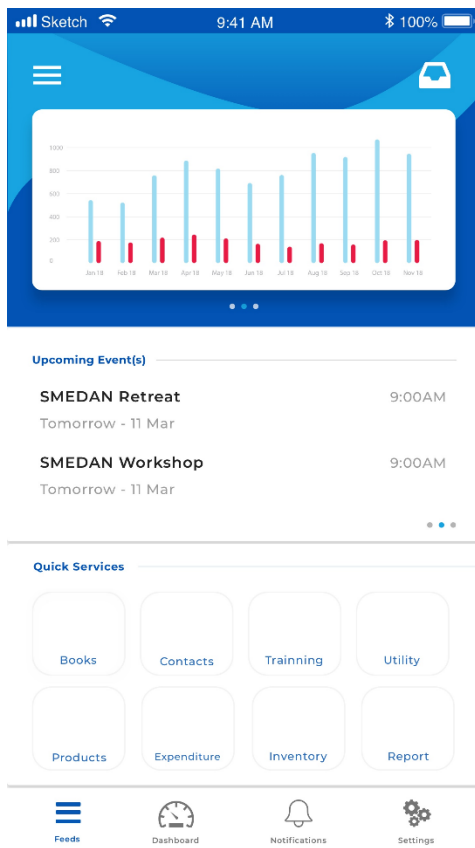
User Verification



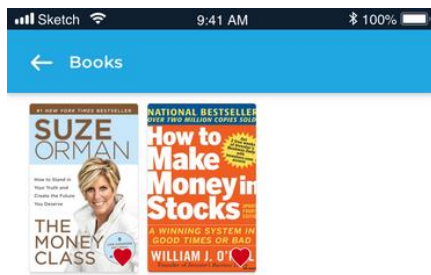
Social Feed



Dashboard



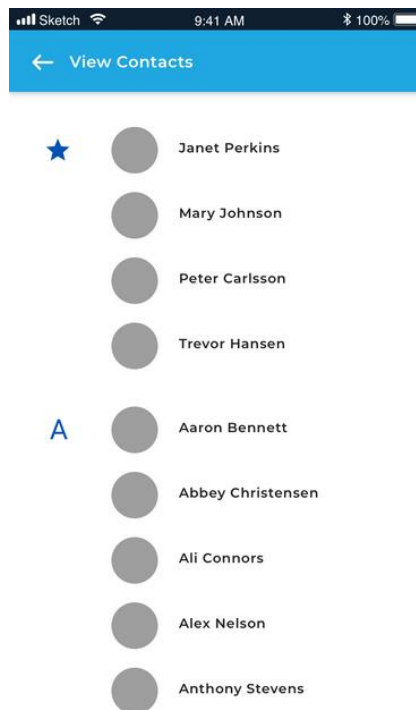
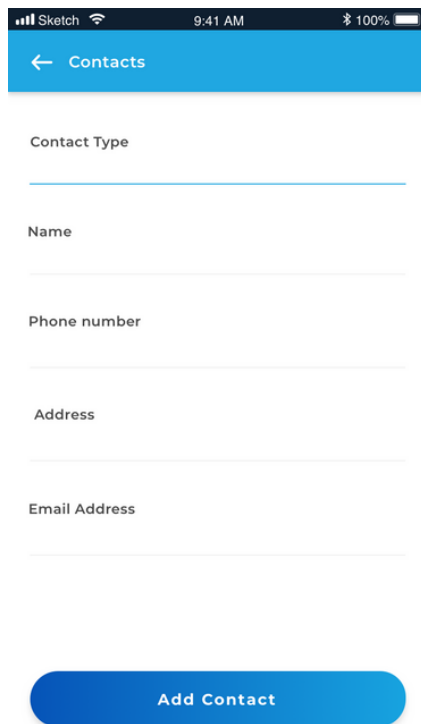
Books



Training




Contacts



Products/Inventory/Expenditure

← Products



Enter Product Name

Purchase Cost

Selling Cost

Description

Contact Details

Delivery Options

Express delivery Normal delivery

Add Product

← Inventory

Enter Product Name

Date

Stock

Add Inventory

← Expenditure

Name of Expenditure

Date

Description


Expenditure type

Cost

Vendor

Add Expenditure

← Products



Enter Product Name

Purchase Cost


Selling Cost

Description

Contact Details

Delivery Options

Express delivery Normal delivery

Save Product 


← Inventory

Enter Product Name

Date

Stock

Clear Stock

Save Product 

← Expenditure

Name of Expenditure


Date

Description

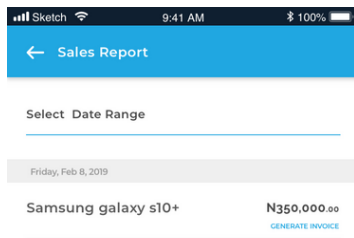
Expenditure type

Cost

Vendor

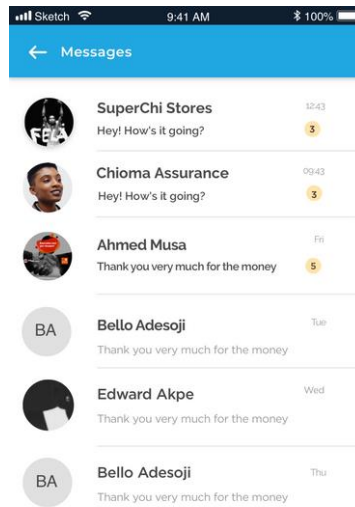
Save Expenditure 

Reports



Add Expenditure

Messages



Type a message

Sales

← Settings

Profile

Firstname

Lastname

Email Address

Password

Push Notification

Invite SME ➤

Language ➤

About App ➤

Help ➤

Connect to social account ➤

[Log-Out](#)

Market Intelligence Centre

← Notifications

SMEAppbot
You have a potential new customer
[Connect Now>>](#)

SaleForecast
We forecast that there would be a massive sales increase

Settings

☰ Feeds

21° in Lagos
Mostly Cloudy

Books of the week

SUZE **NATIONAL BESTSELLER** **DAVE RAMSEY**

Enter Product Name

Purchase Cost

N 310,000.00

Description

A white samsung galaxy 10+

Quantity

100

Unit Cost

N 250,000.00

Delivery Options

Express/Normal delivery available

Total Cost

N 350,000.00

Available Stock

200

Select quantity

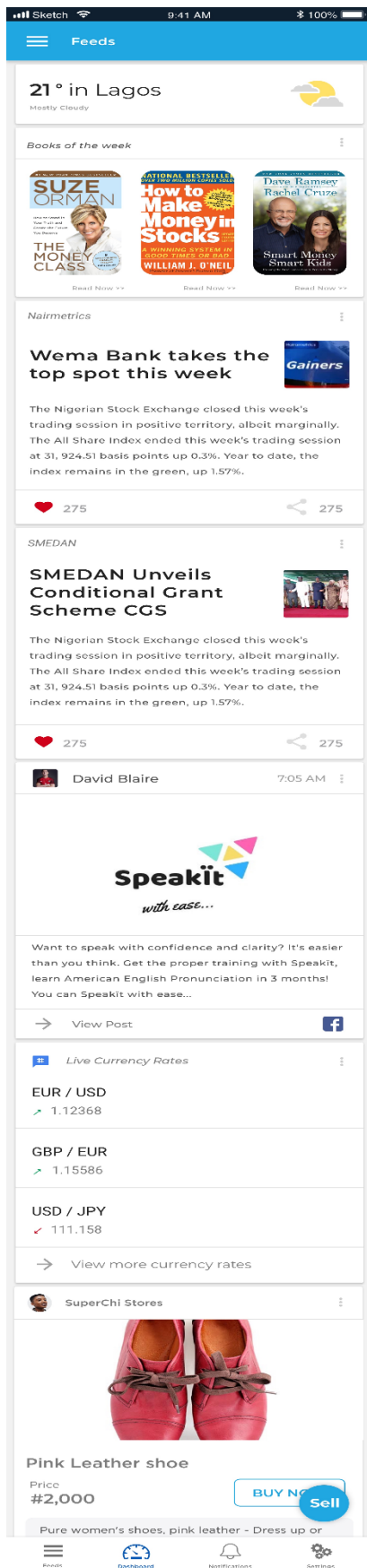
Sell this product

The All Share Index ended this week's trading session at 31,924.51 basis points up 0.3%. Year to date, the index remains in the green, up 1.57%.

♥ 275
➤ 275

☰ Feeds
🕒 Dashboard
🔔 Notifications
⚙️ Settings

Home Screen



Appendix E – Ethics Approval



UNISA COLLEGE OF SCIENCE, ENGINEERING AND TECHNOLOGY'S (CSET) RESEARCH AND ETHICS COMMITTEE

08 May 2018

Ref #: 012/TAA/2018/CSET_SOC
Name: Mr Tolani Adedamola Abdullateef
Student #: 55769039
Staff #:

Dear Mr Tolani Adedamola Abdullateef

Decision: Ethics Approval for 5 years (Humans involved)
--

2018-05-24
OFFICE OF THE DEAN College of Science, Engineering & Technology

Researchers: Mr Tolani Adedamola Abdullateef
3b Ironbar Street, Off Providence Road, Lekki Phase 1, Lagos, Nigeria
55769039@mylife.unisa.ac.za, +2348033705116

Project Leader(s): Prof H Twinomurinzi, twinoh@unisa.ac.za, +27 11 670 9361

Working title of Research: The influence of Mobile ICT Usage on the Dynamic Capabilities of SMEs in Nigeria: A critical realist study

Qualification: PhD in Information Systems

Thank you for the application for research ethics clearance by the Unisa College of Science, Engineering and Technology's (CSET) Research and Ethics Committee for the above mentioned research. Ethics approval is granted for a period of five years, from 08 May 2018 to 08 May 2023.

- | |
|---|
| <ol style="list-style-type: none"> 1. The researcher will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics. 2. Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study, as well as changes in the methodology, should be communicated in writing to the Unisa College of Science, Engineering and Technology's (CSET) Research and Ethics Committee. An amended application could |
|---|



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Appendix F – Certificate of Editing



Certificate of Editing

To whom it may concern

This is to certify that the manuscript detailed below was edited by an English language academic editor.



Estee Wiese
estee.wiese@gmail.com

Date: 20/05/2019

Manuscript Title: A CONTEXTUAL DESIGN ARTEFACT FOR DYNAMIC CAPABILITIES OF SMES IN NIGERIA: A CRITICAL REALIST STUDY

Manuscript Author: Tolani Adedamola

Institution: University of South Africa, School of Computing

Appendix G – Turnitin Originality Report

9/3/2019 Turnitin

Turnitin Originality Report

Processed on: 03-Sep-2019 12:56 SAST
 ID: 1166583165
 Word Count: 35828
 Submitted: 1

Thesis Completed By A TOLANI

Similarity Index	Similarity by Source
8%	Internet Sources: 41% Publications: 21% Student Papers: 37%

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< 1% match (publications) Adebowale Owoseni, Hossana Twinnomuniri, "Mobile apps usage and dynamic capabilities: A structural equation model of SMEs In Lagos, Nigeria", Telematics and Informatics, 2018
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