Cape Peninsula University of Technology

An information system framework for validating physical addresses against identity document in the Republic of Angola

By

Maria Rosa Gombo Mutudi

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Supervisor: Professor Tiko Iyamu

DECLARATION

I, Maria Rosa Gombo Mutudi, hereby declare that this thesis entitled, "***An information system framework for validating physical addresses against identity document at the Republic of Angola***" is my own work. The work is presented for the Master degree in Information Technology at the Cape Peninsula University of Technology. The work has not been previously submitted to any other institution of higher education for the award of a degree. Furthermore, I declare that all the sources cited in this work are acknowledged in a list of references.

Signed:  Date : 28-October-2019

DEDICATION

This study is dedicated to my loving parents, Mutudi Mesongolo and Adelina Mutudi for their love, support and investing in me.

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I express my most sincere gratitude to:
My Lord God and Saviour Jesus Christ, for the blessing of wisdom, strength to endure and continue with my studies in the midst of loss, sorrow, and trials. And for giving me His peace and assurance when I needed it most in order to remain focused amongst all the distractions around me. I couldn't make it without His grace.

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Abstract

In the Republic of Angola, home addresses are printed on the national identity (ID) document. However, the physical addresses that are stored in the government's agency (Ministry of Homeland) database and printed on individuals ID document, are often different from citizens' actual residences. As a result, the databases are often filled with duplicated, incorrect and inaccurate physical addresses. This makes it more challenging for the government and its agencies to monitor, trace and manage activities, as well as provide services to individuals and communities. Consequently, the security of the country is also at stake as it enacts fraudulent acts and makes it more difficult for law enforcement agencies to address and uncover criminal acts and intents. Therefore, the aim of the study was to develop an information system framework, which can be used to address the challenges that duplication and inaccuracy of physical addresses in the ID system pose to the Republic of Angola including the government service delivery and citizen's activities.

Based on the aim of the study the objectives were: (1) to identify and examine the factors of deficiencies in the current system whereby wrong, duplicate, inaccurate or inconsistent physical addresses are printed on identity documents of individuals; (2) Examine both technical and non-technical factors that can improve the current system. In achieving the objectives of the study, qualitative data was collected from the community of Luanda in Angola, and from one of the Ministries within the Angolan government. Due to ethical considerations, the Ministry was named "Ministry of Homeland" and it was used as a case in the study. This was mainly because this is the Ministry that deals directly with the issuance of IDs and storage of physical addresses. The data was collected through a semi-structured interview technique. The data was hermeneutically analysed from the interpretive approach. The analysis was guided by the lens of the duality of structure from structuration theory perspective. Seven factors were found to be the constraining and enabling factors of the efficiency and deficiency in the ID issuance process in the Republic of Angola. The findings were further interpreted towards the development of the information system framework which can be used to address the challenges that the duplications and inaccuracy of physical addresses in the ID system pose to the Angolan government and its people.

Keywords: Information Technology, information systems, government improvisation of service delivery, data management, Information Communication Technology (ICT), government services, validation of attributes within a system, structuration theory, structuration theory and Information systems.

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION AND BACKGROUND

This chapter provides an introduction about the entire study. The chapter is divided into eleven main sections. The first section is an introduction and background to the study. This is followed by the research problem and aim of the research in sections two and three, respectively. An introductory review of literature is presented in the fourth section. The fifth section covers the methodology that was applied in the study. The significance, benefits, ethical consideration, and delineation of the research are introductorily discussed in sections six, seven, eight and nine respectively. The structure of the thesis is diagrammatically presented in the tenth section, and the chapter is concluded in the eleventh section.

The government of every country relies on information technology (IT) systems to store, retrieve and manage information which specifically includes the physical address of its citizens and residents. The IT systems are critical in that they are used to trace, locate and to some extent manage the activities of each person within the country (Rose-Redwood et al., 2017). Also, these systems are crucial in that they supports and enables ease of service delivery such as emergency to disastrous incidents, health services, security to life and environment, and post office services (Yildirim et al., 2014). Some IT systems are beneficial to the government of countries' effective and efficient service delivery in many areas, such as safety, health, and social-economic activities. However, without an accurate physical address infrastructure within a country, it is practically impossible to effectively manage the country and easily provide critical services to members of the society (Yildirim et al., 2014).

Shalvi and De Dreu (2014) explain a scenario where, a mother from Ohio in the United States of America (USA) faked her address in order to register her children in a school outside their residential district. The woman was then arrested for this illegal act owing to a technological advancement in the country. Such fraudulent activities were becoming more and more prevalent in the USA, however, the government solved the problem of people faking their home addresses by putting in place an accurate physical address infrastructure, which is enabled and supported by an IT system through the improvisation approach. The concept of improvisation provides innovative responses to unpredictable problems (Süße, 2015). According to Iyamu (2017), improvisation is used to evaluate planning and decision making in terms of IT activities for organizational benefits. Through an IT system that focuses on improvisation, the government can monitor, control and manage compliance with laws,

policies, and regulation within the country. However, the information that is fed (or captured) into the system must be accurate, in lure of the principle of garbage-in-garbage-out.

In Angola, many of the citizens do not have or possess proof of their current physical addresses. Some of the individuals have duplicated addresses. There are also some people who have created their own physical addresses, due to lack of urbanisation. The lack of an accurate information about individuals' physical addresses affect the political development of a country in that, it becomes difficult to plan and execute a fair democratic election due to the increase of fraud that multiple addresses can provoke (Njoh, 2010). Financial institution and the safety of the country can likewise be affected by the increase of crime and fraud in a country where individuals can possess multiple addresses or fake their addresses in order to get public services, which they are not eligible for, due to their criminal records (Bhattacharjee, 2014). The government can respond to such illegal act through the improvisation approach, as highlighted by Secchi, Rothand and Verma (2016), services are improvised through creativity, spontaneity, and pulling together new services from available resources.

Inaccurate physical addresses are not only problematic, as they enable illegal acts corruption, but also have an impact on the ID system. As in many other countries, the Angolan government relies on the ID that they provide to the citizens for many activities and events. This includes purposes such as population census, service delivery, economic development and fight against crime. This necessitates the information on the ID to be current and accurate. However, this has not been the case in Angola for many years. In an event of a fire and health-related issues, it is difficult for the ambulance system to respond to emergencies (Nyarko et al., 2015). The practice of improvisation enacts service delivery by enabling appropriate responsiveness to incidents and strategic events (Secchi, Roth & Verma, 2016). The major source of inaccurate information regarding citizens' ID in Angola has been the physical address. Thus the challenge that Angola faces with regards to physical addresses needs to be explored.

1.2 RESEARCH PROBLEM

At the Republic of Angola, home addresses are printed on the national identity document (ID). As a result, those with IDs do not need to carry proof of residence for transactional purposes. However, home addresses are not confirmed by the government before they are captured and printed on individuals' IDs, making them inaccurate and inauthentic. Thus, many citizens, in the Republic of Angola do not have single physical addresses. As a result, the physical address that is registered and printed on individuals ID document is often different from where they reside. The one (ID number) to many (addresses) relationship makes it challenging for government and its agencies to monitor, trace and manage activities, and as well provide

services to individuals and the communities. Some of the primary implications and consequences of the ID and address issue that are prevalent include: (1) fraudulent acts by individuals and groups; (2) law enforcement agents (or agencies) face challenges when addressing and uncovering activities, such as criminal acts and intents; (3) difficulty in locating the actual house in the event of a fire incident or when a person/s urgently requires an ambulance and medical attention; and (4) the inability to trace and identify missing people when disasters such as flood and earthquake occurs. Consequently, until the issues of duplicated and inaccurate physical address are addressed, the government of Angola will continue to struggle in achieving its socio-political and economic objectives, and as well as delivering improved services. Thus, this study was undertaken, as discussed in the aim, objectives, and questions in the subsections that follow.

1.3 AIM, OBJECTIVES AND RESEARCH QUESTIONS

This section presents the research aim, objectives and questions, in the subsections that follow:

1.3.1 Research Aim

The aim of the study was to develop an information system framework, which can be used to address the challenges that the duplications and inaccuracy of physical addresses pose to the ID system at the Republic of Angola.

1.3.2 Research Objectives

Based on the aim, the objectives were articulated as follows:

i. To identify and examine the factors of deficiencies in the current system, whereby wrong, duplicate, inaccurate or inconsistent physical addresses are printed on identity documents of individuals.
ii. Examine both technical and non-technical factors that can improve the current system.

1.3.3 Research Questions

The main research question was, how can an information system framework be developed to address the challenges that the duplications and inaccuracy of physical addresses pose to the ID system at the Republic of Angola? Based on this main question, the following sub-questions were formulated:

i. What are the factors of deficiencies in the current system, which allows incorrect, duplicate, inaccurate or inconsistent physical addresses of individuals to be printed on individuals identity documents?

ii. What are the technical and non-technical factors that can improve the current system?

1.4 LITERATURE REVIEW

Based on the objectives of the study as stated in section 1.3 above, a review of the literature was conducted in the areas of Information Technology, information systems, government improvisation of service delivery and data management. Also covered is structuration theory, the theory that would be used as a lens to guide the analysis of the data.

1.4.1 Information Technology

Information technology (IT) is defined as an academic area which involves both technical and theoretical aspects, with the goal of satisfying individuals and organisational needs by selecting, creating and applying computer technologies (Scarpino et al., 2017). According to Anderson (2014), there is an increased reliance on IT, from both individuals and organisations' perspectives. To a certain extent, the use of IT has become part of everyday life for many individuals and organisations including governments. Khairi and Baridwan (2015) claim that IT is now considered to be the major factor of the survival and development of a business enterprise. In addition, Grembergem and De Haes (2017) state that IT has also become critical in the support and growth of the business. This increasing reliance on IT can be attributed to the various factors, which includes benefits that it contributes to all areas of life (Anderson, 2014).

In addition to individuals and organisations' use, IT is crucial to the development of a country (Islam et al., 2015). According to Avgerou and Walsham (2017), IT plays a very important role in economic growth and social conditions, especially in developing countries. Ganju, Pavlouand and Banker (2016) state that IT essentiality comes from its support and enablement of improved access to health care, education, markets, and information, therefore reduces the rate of unemployment.

However, Avegerou and Walsham (2017) argue that the implementation of IT artifacts in the country does not necessarily and automatically bring about benefits, like everything else, it has some disadvantages or challenges. Along the same line of argument, Venkatesh, Balaand and Sambamurthy (2016) state that the successful implementation of IT in a country depends on various factors which include infrastructure fits, new economic policies, and reform programs. These factors have an impact on any information systems that are deployed (or about to be deployed), which are also influenced by the type of data that they make use of, or connect to each other (Sari, Karaduman & Firat, 2015).

1.4.2 Information System

Primarily, information systems are used to gather, store, organize, process, analyse and disseminate specific information for a specific purpose within an environment (Rainer et al., 2013). Bajdor and Grabara (2014) state that information system in simple terms is just a composition of information itself. Thus Grabara, Kolcun and Kot (2014) claim that Information systems are critical in the acquisition and transmission of information in organizations and enterprises.

Similar to IT, information systems are used in almost every area of life because they allow for better functioning of organisations and everyday life (Bajdor & Grabara, 2014). This Includes the development of a country in providing health care services and location-based services (Aloudat et al., 2014). However, information systems wholly depend on data in order to function or execute its activities.

The implementation of information systems in critical areas such as healthcare can be challenging to system designers and health managers in terms of scalability between national and district levels (Nguyen, Nielsen & Braa, 2017). This is to enable and support decision-making and information management. Although it is argued that the implementation of information systems are of benefit to the government in providing services to the country, the design and management of the data that the systems connect to are of huge influence (Clark, Brudney & Jang, 2013).

1.4.3 Government Improvisation of Service Delivery

The use of information systems and Information Technologies (IS/IT) has many benefits such as: ease of access to information, improved track and trace of citizens and beneficial to the government of many countries (Clark et al., 2013). Carvalhosa et al. (2017) state that IS/IT can also be used to facilitate interaction between government agencies and citizens in providing and receiving services through planning. Planning is the basis for management at organizational and governmental levels. However, there are some situations that cannot be predicted, which can hinder the successful accomplishment of the predefined objectives if an emergency response is not applied (Rankin, Dahlbäck & Lundberg, 2013). Therefore, improvisation plays a very important role at the managerial level in that managers are able to recur to their creativity to deal with unforeseen and unusual situations, thus enabling them to overcome the challenges and meet the set objectives (Littike & Sodré, 2015).

One of the most challenging areas, which has an impact on government services to the citizens is the tracing and tracking of citizens in order to effectively monitor and manage citizens' and residents' activities and improve their quality of life (Mora-Mora, Gilart-Iglesias,

Gil & Sirvent-Llamas, 2015). The use of IS/IT enable location-based services, such as identification of persons and household, which are very beneficial to the country in that, they facilitates the ease of access to services as well as the management of emergency services (Aloudat et al., 2014). Other services that can easily be delivered by the government using IS/IT artifacts include health services and security (Yildirim et al., 2014). Thus, Rankin et al. (2013) explained that the ability to trace and monitor, through management, and adjust to new or unforeseen situations require improvisation.

However, many developing countries such as Angola and Ghana are still not able to provide these type of services effectively due to lack of single physical address of residences (Nyarko et al., 2015). This implies that the country has not overcome the challenge of urbanism, which involves the application of IS/IT for street addresses (Avegerou & Walsham, 2017; Yildirim et al., 2014). This, therefore, hinders the implementation of advanced IS/IT for the providing of effective government service (Avegerou & Walsham, 2017). Within the organisational context the concept of improvisation can help to define a method or design principle that an organisation can use to focus on its ability to adapt and innovate (Süße, 2015). Secchi, Rothand and Verma (2016) assert that the improvisation process is based on three key elements of service improvisation namely; creativity, spontaneity, and bricolage or pulling together new services from available resources.

In Venkatesh, Balaand and Sambamurthy's (2016) view, if the country is not prepared in terms of infrastructure before the implementation of sophisticated systems, it is sure to encounter challenges rather than benefits. Gilfoyle and Thorpe (2016) stated that lack of these systems in a country may bring the government in a state of not being able to even control or manage important information or data in the country such as geographical or physical location for emergency purposes. The practice of improvisation does not only come from the management part but it results from all the elements of service delivery such as: having the right personnel, training, rewards, appropriate environment and good communication within the organization (Secchi, Roth & Verma, 2016). In the same line of argument, Magni, Provera and Proserpio (2010) state that this practice benefits service delivery even from the development part, in that it enables flexibility in terms of dealing with the emergent customer needs resulting in customer satisfaction.

1.4.4 Database Management

Datasets are at the heart of every organisation, due to its importance, therefore need to be effectively managed (Holt et al., 2015). Thus, data influences the design, development, and implementation of IS/IT within an environment. Poljak, Poscie and Jaksie (2017) describe database management as the process of defining the structure of the data, storing and

retrieving data, and process stored data in the database. This is mostly done through a software system called database management systems which enables ease of access and management of data (Scholten& Stillwell,2013).

Database management system is beneficial to organisations, in the health environment and in the government of a country (Susanto et al., 2016; Gilfoyle & Thorpe, 2016). Raghupathi and Raghupathi (2014) assert that possessing such systems for database management is critical in providing effective emergency services because the traditional way of managing data has the assumptions that data is always organized, clean, precise and certain, which is not always the case. Susanto et al. (2016) state that a system for database management helps organizations in dealing with challenges such as standards in the database, workflows when retrieving a large amount of data, cartographic projection and the security and reliability of data.

Gilfoyle and Thorpe (2016), argued that the government is responsible for providing important data to local authorities and agencies of the country, such as the police authority and fire services. However, the authors claim that information such as geographical or physical location may have been collected a long time ago. As a result, the lack of efficiency in database management may lead to outdated information and much more problems for the country (ibid).

1.4.5 Structuration Theory

Based on the objectives of the study, the structuration theory, among other theories, such as actor network theory (Díaz, Andrade & Urquhart, 2010), activity theory (Nardi, 1996) and diffusion of innovation (Rogers, 2003), was selected to underpin this study. This is primarily because of the theory's focuses on relationship and interaction between agencies and structures.

Structuration theory is a socio-technical theory that was introduced over three decades ago by a British sociologist, Anthony Giddens (Giddens, 1984). Giddens has made use of the theory in twenty-three publications between 1971 to 1989 (Bryant & Jary, 2014). This socio-technical theory has reached a significant level of influence across many disciplines and research fields including Information Technology (Puron-cid, 2013).

The theory focuses on agency and structure (Feeney & Pierce, 2016). According to Coad and Glyptis (2014), this theory is useful in causing researchers to respond to research problems and interpreting research results. Iyamu (2014) states that structuration theory is used to get an understanding of how people and Information Technology interact, by focusing on

dependent and independent variables and their relationship. In addition, Chang (2014) claims that the theory consists of how people base their interactions on rules and resources (structure) and at the same time create new rules and resources, thus agents and structure are not independent of each other. The author defines structure as a set of rules and resources. Englund and Gerdin (2014) state that agents consist of the human and non-human, however, agents and structure represent two sides of the same coin, rather than two distinct phenomena. According to Chang (2014), the theory is based on the belief that people's social actions are always changing and that there is a duality between each individual and the society. Therefore, Giddens' Structuration theory focuses on the interactions between people and how those actions create rules and structures by which people gage their behaviors on, thus suggesting that we have no one else to blame but ourselves for whatever we produce or re-produce (Roberts, 2014).

The central concept in structuration theory is the duality of structure which is also the means that Giddens used to avoid the dualism of agency and structure (Bryant & Jary, 2014). According to Iyamu (2017), the duality of structure consists of structure, modality, and interaction where the modalities (interpretive schemes, facilities, and norms) link the structure and the interactions demonstrated in Figure 1.1.

As explained in Englund and Gerdin (2014), structure consists of signification, domination, and legitimation; interaction consists of communication, power, and sanction, which interacts through modalities. Signification structure can either be subjective or objective, it provides interpretative schemes that are needed for communication and the interpretative schemes are used to make sense of the interactions (Englund & Gerdin, 2014). Dominion is obtained through facilities and consequently, there is an ability to exercise power, for example, the individual or institution that provides controls and allocate resources. Legitimation structure provides norms that sanction the action and at the same time sanctions, can provide norms that can consequently be legitimized, for example, the industry regulations and practices (Englund & Gerdin, 2014; Moore, 2013).

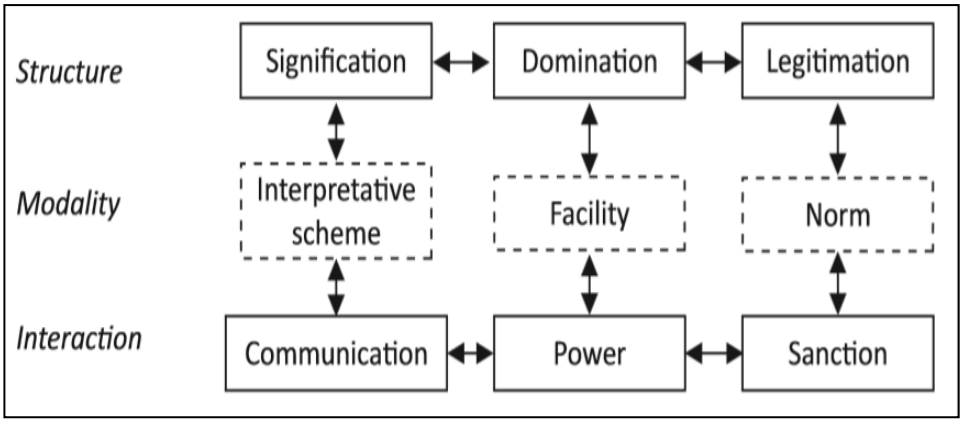

Figure 1. 1 Duality of Structure (Giddens, 1984).

According to Chang (2014) the three dimensions of the duality of structure, interact with each other in a two-way communication in which the modalities determine ways that they will interact with each other.

1.5 Research Methodology

Research methodology refers to the application of philosophies, approaches, methods, and techniques that are employed in order to get a deeper understanding of individuals' or group of individuals' point of views, experiences, perceptions and different perspectives on the phenomenon being studied (Vass, Rigby & Payne, 2017). Thus, the remainder of this section discusses the methodology that was applied and followed in this research.

1.5.1 Research Philosophy

Ontology and Epistemology are two main research philosophies. Ontology is concerned with the study of what is known, knowledge and facts (Gonen et al., 2015). This is different from epistemology, which is concerned with questioning what is known in order to gain new knowledge and focuses on what forms the bases of existing knowledge (Ritchie et al., 2013). Gray (2013) argues that epistemology does not only seek new knowledge but also provides a background to clearly determine which knowledge is adequate.

Based on the objectives of the study both ontology and epistemology philosophies were followed, in that: (1) Ontologically, we do know that citizens and residence of Angola have physical addresses, which are often different from the ones that are printed on their national identity documents. Through this study, seeks to examine and understand why and how inaccurate, duplicated physical addresses come to being, and printed on national IDs. (2) epistemologically, we needed to know how the current situation regarding the deficiencies in the issuance of ID can be changed to improve quality and efficiency.

1.5.2 Research Approach

There are two main types of research approach, namely, inductive and deductive approach. Gray (2013) defines the inductive approach as a type of research that is conducted from the specific to the general, which means that a theory results from the research. Ritchie et al. (2013) state that the deductive is a top-down approach, which simply means that the research starts with a theory, which implies from general to specific. In addition, Cho and Lee (2014) claim that the inductive approach is appropriate for situations where there is limited information about the phenomenon being studied, enabling a theory to be developed for the phenomena being studied.

Based on these points, the inductive approach was followed in this study due to the fact that the aim of the study was to develop an information system framework, which can be used to address the challenges that the duplications and inaccuracy of physical addresses pose to the ID system at the Republic of Angola. The study was conducted from the specific to the general because the development of the framework was based on the data that was collected. Also, the framework can be used by various government agencies and institutions within the country. Other countries with similar challenges can also employ the framework that was developed from the study.

1.5.3 Research Methods

There are two types of research methods, qualitative and quantitative (Davis & Hughes, 2014). However, both methods can be combined, which is called the mixed method (Griensven, Moore & Hall, 2014). Bambale (2014) says that quantitative research consists of explaining phenomena based on numerical data and analyze the data through mathematical-based methods and statistics. According to Ritchie et al. (2013) quantitative method is concerned with numbers, measurement, and statistical figures. While Hammarberg, Kirkman and De Lacey (2016) claim that qualitative research seeks to gain a deeper understanding of phenomena from the participant's point of view, in which there are many realities and truth, based on subjectivism.

The aim of the study was to develop an information system framework, which can be used to address the challenges that the duplications and inaccuracy of physical addresses pose to the ID system in the Republic of Angola. This involved seeking an in-depth understanding of how and why things happen in the way that they currently do (Iyamu, 2015). This could only be effectively and accurately done through qualitative methods, mainly because it requires opinions and views rather than statistical figures (Vass et al., 2017). The qualitative method entails eliciting information from the people that encounters the challenges on daily basis, from both citizens and government perspectives.

1.5.4 Research Design

Godwin and Potvin (2017) describe a case study as an empirical examination of a case or phenomenon within its real-life context. The case study approach enable in-depth examination of a phenomenon in its natural settings or real-life context (Wohlin & Aurum, 2015). Hvalic-Touzery et al. (2017) stated that the case study approach allows the examination of a phenomenon within a single entity. Therefore, the case study was applied in this study to allow an in-depth examination of the phenomenon being studied within its real-life context.

Initially, two ministries within the Angolan Government were selected as cases in the study. However, during fieldwork, it was realized that only one Ministry meets the criteria of this research as explained in Chapter 3. Therefore, only one Ministry within the Angolan government was used as a case in this study. A pseudonym was given to the Ministry due to ethical considerations. Therefore, in this study, the Ministry is labeled Ministry of Homeland.

The Ministry of Homeland was selected mainly because it is the Ministry in the Republic of Angola that deals directly with identification systems and physical addresses in terms of capturing data and issuing IDs. The case selection was strictly based on the objectives of the study which were: (i) to identify and examine the factors of deficiencies in the current system whereby wrong, duplicate, inaccurate or inconsistent physical addresses are printed on identity documents of individuals and (ii) to examine both technical and non-technical factors that can improve the current system.

1.5.5 Data Collection

Data collection refers to the process of gathering information from the participants, using various techniques such as; interviews, questionnaires, documentation, and observation (Taylor, 2017).

There are three types of interviews techniques namely; unstructured, semi-structured and structured interview (Poedjosoedarmo, Subroto & Wiratno, 2013). The unstructured interview technique is a free conversation about a specific topic without a standardized set of questions aiming to collect in-depth information from the participants (Jamshed, 2014). The structured interview technique is a very standardized interview where a fixed set of questions is asked of all participants (Wilson, 2016). The semi-structured interview technique is used to gather the response from participants by an in-depth discussion between the interviewee or researcher and the participant (Araújo et al., 2017).

Amongst the three types of interviews techniques, the semi-structured was selected and used to collect data. This was mainly because the technique provides a guide to conduct the interview and at the same time enables the interviewer to probe for clarifications whenever it is necessary in order to get a deeper understanding of the phenomenon being studied (Ahmad et al., 2017). Therefore, from the research questions presented in section 1.3.3, three interview guidelines were developed for the three different groups of participants which were the IT specialists and the non-IT personnel of the Ministry of Homeland, and the community members. During the interview, more questions were asked of the participants to get an in-depth understanding or clarification of the participants' answers. The interviews were conducted until a point of saturation was reached. The data collection process is explained in more details in Chapter 3.

1.5.6 Data Analysis

Chatterjee, Kumar and Madalli (2016) define data analysis as the process of evaluating and examining data through analytical and logical reasoning techniques. Thus, the hermeneutic technique from the interpretive approach was employed in the analysis of the qualitative data.

Hermeneutic is a data analysis method that is used to analyse and interpret qualitative data (Wohlin & Aurum, 2015.) The interpretation of data is carried out following the hermeneutic circle. According to Galehbakhtiari (2015), the hermeneutic circle consists of seeking the understanding of the text as a whole by interpreting small parts of the text continuously until a deep understanding of the whole text is reached. This involves examining and interpreting the relationship between smaller parts of the data in order to draw meaningful conclusions (Shaw, Grainger & Achuthan, 2017). Thus, the hermeneutics method is often used in Information Communication Technology (ICT) studies to bring up the concealed knowledge and understanding of the phenomenon being studied (Mason, 2014).

Due to the criticality of the data analysis, the use of the Hermeneutic method was guided by a theory. The selection of the theory was intense and carefully undertaken. In the end, structuration theory was selected. This was done based on the objectives of the study which were identified and examine the factors of deficiencies in the current system, whereby wrong, duplicate, inaccurate or inconsistent physical addresses are printed on identity documents of individuals and to examine both technical and non-technical factors that can improve the current system.

The structuration theory focuses on technical and non-technical or human and non-human factors their relationships and how they interact (Iyamu, 2017). According to Iyamu (2014), the aim of using structuration theory is to understand the interaction between information

technology and humans by paying careful attention to the relationship that exists between dependent and independent variables.

Considering the above-mentioned factors, the hermeneutic technique, guided by structuration theory as a lens, was employed in the data analysis, with a specific focus on the following:

i. Examine how rules and regulations are employed in the use of available resources, such as information technology to enable and support the system and processes.
ii. Examine the interaction that happens between technical and non-technical agents. This was to understand how the current system is used to: (i) capture physical addresses – in terms of duplication, redundancy and validation, and (ii) store physical addresses – in terms of centralization, decentralization.

1.5.7 Units of Analysis

The analysis was done in units. This was to ensure that the critical areas were comprehensively covered. According to Thyme, Wiberg, Lundmanand Graneheim (2013), unit of analysis is the basis for qualitative data analysis. Neuendorf (2016: 20) defines it as "the element on which data are analysed and for which findings are reported" and states that these elements are usually people. The main units of analysis include:

1. The service provider (Government non-technical personnel) – those who make use of the system to provide services to the community.
2. Services recipients (the communities in Luanda) – those who receive services from the government.
3. IT specialists (Government technical personnel) – those that are responsible for enabling and supporting the system.

1.6 SIGNIFICANCE OF THE STUDY

The study will be of significance to both the Angolan government (and its people) including the government of other countries and the academic domains:

i. The study will assist in matters relating to safety and security, from the perspective of accurate tracing, tracking, and identification of individuals. Thus, activities can be better coordinated and managed. The study will also address fraudulent and criminal activities.
ii. The Ministry of Homeland will benefit from this study, in terms of guidance on carrying out their activities.
iii. The study is significant because it will contribute to the body of knowledge, specifically from developing countries' perspective.

1.7 ETHICAL CONSIDERATION

Ethics is a set of consistent rules that can be used as bases within which practice moral actions are executed (Pasztor, 2015). These rules are established and held in a document that is called a “code of ethics”, to serve as a guide for good conduct in different areas (Senter et al., 2018).

For this study, the Cape Peninsula University of Technology’s research code of ethics was followed as a guide for good conduct during the research. Therefore, the researcher strictly considered the following:

i. Obtained an introductory letter from the university and the supervisor (Appendix B).
ii. Sought permission from the organisation that was used as a case in order to collect data.
iii. Obtained an ethical clearance from the faculty research ethics committee (Appendix B).
iv. Obtained consent, in principle, from the organisation giving permission for data collection (Appendix B).
v. Provided an informed consent (Appendix B) to all participants to legitimately and willingly participate in the study.
vi. Kept the participant's information confidential, only the researcher and the supervisor have access to it.
vii. kept the data collected anonymous and access was granted only to the researcher, the supervisor only. In addition, examiners will be granted should they request for it, for audit purposes.
viii. Explained the participants’ right to withdraw should they wish to do so, at any given time. Also, the participants were made aware that they may decline to answer any questions that they did not feel comfortable to answer without suffering any negative consequences.

1.8 DELINEATION OF RESEARCH

This study was conducted in the capital city (Luanda) of Angola, due to the fact that the head offices of the government ministries are situated in Luanda. Among all ministries, the Ministry of Homeland was selected because it was the one that focused directly on ID documents and physical addresses.

1.9 THESIS STRUCTURE

This thesis consists of six chapters as shown in Figure 1.2.

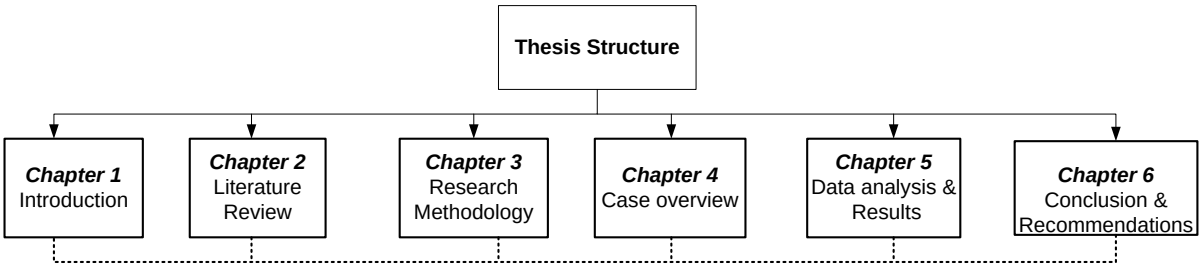

Figure 1. 2 Thesis Structure

1.10 CONCLUSION

This chapter presents an introduction and background to the study. The research problem and the aim of the study are presented together with the objectives that were extracted from the aim. A high-level literature review is conducted in the key areas of the study. A summary of the research methodology followed and applied in this study is presented. Therefore, the chapter provides an overview of the thesis so that the reader may have a complete view of what the study.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter provides a literature review in the key areas of this study. Rowe (2014) defines literature review as the process of combining a number of existing literature on a specific topic to describe the gaps in the literature in order to support the goals of the study. Based on the aim of the study, which was to develop an information system framework, which can be used to address the challenges that the duplications and inaccuracy of physical addresses pose to the ID system in the Republic of Angola, the literature review was conducted on key related areas. The areas include information communication technology (ICT), government services and Validation of attributes within a system. The review also covers structuration theory and its application in Information systems studies. Structuration theory was used to underpin the study. This means that the theory was used as a lens to guide the analysis of the data as explained in Chapter 3 and presented in Chapter 5.

2.2 INFORMATION AND COMMUNICATION TECHNOLOGY

Information communication technology (ICT) is defined as a combination of various technologies, tools, and resources applied to communication, storage, and management of information (Hamdani, 2017). ICT then uses the information to meet individuals or organisational needs and purposes (Kaware & Sain, 2015). According to Redwood et al. (2017), ICT cover's a wide range of communication devices including hardware, software, television, computer, and network. Therefore, Hanseth and Bygstad (2015) claim that ICT is widely considered to be the enabling factor for innovation in many fields. Based on the fact that ICT considers technology as a tool for innovation, Hamdani (2017) states that ICT becomes easily adaptable in various different fields.

ICT is, therefore, considered to be the main driving force in improving the performance of organisations and economic growth (Yunis, Tarhini & Kassar, 2017). The government of many countries have set their focus on investing in ICT equipment for service delivery including education from the early 1980s (Mirzajani et al., 2015). Thus Kaware and Sain (2015) state that ICT was introduced as an innovation that brought a huge improvement in many fields that affects our daily lives including business, healthcare, banking, transport, and organisational service delivery.

There are three components of ICT that stand out as the main components namely; people (Human resources), technology (hardware, software, telecommunication systems, database),

and process or procedures (Sylvestre, Haiyan & Yiyi, 2018). Iyamu and Adelakun (2008) explain and demonstrate the relationship between the main components of ICT as shown in Figure 2.1.

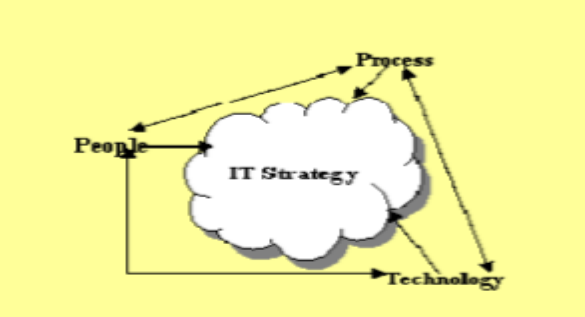

Figure 2. 1 Components of IT strategy (Iyamu & Adelakun, 2008).

Although the focus of Iyamu and Adelakun (2008) was on Information Technology (IT) strategy, it does not mean that it is off-topic because ICT is an umbrella term that covers several areas of Information Technology or Systems (IT/IS) (Charoensukmongkol & Moqbel, 2014). As explained by many other scholars such as Noor (2017) and Sylvestre et al. (2018), people, technology, and process are indeed the main components of ICT.

It is a well-known fact and strongly highlighted in the literature that human resource is needed for the well functioning of any ICT artifact (Iyamu & Shaanika, 2018). Thus the successful implementation of ICT strongly depends on the skills of the individuals in any organisation (Iyamu & Adelakun, 2008). However, there are many challenges in the implementation of ICT in governmental organisations, which have resulted in many failures as reported in many studies including Bouaziz and Chaabouni (2013). Mutuku and Machyo (2017) attribute those challenges to the human factor by stating that one of the most inherent challenges in the implementation of ICT is the lack of necessary skills from the government officials.

Technology component refers to both hardware and software that are used from the individual and organisational perspective (Khairi & Baridwan, 2015). Most organisations including the government of a country rely on the technological component of ICT to perform their activities (Rose-Redwood, Alderman & Azaryahu, 2017). However, the technological aspect is a challenge in most developing countries due to the lack of proper infrastructure (Gilfoyle & Thorpe, 2016). From the same perspective, Oyelana and Thakhathi (2015b) suggest that the lack of adequate infrastructure and awareness about the importance of ICT also affects its implementation in the government service delivery process.

Increasingly many organisations including government are following rigorous processes to implement ICT (Chen, Castillo & Ligon, 2015). This can be attributed to the high demand for

improved and better service delivery (Ogunleye & Belle, 2014a). As a result, the implementation of ICT in the government of many countries improves the technological infrastructure and economic growth of the county (Oyelana & Thakhathi, 2015a).

Based on the benefits and influential power of ICT, Noor (2017) claims that ICT became the most powerful and dependable tool to enhance efficiency and effectiveness. Therefore, business and governmental organisations have experienced a great improvement in their operation and services (Nawi, Ibrahim & Rahman 2013). However, from developing country perspective, Ogunleye and Belle (2014b) argue that the ICT enhancement of government service delivery is hindered by many factors including the organisational structure, leadership skills and changes in public institutions.

2.3 GOVERNMENT SERVICES

Government is an organisation that consists of a combination of goals, structures, and functions through which services are provided to the communities (Ogunleye & Belle, 2014a). However, state that governmental organisations are big and complex, making it complicated to achieve its goals (Oyelana & Thakhathi, 2015b). Therefore, various efforts either traditional or electronic have been put in place in order to manage and enhance the government's activities in an attempt to improve service delivery (Alsmadi & Abu-Shanab, 2016).

Some of the services that government provides include education, transportation, healthcare, and police or law enforcement services (Barrett, Pitas & Mowen, 2017). These services are critical to the development of any country and form a considerable part of every citizen's and business life (Tran et al., 2014). As a result, there is an increasing demand for quality service delivery from the government to the country (Sá, Rocha & Cota, 2016). Therefore, there is a need for technological advancement in the country in order to effectively and cost-efficiently respond to the demands for quality services to the country (Nawi et al., 2013).

One of the critical services in which the demand for quality continues to increase is the healthcare sector (Viceconti, Hunter & Hose, 2015). Talib, Azam and Rahman (2015) define healthcare as a set of services provided to a group of people or individuals with a purpose of maintaining, restoring, and promoting good health. Thus, healthcare is a very important and sensitive sector in that the lack of quality in providing the services can cause serious injuries to individuals and even death (Anand & Routray, 2017). Mgudlwa and Iyamu (2018), state that due to its sensitivity the services should be rendered privately under a policy in order to protect the service providers and the patients. Therefore, the government plays a very important role in the healthcare sector in providing the policies and regulations by which healthcare practitioners base their operations on (Greer, Wismar & Figueras, 2016).

Healthcare services are enhanced by the implementation of ICT, hence governmental investments in ICT has been growing since the 1980s (Silva et al., 2015). Thus ICT is considered a potential tool for enhancing the efficiency, performance, and transparency of healthcare service delivery (De Rosis & Vainieri, 2017). In addition, Gole, Sharma and Misra (2017) claim that ICT reduces significantly the cost of healthcare service delivery by enabling healthcare providers and policymakers or government to make use of the same platform.

Healthcare services are most of the time required to be delivered with emergency and yet with quality (Jennings et al., 2015). This is because ambulance or health services delivered efficiently and on time, can reduce the mortality rate of a country. This efficiency can be achieved through the technological advancement in the healthcare sector and in the country (Agarwal, 2017). According to Zakariah et al. (2017), the implementation of ICT for better physical address infrastructure in the country facilitates the delivery of health emergency services. However, in many developing countries like Ghana, the challenge of delivering health emergency services persists due to the poor physical address infrastructure in the country (Nyarko et al., 2015). On the other hand, the government of many countries is overcoming these challenges by transforming service delivery through the implementation of ICT (Mutuku & Machyo, 2017).

Another emergency service that benefits from the government's investment in ICT is the law enforcement agencies that are responsible for applying or providing police services to the communities (Cordner, 2014). Police services are of extreme importance because they make sure that the laws are respected, reduce citizen's fear of crime, they fight criminal acts and attempts, thus maintaining the security of the country (Gill et al., 2014). Due to the importance of police services, it is critical that government law enforcement agencies or police management, guarantee that quality services are delivered effectively and efficiently (Tomaževič, Seljak & Aristovnik, 2016). This has been made possible through the implementation and investment of ICT by the government of many countries beginning in Europe and US since the 1990s (Ark, Inklaar & McGuckin, 2003).

Most recently in Kenya, the use of ICT for law enforcement has brought the country in a high level of transparency in that, corruption activities have been reduced in the delivery of services (Mutuku & Machyo, 2017). Also, Michael and Miller (2013) state that law enforcement agencies rely on ICT components such as closed-circuit television (CCTV), for security and criminal investigation in order to eliminate the need for eyewitness which are subject to many errors.

Despite the endless number of benefits of ICT in the development of a country, many developing countries are still not making use of ICT to improve service delivery (Venkatesh, Balaand & Sambamurthy's, 2016). This can be attributed to the lack of personal and technological advancement in the country (Ogunleye & Belle, 2014a). Nyarko et al. (2015) argue that the difficulty to implement ICT artifacts for government service delivery in developing countries can also be attributed to the challenge of urbanism in terms of proper physical address infrastructure in the country. Therefore, the lack of technological advancement in the country including the physical address infrastructure negatively affects the quality of government service delivery (Avegerou & Walsham, 2017). In the same line of argument, Gilfoyle and Thorpe (2016) claim that without an accurate infrastructure it becomes almost impossible for the government to control the geographical location of each citizen to effectively act in cases of emergency. In addition Mora-Mora et al. (2015) claim that the challenge of locating and tracking citizens for government service delivery becomes worse without technological advancement in the country.

Similar to its benefits, the deployment and use of ICT poses many challenges. Hence there have been many studies such as Mkude and Wimmer (2013) and Baeuo, Rahim and Alaraibi (2016) that focuses on how to address some of the challenges of ICT artifacts within government environment. As shown in Figure 2.2, Odat (2012) explains some of the challenges of ICT in government institutions from developing country perspective.

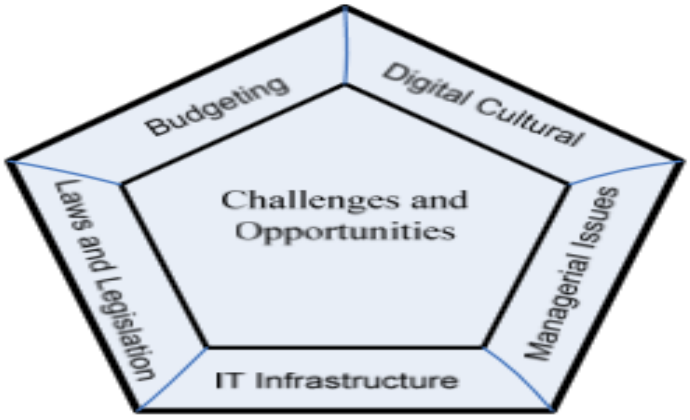

Figure 2. 2 Challenges and opportunity framework (Odat, 2012).

Figure 2.2 highlights the main challenges and opportunities that government of developing countries faces during the implementation of ICT namely; IT infrastructure, managerial issues, laws, and legislation, digital culture, and budgeting (Odat, 2012). According to Baeuo et al. (2016), the lack of IT infrastructure in developing country is manifested from technical and non-technical perspective including both the scarcity of adequate IT equipment and skills from the leadership, government and the citizens. The lack of IT infrastructure can also be influenced by the digital culture. Digital culture involves the fact that the majority of the

population in most developing countries are illiterate, most of them do not have a basic understanding of ICT (Bakunzibake, Grönlund & Klein, 2016). Also, the lack of security and confidentiality is predominant in developing countries, making it a challenge to implement ICT (Sarrayrih & Sriram). According to Elkadi (2013) security is a critical factor for the successful implementation of ICT for government activities or services.

The lack of IT infrastructure makes it more expensive to implement ICT in a developing country as compared to other countries with technological advancement (Waller & Genius, 2015). Implementing ICT on its own involves many expenses, however, the expenses are particularly higher for developing countries due to the lack of necessary resources (Weerakkody, Irani & Lee, 2013). According to Venkatesh et al. (2016), it can also be attributed to the long process that the government will have to go through in order to prepare the country before even beginning the implementation of ICT.

Many developing countries also suffer from managerial or leadership issues (Ogunleye & Belle, 2014b). The predominant problem with the management or government is the lack of transparency due to the high level of corruption that exists in developing countries (Mkude & Wimmer, 2013). As a result, the level of trust between government and citizens is dramatically reduced (Mutuku & Machyo, 2017). Therefore, it becomes more difficult to maintain a good relationship between government and citizens in order to improve service delivery (Alsmadi & Abu-Shanab, 2016). According to Majdalawi et al. (2015), another managerial issue is the laws and legislation that government formulates which sometimes constrains the implementation of ICT if they are not constantly updated.

2.4 VALIDATION OF ATTRIBUTES WITHIN A SYSTEM

Validation is the process of assessing the final results to improve and determine whether it meets the pre-defined requirements (Jung et al., 2015). According to Parsa et al. (2016), the focus of validation is to answer the question: “Are we building the right product?” which means that the emphasis is on building the product in accordance with the requirements. Smolentsev et al. (2015) state that the process of validation establishes the accuracy or validity of a product. Therefore, Elshorbagy et al. (2015) claim that the rationale behind carrying out a validation process is to ensure that critical areas of the systems are covered with the required functionality and are under the specified standards. Therefore, validation is a key factor to ensure the quality of any information system, model, software products and another deliverable (Chevers & Grant, 2017).

When validating a system, all elements or attribute of a system, need to be tested to ensure that they all comply with the pre-defined requirement (Hut, van den Brink & van Cappellen,

2017). The data in a system is part of the elements or attributes that need to be validated. According to Araújo, Salles and Saito (2008), validating the data is very important because it ensures the correctness, quality, completeness, usefulness and adequacy of data. In the same line of argument Abo and Voisin (2013) state that the validation of data needs to be done against the requirements of the system to ensure the security of the system. However, when this it is done manually it takes a lot of time and is more subject to error, inconsistencies, and complexities (ibid). Pazderin and Kochneva (2014) claim that this becomes very complex because the "bad data" (data with error) which results from the lack of adequate technology to validate data, is very difficult to identify or discover. Therefore, Mittal (2013:35) states that "poor data quality is still a major and exponentially growing problem" in any organisation including the government.

Government's interest in the use of information systems is also to facilitate the storage of data including citizen's and residents data such as physical addresses (Clark, Brudney & Jang, 2013). These systems are essential for government service delivery to the country due to the critical data that are stored in them which are crucial for emergency services (Aloudat et al., 2014). However, due to the lack of adequate technology in many countries, the data is more likely to be outdated, inconsistent, containing error and inaccurate (Gilfoyle & Thorpe, 2016). As a result, service delivery becomes more complex and difficult. Therefore, there is an increasing concern for accuracy, truthfulness, and consistency which is accomplished through effective data validation (Mittal, 2013).

2.5 STRUCTURATION THEORY

The term structuration is described as "the process through which actors select, adapt, apply, manipulate and alter available structures" (Schmitz, Teng & Webb, 2016:665). Structuration theory is a social theory that focuses on the production and reproduction of social systems that occurs through the interaction between agents and structures (Chang, 2014). The theory was introduced by Anthony Giddens who was looking at how agents base their actions on structures and how those structures are at the same time created by the agents (Giddens, 1984). According to Twum-Darko (2014), the key elements of the structuration theory includes agents and structure.

In structuration theory, agents are technical and non-technical or human and non-human (Iyamu, 2014). Human agents are also called agency due to the fact that they intentionally perform their actions with intended outcomes although their actions can sometimes produce unexpected outcomes (Burridge et al., 2010). This implies that human agents act consciously and are able to control their behaviors or actions (Puron-Cib, 2012). In contrast, technical agents such as computers, perform their actions unconsciously which means that there is a

lack of awareness in their actions (Orlikowski, 1992; Giddens, 1984). According to Oppong (2014:113) “agents produce structures while the structures reproduce and sustain themselves through actions of the agents”.

Structure consists of rules and resources that are applied in the production and reproduction of social systems (Gao & Hua Li, 2010). Structures, therefore, “do not exist independently of human action, nor are they material entities” (Iyamu & Rood, 2010:1). According to Giddens (1984) resources are divided into two; authorative resources that manage the activities of non-technical agents (people), and allocative resources that are used to control technical agents. In the same way, there are two elements of rules namely; the normative elements that create and are created by legitimation and codes of signification that creates and are created by the signification through agent’s actions (Meurer, 2004). This interaction between agents and structures defines the core element of structuration theory, which is the duality of structure (Bracker, Schuhknecht & Altmeppen, 2017).

Giddens’s focus in the duality of structure was to go to the roots of how structures are created by agent’s actions and how agent’s actions are enabled and constrained by structures (Bryant, 2014). Iyamu (2013:228) puts it this way: “the rules and resources drawn upon in the production and reproduction of social action are at the same time the means of system reproduction”. As shown in Figure 2.3, the duality of structure consists of three dimensions namely: Structure, modality, and interaction (Giddens, 1984).

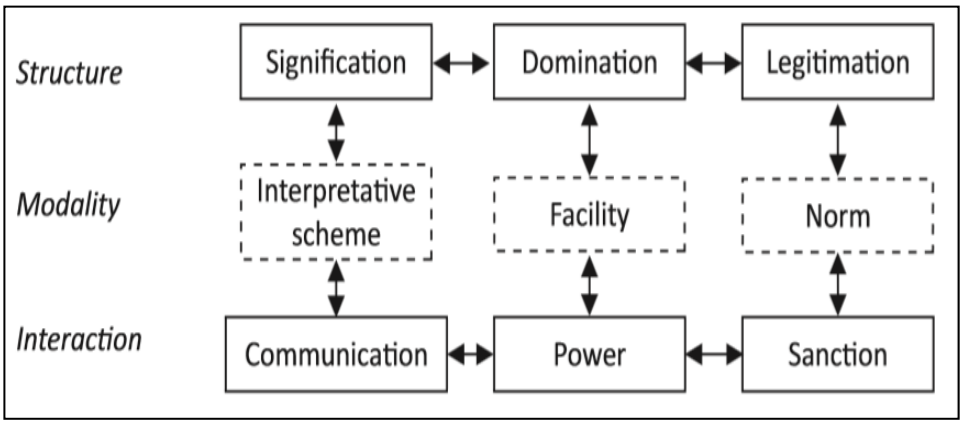

Figure 2. 3 Duality of Structure (Giddens, 1984).

The interaction between agents and structures are linked through the modalities; interpretive scheme, facility, and norm (Iyamu, 2017a). As stated by Kaewkitipong, Chen and Ractham (2016) signification are established by human agents through the use of interpretative schemes. This is then used to generate the meaning of communication (Englund & Gerdin, 2014). Human agents dominate through the use of facilities that are then used to exercise power (Omar, Weerakkody & Sivarajah, 2017). In the case of legitimation structure, Giddens

(1984) states that human agents create legitimation structures by sanctioning their actions and in the same way human actions are formed by legitimation and therefore sanctioned.

The duality of structure is the element of structuration theory that has been mostly applied in Information system (IS) studies (Bernardi, 2017). Due to the fact that the outcome of any information system is based on the interaction between agents and structures (Dennis, Clay & Ko, 2017). Therefore, Indeje and Zheng (2010) state that the duality of structure allows a comprehensive and clear understanding of how IS artifacts mediate the interaction between human agents and structures.

2.6 INFORMATION SYSTEMS AND STRUCTURATION THEORY

Information system (IS) is a network constituted of hardware, software and people (Hosseini et al., 2017). IS has been extensively used by organisations and individuals to support and improve daily operations and activities (Bajdor & Grabara, 2014). Due to the important role that IS plays in an organisation's productivity and performance, many studies have been conducted around this particular subject area (Aydiner, 2017). However, in order to get a clear understand of how IS has the power to constraint and enable activities and events, many scholars have made use of structuration theory (Dwivedi et al., 2015).

The main focus in most IS studies, is to examine and understand the interaction between social structures and technology (Iyamu, 2017b). In this respect, Orlikowski (1992) applied structuration theory to examine the nature and role of technology in organisations (social structure). Bernardi (2017) also adopted structuration theory to understand the roles of the technical factors in IS/IT during the processes of non-technical agents accountability in the healthcare sector (social structure). Puron-Cid (2013) adopted the structuration theory to study the nature of e-government and examine all the structures involved in the e-government. Iyamu and Roode (2010) affirmed the critical influence of non-technical factors in the implementation of IT strategy. Therefore, the authors used Structuration theory as a lens to understand how technical and non-technical factors enable and constrain the implementation of IT strategy in organisations (social structures).

Thus, the use of structuration theory in IS research has its roots in the idea of the duality nature of IS that was articulated by Orlikowski (Orlikowski, 1992). The duality nature of IS is demonstrated in the fact that IS has the power to influence organisations activities while at the same time people, social, and political factors have a strong effect on IS (Pozzebon & Pinsonneault, 2001). Therefore, Chang (2014) states that there is a relationship of production and reproduction between IS and human behavior pattern that can be clearly analysed through the lens of structuration theory. Thus, Iyamu (2013: 225) claims that structuration

theory “is particularly useful in acknowledging and analysing the dialectic between organisational (including the computing environment) and technological structures, as well as human action”.

Through the lens of Structuration theory, both IS and social systems are produced by human actions in a particular environment (Dennis et al., 2017). Gao and Hua (2010) claim that IS is also considered a structure (rules and resources) through which human actions are produced. Therefore, IS has the power to influence the actions and the environment where those actions are produced and reproduced (ibid). The influence can be negative or positive based on the functionalities of an IS artifact that was produced (designed, developed and implemented) by human agents (Pozzebon, Mackrell & Nielsen, 2014). Therefore, over the years, structuration theory has been a useful tool to analyse the dualism of IS/IT in many social structures from both technical and no-technical perspective (Puron-Cid, 2013).

However, there are some authors that were not only limited to the use of Giddens’s structuration theory as a lens. Instead, they used the theory as a basis for creating other frameworks in order to achieve the aim of their studies. For example, Desanctis and Poole (1994) proposed an “Adaptive structuration theory” (ASP) to unpack the interaction between people, social structures and technology. The authors claim that unlike the structuration theory, ASP “explores the inherent structure of technology more fully” (p125). Stones (2005) also argues that Giddens’s structuration theory describes its elements in an abstract way making it remain on a philosophical level. Therefore, the author developed a “Strong-structuration theory” framework, where he adds and clarifies some of the concepts of structuration theory in order to bridge the philosophical and substantial level of structuration theory.

However, none of the criticism stopped Dennis et al. (2017) and many other researchers from achieving the objectives of their studies. In the same way, Structuration theory is suitable for achieving the objectives of this study, which are to (i) identify and examine the factors of deficiencies in the current system, whereby wrong, duplicate, inaccurate or inconsistent physical addresses are printed on identity documents of individuals, and (ii) examine both technical and non-technical factors that can improve the current system. This is based on the fact that the theory is suitable for examining the interaction between technical and non-technical factors and how technology is enabled and constraints by structures (ruses and resources) (Bernardi, 2017). Iyamu (2013:225) supports this, by stating that “One of the most important factors in the computing environment is understanding how technology is driven and “determined” by components such as rules, regulations, and resources within the organisations”.

2.7 CONCLUSION

This chapter presents a holistic and comprehensive review of literature that relates to this study. The review was conducted in the following key areas of the study: information communication technology (ICT), government services, Validation of attributes within a system, structuration theory, and information system and structuration theory. This was done in order to point out and deeply describe the existing gaps in the literature and validate the need to conduct this study. The next chapter (Chapter 3) is about the research methodology that was followed and applied in order to achieve the aim and objectives of this study.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter details the research methodology that was applied in this study. Research methodology is the systematic application of philosophies, approaches, methods, and techniques to study a particular phenomenon (Vass, Rigby & Payne, 2017). Based on the research aim which was to develop an information system framework, which can be used to address the challenges that the duplications and inaccuracy of physical addresses pose to the ID system at the Republic of Angola, methods, and approaches were selected and applied in the study. The rest of the chapter is divided into 8 sections, namely: (i) Philosophical assumption, (ii) Research approach, (iii) Research method, (iv) Research design, (v) Data collection, (vi) Data analysis, (vii) Ethical considerations (viii) and conclusion.

3.2 PHILOSOPHICAL ASSUMPTION

The philosophical assumption is the beliefs about how the researcher's views the world (Alkhalifah, 2017). According to O'Gorman and MacIntosh (2015), it is critical that a researcher clearly establishes the assumptions that will guide the research so that it becomes clear to other researchers regarding the basis in which the claims in the findings were made. The two philosophical assumptions, ontology, and epistemology are popular and commonly applied in the field of information systems (IS) studies. The two philosophies are discussed, but with a focus on how they relate to this study.

In philosophy, ontology originates from metaphysics which appraises the very nature of existence (Storey, Trujillo & Liddle, 2015). Gonen et al. (2015) state that the term ontology simply means what exists or what is known. Based on the objective of this study which was to identify and examine the factors of deficiencies in the current system, whereby wrong, duplicate, inaccurate or inconsistent physical addresses are printed on identity documents of individuals, the followings do exist and are known: a system; identity documents (IDs); and deficiencies. According to McLachlan and Garcia (2015), the two ontological assumptions are realism (single reality) and relativism (multiple reality). In the phenomena that are being studied, individuals and groups perhaps have different opinions about the existence of the system that is currently used for the Identity Documents. Also, there are different views on how the deficiencies come to being.

Epistemology, on the other hand, focuses on what can be known about what is known (Ritchie et al., 2013). Liu (2018) claims that the two epistemological assumptions are known as objectivism (testing what is known to find out the truth) and subjectivism (interact with participants to find out the truth). Thus, the study's other objective was to examine both technical and non-technical factors that can improve the current system. This is primarily because there are things about the current system that can be explored and known, for improvement purposes. According to Gray (2013), these assumptions will then guide how the researcher will go about questioning what is known to obtain new knowledge.

The ontological assumption was the relativism mainly because in relativism the truth is dependent on the context. This therefore dictated the Epistemological assumption which was the subjectivism that was motivated by the fact that the researcher needed to interact with the participants to find out what could be known, regarding what is known about the incorrect addresses on citizens' IDs from the participants' perspectives and experience.

3.3 RESEARCH APPROACH

Research approach focusses on whether a theory will result from the research or the research will be based on a theory (Gray, 2013). The two common approaches in IS studies are the inductive and deductive (Goshwami, 2010).

The deductive approach is often referred to as a top-down approach, meaning that the reasoning is guided from the general to specific observation (Parmaxi, Zaphiris & Ioannou, 2016). The approach is often undertaken or followed to test a particular theory rather than creating a new theory (Wohlin & Aurum, 2015). Woo, O'Boyle and Spector (2017) describe the deductive approach as an inflexible testing of hypothesis. The approach is commonly associated with objectivism. Therefore, the deductive approach often results in statistical figures whereas the inductive approach focuses on an empirical generalisation (Tsang, 2014).

The inductive approach is considered to be a bottom-up approach, which means that a theory results from the research (Cheong, Hallihan & Shu, 2014). By following this approach, the researcher normally does an in-depth reading and interpretation of raw data collected in a specific environment from where the researcher derives concepts, themes, and models (Jebreen, 2012). According to Thomas (2006), the primary purpose of the inductive approach is to allow the research to extract findings from the standing out themes that derives from the raw data. The inductive approach is often associated with subjectivism. According to Alvesson and Sköldberg (2017), the underlying assumption of the inductive approach is that whatever is obtained from the experience of a single case, can also be valid for other cases.

Based on the aim of the study which was to develop an information system framework, which can be used to address the challenges that the duplications and inaccuracy of physical addresses pose to the ID system at the Republic of Angola, the inductive approach was followed. This was mainly because the approach implies generating a theory from the data that was collected and analysed. This means that the framework was developed based on the data collected in a specific context (Republic of Angola), which can also be applied in other developing countries with similar problems.

3.4 RESEARCH METHODS

Research methods are considered to be the drivers of the whole research in that they dictate which tools and techniques will be used to conduct the research (Patten & Newhart, 2018). There are two main types of research methods, which include the quantitative, qualitative (Davies & Hughes, 2014). However, the two methods can be combined, which is referred to as mixed methods (Griensven, Moore & Hall, 2014). Both quantitative and qualitative methods including the mixed methods are common in IS studies (Urquhart & Fernández, 2016).

Quantitative methods focus on the testing of theories and collecting numerical data to prove those theories (Biswas & Muthukkumarasamy, 2017). The methods are subjective in nature, which means that who undertakes quantitative studies believe that there is only one truth that has to be tested and measured in order to discover the truth (Bambale, 2014). The quantitative method is most appropriate when the researcher aims to identify and test hypotheses through rigid and systematic approaches (Ritchie et al., 2013).

Different from quantitative, the qualitative methods are of contextual and subjective nature (Iyamu & Shaanika, 2018). The methods focus on individuals' understanding, and experience from the perspective of the phenomenon being studies (Hammarberg, Kirkman & De Lacey, 2016). In qualitative methods, the research seeks to understand the rationale behind the existence of phenomena through direct interaction with the participants (Iyamu, 2015). Qualitative methods are increasingly being adopted in IS studies in order to obtain in-depth understanding of the phenomena being studied from individuals' point of views (Walsham, 2018). This is motivated by the fact that IS/IT artifacts do not exist on its own separate from human influence (Iyamu & Shaanika, 2018).

In this study, the qualitative method has been adopted based on the aim of the study, as stated above. In order to achieve this aim, direct interactions with the participants were required, so as to get an in-depth understanding of the current system. This includes getting different opinions on why wrong or inconsistent physical addresses are printed on identity documents of individuals, as well as what technical and non-technical factors that could be employed to

improve the current system. This could only be achieved through the gathering of many realities, to why things are in the way that they are regarding the current state and its products.

3.5 RESEARCH DESIGN

The research design is the approach used to guide and combine all the elements of a study in a logical sequence in order to address the aim of the study (Creswell & Poth, 2017). Some of the approaches that can be applied as research design include ethnography, survey and case study. The selection of an approach or approaches is based on the research objectives and linked to the philosophical assumption and research methods that are chosen for the study. After choosing a stance from the philosophical assumptions, all the choices that the researcher makes will have practical influences to the research design (Creswell, 2007). Baškarada (2014:05) suggest that research design has to be logically linked to "the research questions to the research conclusions through the steps undertaken during data collection and data analysis".

Ethnography research design is a systematic application of methods and techniques to observe social and cultural phenomena in the real-life environment (Goldstein et al., 2014). The ethnography design entails that the researcher observes and interacts with a group to gain an in-depth understanding of the phenomena through a long period of data collection (Merriam & Tisdell, 2015). However, Baskerville and Myers (2015) claim that, so far in IS research the use of ethnography is mostly based on the traditional way of observing the units without deliberate intervention to change the current situation.

A Survey is by nature a nonexperimental design whereby the researcher applies verbal or written techniques to quantify the participant's opinions and beliefs (Abbott & Mckinney, 2013). According to Alan (2015), the most used data collection method in a survey design is the questionnaire. However Case and Given (2016) argue that the survey design covers many other data collection methods including both individuals and focused group interviews and the questionnaire can either be paper-based, online or sent via email. Although the survey design is mostly used in quantitative studies, it can also be used in qualitative studies. However, Bygstad and Munkvold (2016) state that, one of the research designs that is increasingly adopted in IS qualitative research, is the case study approach.

A case study is profound and comprehensive for the study of a phenomenon as a whole (Yazan, 2015), which makes it preferable in many IS studies. Yin (2018) states that the focus of a case study is on current situations within its occurring environment. According to Wohlin and Aurum (2015), the case study approach is most suitable for the qualitative empirical type

of research due to the fact that it allows the researcher to get a deeper understanding of contemporary complex phenomena.

Based on the objectives of the study which were to: (i) identify and examine the factors of deficiencies in the current system, whereby wrong, duplicate, inaccurate or inconsistent physical addresses are printed on identity documents of individuals and (ii) examine both technical and non-technical factors that can improve the current system, the Case study approach was employed as the research design in this study. This was mainly because, the researcher was seeking answers to questions such as why and how (Yin, 2018). This involved direct interactions with the participants in order to get in-depth knowledge and an understanding of the phenomena within its natural setting (Bygstad & Munkvold, 2016).

Guided by the objectives of the study initially two Ministries within the Angolan government were selected as cases. However, in practice, only one Ministry was used as a case in this research. Initially, both ministries were selected because they were the only two Ministries that deal with citizens' IDs and physical address. However, when one of the Ministries was approached for permission to conduct a study, the researcher came across with a change in the Angolan government structure.

The Ministry of Urbanism and Housing (Ministerio de Urbanismo e Habitação) was merged with the Ministry of Territorial planning (Ministerio de Ordenamento do Territorio) which became the Ministry of Territorial Planning and Housing (Ministerio do Ordenamento do Territorio e Habitação). This resulted in a lack of understanding from the Directors as to why the researcher needed to conduct a study in that Ministry. The argument was that the study is only related to the Ministry of Homeland that deals with the IDs and the physical addresses printed on the ID.

After the constant request, the researcher was informed that the focus area of the study which is the area of physical addresses in connection with the IDs, was a project that was only being implemented within the Ministry of Territorial Planning and Housing in this current year (2018). Therefore, the current state of the Ministry didn't meet the criteria stipulated by the researcher which was "at least a year of experience with the system". As a result, only the Ministry of Homeland was used as a case for this study.

3.6 DATA COLLECTION

The data collection entails gathering of materials, which include text, audio and visual that are related to the phenomena being studied (Taylor, 2017). There are different techniques that can be used to collect data, from various sources in a study. Some of the techniques include

interview, documentation, and observation (Iyamu & Shaanika, 2018). One of the most popular technique in qualitative research is the interview technique (Marshall et al., 2013). The technique allows direct interaction with the respondents, one-on-one or in group. There are three types of interviews techniques namely: structured, semi-structured and unstructured (Poedjosoedarmo, Subroto & Wiratno, 2013).

The Semi-structured interview is one of the most used interview technique in IS qualitative research, owing to its flexibility (Iyamu, 2018). According to Baskarada (2014), semi-structured interview simply means that the researcher will have interview guidelines and at the same time the possibility to ask for clarification whenever necessary. In a same-structured interview, the researcher is allowed to ask questions based on the participant's responses even if they are not part of the interview guideline (Marshall, Brereton & Kitchenham, 2015). This flexibility of semi-structured interview leads to a richness of data as the researcher and the participant will be able to engage in a deep conversation (Shaanika & Iyamu, 2018).

Therefore, the semi-structured interview technique was selected to conduct this study. The researcher developed three sets of interview guidelines (Appendix A) one for each unit of analysis namely: the technical and non-technical government personnel and community members. Technical personnel in this study is referred to the IT specialists that are responsible for enabling and supporting the system. Non-technical personnel refers to the people who make use of the system to provide services to the community. Community members are the ones that receive the services from the governmental institution. A total of 16 people, as shown in Table 3.1 were interviewed at the point of saturation. This is a point where no new information was forthcoming. Marshall et al. (2013) describe the point of saturation as the time during data collection where the participant's answer becomes repetitive or redundant.

For the non-technical personnel, the interviews were conducted at their workplace. The manager offered an office for the researcher to conduct the interviews after introducing the researcher and the purpose of the study to all the non-technical employees. For the technical personnel, one participant was interviewed at a restaurant because that is where the participant felt comfortable. Other participants refused to be interviewed one on one which led to an unpredictable focused group interview. According to Zeng (2018) focused group interview is a method of gathering data by allowing the participants to engage in a discussion.

The community members that participated in this study were interviewed at places of their preferences. Also, the participants were allowed the liberty to decide on time or period that was convenient for them. Despite these flexibilities, there were challenges in the process of data collection.

3.6.1 DEMOGRAPHY

As shown in Table 3.1, the participants in the study were well spread. They consisted of government employees, which were both IT specialists and non-IT personnel, and community members. The spread of the participants was purposely to create a balance, which contributed to the richness of the data.

Table 3. 1: Demography.

	Participant	#
IT Specialist	Technical chief Engineer	2
	IT consultant	1
Non-technical personnel	End-user (system operator)	3
	End-user (analyst & administrator)	2
Community members	National Identity Document holders	8
Total		16

3.6.2 Criteria for selecting participants

In order to gather data that are related to the study, and at the same time ensure that the data is rich towards achieving the objectives of the study, criteria were used to select the participants. There were three main criteria: (1) participants must come from both IT and non-IT units of the organisation that is used as cases in the study; (2) each participant must have spent a minimum of 1 year working in the organisation; and (3) community members who have ID, and have changed addresses since obtaining the ID.

Based on the criteria, the Technical and non-technical personnel were selected to participate in the study. The selection of the participants was based on their experience with the system, which was a minimum of 1 year. A minimum of 1 year of experience was considered to be enough to have a good understanding of the system's functions, from both IT and users' perspectives. The Community members that have changed physical addresses at least more than once were also selected to participate in the study.

3.6.3 Interview guidelines

The interview guidelines (Appendix A) were formulated based on the two research questions; (i) what are the factors of deficiencies in the current system, which allows incorrect, duplicate, inaccurate or inconsistent physical addresses of individuals to be printed on individuals identity documents? (ii) what are the technical and non-technical factors that can improve the current system?

The two research questions were broken down into questions that allow the researcher to elicit information, which leads to answering the research questions. The questions were articulated as simple as possible to make it clear for the participants. Three interview guidelines were developed for the three groups of participants: IT specialists; (non-IT personnel working in the organisation; and (community members). This was due to the fact that each of the groups would be speaking about the subject from different perspectives. The community members would be speaking from service recipient perspective. The IT specialists focus on the technical aspect of the system. The non-technical personnel has experience about how the system works from a non-technical viewpoint. All the interview guidelines were developed in English and then translated into Portuguese which is the language spoken by the participants.

The interview guidelines helped to maintain focus during the interviews and enabled the researcher to engage in a conversation with the participants without missing the objective of the study.

3.6.4 Challenges and solutions during data collection

Even though criteria were set and used in the selection of the participants, there were challenges. During the interviews process, four main challenges were encountered: (1) the use of Portuguese language; (2) cultural differences; (3) access to participants; and (4) translation from Portuguese to the English language. Even though the challenges were critical, the process was neither disrupted nor derailed. Despite the challenges, rich data were gathered. The challenges are discussed as follows:

The use of Portuguese in the interviews

Challenge: The researcher also faced many challenges when trying to ask questions in Portuguese while thinking in English. This was due to the fact that whatever is clear in English is not necessarily clear in Portuguese. As a result, during the first interviews, the participants had challenges understanding what was being asked.

Solution:

The solution to this challenge was to rephrase the questions every time the participants didn't understand the question. Some participants would say that they didn't understand the questions but others would just answer anything even if they did not understand the question. Through the answers, it was possible to realise that the participant did not understand the question and therefore the research had to think and find a way to rephrase the question.

Cultural affiliation

Challenge: In terms of the community members, the challenge was to make them understand the study and culture. Some participants lived in Luanda but they were from another province, so, referring to an older person as “You” in some cultures in Angola is considered an offense. Therefore, the researcher had to watch out for those things.

Solution:

The approach was to have a conversation about the topic before conducting interviews where the participants were allowed to ask any question or clarification whenever necessary. Regarding the culture, the researcher had to refer to some participants as father and sister to avoid referring to them as “you”.

Access to participants

Challenge: Another challenge was to get permission for data collection for both technical and non-technical employees. The organization kept on sending the researcher back many times. In the process of trying to reach out to the participants, motivation and transport was another challenge that the researcher faced. This was because the selected organization is far from where the researcher resides in Angola. Therefore, there were many difficulties in terms of transport and the motivation to go to the organisation knowing that they might send you back again with no results. Lastly, the challenge was conducting the actual interview, some participants refused to answer the questions asked by the researcher, some were very strict with regards to time.

Solution:

There was a need for being persistent in terms of requesting permission, otherwise, the researcher wouldn’t be able to collect data. When it comes to the time limit, the researcher had to submit to the participant’s time limit and try to ask questions based on the participant's response in order to get at least something related to the study in cases where the participants refused to answer the questions.

Translation from Portuguese to the English language

Challenge: All the interviews were conducted in Portuguese which is the official language of the country as well as the participants. Some of the interviews were transcribed in Portuguese, thereafter, translated to the English language, and others were transcribed directly to English. There were some challenges in translating the interviews to English because some participants would speak ‘slangs’ (terms or words that are not on Portuguese dictionary), which were very difficult to translate to the English language.

Solution:

In order to address this challenges, the researcher had to ask for an explanation from those who are familiar with the terms (slangs) in order to translate to English based on the meaning rather than word by word.

As explained above, the challenges were well managed, owing to the preparation of the researcher before the process began. The preparation included learning from colleagues' experiences, and Iyamu (2018), which explains: The guiding principles to data collection and implication of practice which includes, the selection of appropriate tools, the spoken language, cultureship, Situationship, Probationship, and Locationship. The solutions to the challenges that were encountered during data collection helped to gather rich data.

3.7 DATA ANALYSIS

Qualitative data analysis is an interpretive process that involves making sense of the data collected in order to discover meaningful and useful information and draw the conclusions (Miles, Huberman & Saldaña, 2013). Before data analysis was conducted, the raw data was proofread. This means that the data was cleaned by correcting the grammatical errors, spelling mistakes, articulating properly the sentences, and remove repetitive words such as "and, and or because, because". Microsoft Word was used to document both the data collected from the organisation (case) and the community members. The documents were properly formatted, by inserting page and line numbers. Each participant was assigned a code name rather than their 'real name'. This was purposely to protect the identities of the participants. This practice is within the ethics of the university (CPUT). Also, the code name including the format of the documents helped when it came referencing the participants' views and opinions during the data analysis. This is explained at the beginning of Chapter 5 of this thesis.

Based on the objectives of the study which were: (i) identify and examine the factors of deficiencies in the current system, whereby wrong, duplicate, inaccurate or inconsistent physical addresses are printed on identity documents of individuals; and (ii) to examine both technical and non-technical factors that can improve the current system, analysis was conducted on the data. The analysis employed the hermeneutic method through interpretive approach. The hermeneutic method is a major subset of the interpretive approach which is based on the concept that the understanding of data or a system as a whole, is achieved by examining its smaller parts (Shaw, Grainger, & Achuthan, 2017). According to Young (2018), the method is used to understand both data and technology by drawing subjective meanings through the hermeneutic circle. The hermeneutic circle consists of the continuous interaction between seeking to understand data by interpreting the data through smaller stages (Wohlin

& Aurum 2015). Thus, the hermeneutic circle enables the examination of an individual's personal experience (Galehbakhtiari, 2015). Also, Shaw et al. (2017) state that this method is appropriate to analyse complex relationship between different stakeholders. Therefore, based on the objective of the study, this method was useful in examining the relationship between technical and non-technical agents within social structures. The analysis was guided by the duality of structure from the perspective Structuration theory.

The duality of structure is the core element of structuration theory and the most adopted element in IS studies (Bernardi, 2017). The concept behind duality of structure is that structures are created through agent's interaction and at the same time those structures constrain and enable agent's actions (Bryant, 2014) which is explained in more detail in Chapter 2.

The duality of structure was used as a lens to examine and gain a deeper understanding as follows:

i. The different agents and agencies that existed within and in the use of information system, to print addresses on citizens' IDs;
ii. The various rules, regulations, and technologies that exist in the use of the system.
iii. How the different individuals or groups interacted with the available rules, regulations, and technologies in providing service (IDs) to the citizens; and
iv. The roles of citizens in the services that they received from the government, regarding printing addresses on their IDs.

3.8 ETHICAL CONSIDERATIONS

The Cape Peninsula University of Technology's (CPUT) research code of ethics was followed as a guide to ethically conduct he research. The researcher applied the following steps:

i. The ethical form was completed and submitted to the CPUT ethical committee.
ii. An introductory letter from the supervisor and the CPUT ethical committee was sent to the organizations (Appendix B). The letters were both in English and Portuguese.
iii. The researcher then sought permission from the organization in order to collect data.
iv. Ethical clearance was granted from the faculty research ethics committee (Appendix B).
v. Before conducting the interviews, a consent in principle was granted from the organization (Appendix B).
vi. The consent in principle was then sent back to the CPUT ethical committee.
vii. An informed consent was consent letters was given to all community members before conducting any interview (Appendix B). The informed consents were both in English and Portuguese.

viii. All participation in the study were voluntary. None of the participants were forced to be part of the study neither given any payment to participate in the study.

ix. The participants were made aware of the ethical considerations such as anonymity, confidentiality and the right to withdraw without any time of the research without any negative impact on them.

x. The data collected was kept confidential to the researcher, her supervisor and the examiners for auditing purposes.

xi. All the participants were kept anonymous. The participants and the organization itself were given pseudonyms in order to keep them anonymous.

3.9 CONCLUSION

This chapter presents the research methodology, which includes philosophical assumptions, methods, approaches, and techniques that were followed in conducting this study. The chapter gives a holistic view of the steps that the researcher took in order to achieve the objectives of the study. The next chapter (Chapter 4) presents an overview of the case selected based on the objective of the study.

CHAPTER 4

CASE OVERVIEW

4.1 INTRODUCTION

This chapter focuses on giving a general idea about the organisation that was selected and used as a case for this study. The study was conducted in the Republic of Angola\Luanda. The Angolan government is constituted of 40 Ministries and 2 departments. Based on the objectives of the study, one of the ministries was selected and used as the case. This was due to the fact that the Ministry deals directly with physical addresses in terms of capturing and storing data. The head office of the ministries is situated in the capital of Angola (Luanda).

4.2 FIELD WORK

Based on the aim of the study, the qualitative method was followed, the research design was a case study with the aim of obtaining an in-depth understanding of the case in its real-life context. The real name of the organisation is kept anonymous and a pseudo name was given as a designation for the organisation. This case was named Ministry of Homeland, the name was chosen based on the fact that the study was conducted in the researcher's hometown. Through the use of semi-structured interview 8 interviews were conducted within the Ministry of Homeland, including 3 technical employee and 5 non-technical participants.

All the interviews were recorded using a digital voice recorder to ensure that no data was left out. The interviews were also recorded for transcribing and evidence that the interviews were actually conducted. The interviews were conducted in Portuguese and then transcribed and translated into English. The interviews lasted from minimum of 7minutes to an hour. The confidentiality of the participants was protected and all the participants remained anonymous by giving them code names such as GC 01 to GC 08. This was done, in order to protect the participant's identity.

4.3 ORGANISATION: MINISTRY OF HOMELAND

The Ministry of Homeland is an auxiliary ministerial department of the president of the Republic of Angola. The aim of the Ministry is to propose the formulation, as well as drive, execute and evaluate the politics of justice and promotion, protection and observance of human rights.

Within the scope of assignments, the Ministry of Homeland ensures the relationship between the executive and the administration of justice without the loss of competencies of judicial bodies. The Ministry of Homeland is based in Angola/Luanda and offers several services to the country. The services include technical support services, instrumental support services,

and direct executive services. Due to the complexity of the services, each of these services is assigned to more than one department within the Ministry. The services are broken down into more manageable tasks for each department.

The focus of the study was in the Information Technology (IT) office and the national directorate of civil and criminal identification file department. This was because they are the departments that deal with issuing the IDs and the management, maintenance, and support of the systems that are used to capture and store data for the IDs including the physical addresses. However, to give a complete overview of the Ministry, this chapter presents a brief of the main departments of the organization with more details on the departments where the actual study was conducted.

4.4 ORGANISATIONAL STRUCTURE

The organisational structure of the Ministry of Homeland consists of five main units namely; the minister and the secretaries of the state, advisory organs, technical support services, instrumental support services, and direct executive services as demonstrated in Figure 4.1.

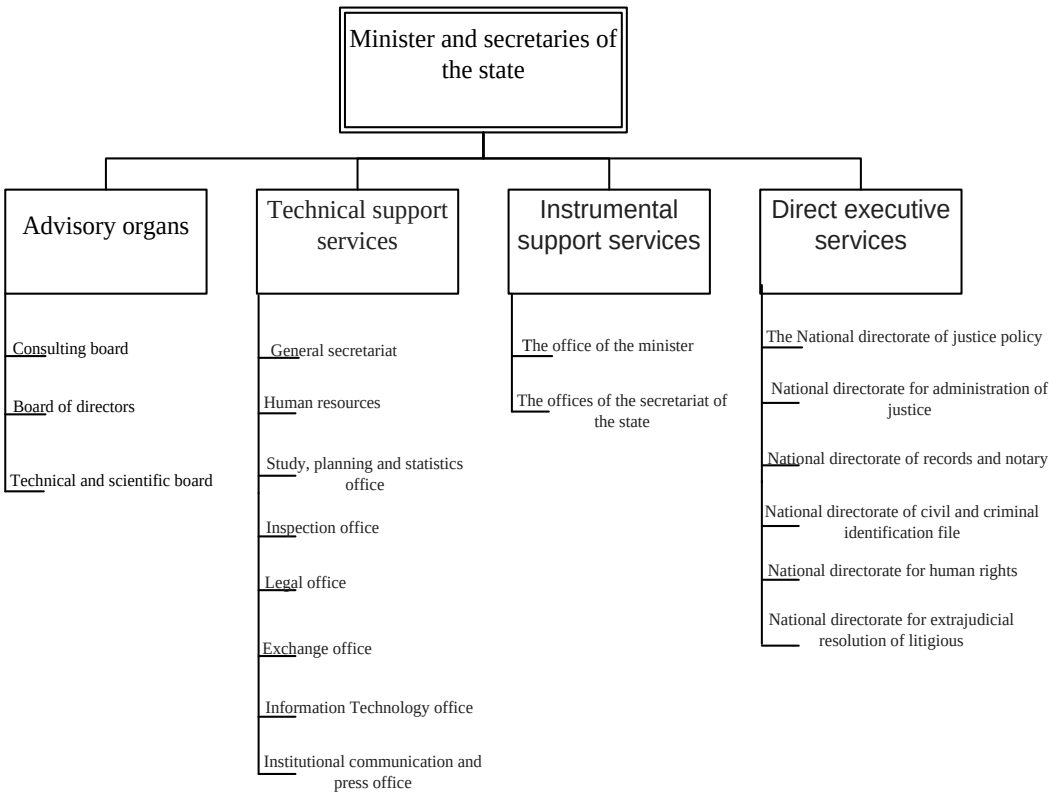

Figure 4. 1 Organisational Structure: Ministry of Homeland.

The rest of this chapter describes each department of the Ministry based on a document named “Diary of the Republic” issued by the human resource department of the Ministry. Some of the content within the document was translated (from Portuguese to English) and rephrased to best describe the organisation.

4.4.1 Minister and secretaries of the state

The Ministry of Homeland is headed by the respective minister, who coordinates all the activities and the functioning of the organs and services that are integrated into the Ministry. In the performance of his duties, the minister is assisted by the secretaries of state, to whom he delegates powers to monitor, handle and direct matters relating to the activity and operation of the services assigned to him.

4.4.2 Advisory organs

As shown in Figure 4.1, the advisory organs are divided into three main departments, the consulting board, board of directors, and the technical and scientific board.

4.4.2.1 Consulting board

The consulting board is an auxiliary organ to the minister, which is responsible to rule on the matters submitted to it. The minister is the president of the consulting board and it is composed by the state secretary, general secretary, national directors, chiefs of the departments for the central services of the Ministry, provincial delegates, chiefs of provincial departments, and other employees and entities that the minister intends to invite.

4.4.2.2 Board of directors

The board of directors is a periodic consulting organ of the Ministry. The board of directors has the responsibility of supporting the Ministry in the coordination of the activities and several services. The board is headed by the minister with the following composition; the state secretary, the general secretary, and national directors.

4.4.2.3 Technical and scientific board

The technical and scientific board is the Ministry’s technical consulting organ. This organ is responsible for supporting the Ministry in coordinating the technical and scientific activities of rights, justice, and human rights.

4.4.3 Technical support services

The technical support services are provided by the general secretariat; Human resources; Study, planning and statistics office; Inspection office; Legal office; exchange office; Information Technology office; and institutional communication and press office.

4.4.3.1 General Secretariat

The main focus of the general secretariat is on registry, monitoring and taking care of administrative issues. This department also takes care of financial and legal issues that are common to all the other services provided by the Ministry namely; (1) budget; (2) assets; (3) public relations; and (4) documentation.

4.4.3.2 Human resources

The human resources office is the support service responsible for the design and implementation of the Ministry's management policies. This is done particularly in the areas of personal development and careers, recruitment, performance appraisal, and income.

4.4.3.3 Study, planning and statistics office

The office of Study, planning, and statistics provides a technical support service of a cross-cutting nature. It is responsible for preparing policy and strategy measures for the Ministry and conducting regular studies and analyses on the general execution of services, activities, as well as guiding and coordinating statistical activities.

4.4.3.4 Inspection office

The main purpose of the inspection office is to control, inspect, monitor and evaluate the application of the plans and programs approved for the sector. The inspection office also applies the principles and norms of order and the functioning of the Ministry's activities.

4.4.3.5 Legal office

The legal office is a technical support service that is responsible for all sort of activities for the advisory services and studies in the legislative, regulatory and litigation areas.

4.4.3.6 Exchange office

The exchange office is a technical support service responsible for carrying out the tasks in the fields of international relations and external co-operation.

4.4.3.7 Information technology office

The information technology office is a support service responsible for the development of the technologies and maintenance of the information systems in order to support the activities of modernisation and innovation of the Ministry.

Some of the services provided by the information technology office include:

I. Ensure the permanence and complete adequacy of the information and telecommunication systems the management and operational needs of the agencies, services, and bodies integrated into the Ministry.
II. Ensure the management of the resources allocated to the execution of the computerisation policy in the area of justice, and procedures related to the acquisition and use of information and telecommunication equipment.
III. Manage the telecommunication network of the Ministry, guaranteeing its safety and operability, promoting the unification of methods and processes.
IV. To promote the elaboration and articulation of the strategic plan of the information systems in place, taking into account the technological evolution and the global training necessities.
V. To coordinate and issue an opinion on the preparation of investments in the field of information technology and telecommunication, agencies, departments and agencies of the Ministry. Also, monitor their execution in articulation with them.
VI. Create and maintain databases of information, and controlling the general access to the databases.
VII. Administer, monitor, update, and maintain the Ministry's databases and data-processing centers, as well as the Ministry's data centers, whenever they are not autonomously managed.
VIII. To ensure the proper functioning and handling of computer equipment and to support users in the operation, management, maintenance of computer and telecommunication systems and equipment.

4.4.3.8 Institutional communication and media office

The institutional communication and media office is the service in charge of ensuring the dissemination of the policies and actions of the ministerial department through the dissemination of specialized information.

4.4.4 Instrumental support services

The office of the minister and the offices of the secretariat of the state are the ones responsible for the instrumental support service.

4.4.4.1 The office of the minister

The office of the minister has the composition, powers, form of provision and category of personnel defined in the legislation in force.

4.4.4.2 The secretariat of the state

The secretariat of the state has the composition, powers, form of provision and category defined by law.

4.4.5 Direct executive services

The National Directorate of justice policy; National Directorate for the administration of justice; National Directorate of records and notary; National Directorate of civil and criminal identification file; National Directorate for human rights; National Directorate for extrajudicial resolution of litigious, are the departments responsible for providing the direct executive services.

4.4.5.1 National Directorate of justice policy

The primary purpose of the national directorate of justice policy is to provide technical support, prepare and monitor the policies and reforms of the justice and human rights sector. This is to be adopted by the executive and coordinate strategies for their implementation.

4.4.5.2 National Directorate for the administration of justice

The mission of the national directorate for the administration of justice is to study, provide and control the execution of the actions and means regarding the order and functioning of the judicial institutions.

4.4.5.3 National Directorate of records and notary

The national directorate of records and notary, directs, guides and coordinates the services of civil and commercial registration, registration of buildings, cars, ships, and notaries.

4.4.5.4 National Directorate of civil and criminal identification file

The national directorate of civil and criminal identification file has the task of designing, preparing, executing and monitoring policies and programs relating to civil and criminal identification services.

The national directorate of the civil and criminal identification file has the following competencies:

I. Support the national policy of justice in the formulation and implementation of policies and programs related to the civil and criminal identification and monitor the implementation of the measures resulting therefrom.
II. Issue Identity Documents and Police clearance.
III. To coordinate the order and operation of its dependent services and to carry out studies on its improvement.
IV. Organize and keep updated the central file.
V. Cooperate with similar entities in the field of civil and criminal identification.
VI. Exercise the other powers delegated to him by the minister.

As shown in Figure 4.2 the National Directorate of civil and criminal identification file is headed by the National director and is composed by the following:

I. Department of administration which consists of; (i) department and staff, (ii)technical and litigation section, and (iii) accounting, statistics ,and heritage section.
II. Department of Central Archiving and Data Verification which consists of; (i) Identity Document production center (CPBI) and (ii) section of the physical file.
III. Department of Criminal Identification that consist of; (i) Business and accounting section and (ii) Registration section and onomastic index.

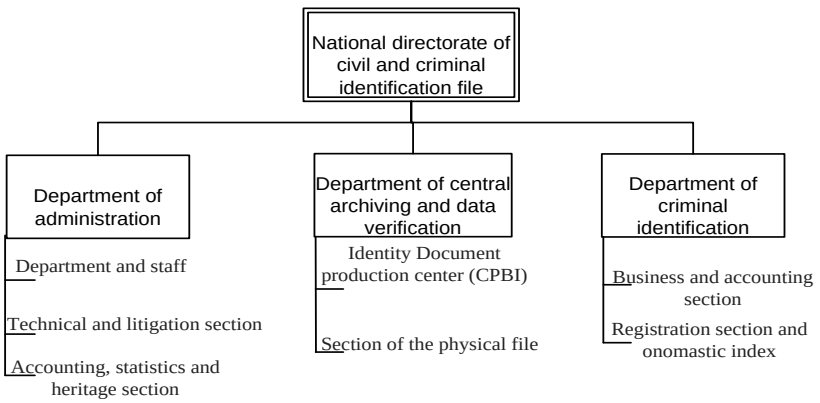

Figure 4. 2 Division of the National Directorate of civil and criminal identification file.

4.4.5.5 National Directorate for human rights

The national directorate for human rights is responsible for ensuring the observance of human rights, in accordance with the principles enshrined in the Constitution, the Universal Declaration of Human Rights, the African Charter on Human Rights and other international human rights instruments, to which Angola be part of it.

4.4.5.6 National Directorate for extrajudicial resolution of litigious

The goal of the National Directorate for extrajudicial resolution of litigious is to promote access to law by alternative means of conflict resolution.

4.5 CONCLUSION

This chapter presents an overview of the case that was selected and used for this study based on the objective of the study. Although the main focus of the study was the department of Information technology and the national directorate of civil and criminal identification file, the chapter also presents a brief of other departments of the Ministry. This was done in order to provide a general idea of the type of organisation where the fieldwork was conducted, how the work is done and how it is structured. The following chapter (Chapter 5) presents the analysis of the data collected from the case that was described in this chapter and the community of Luanda.

CHAPTER 5

DATA ANALYSIS AND RESULTS

5.1 INTRODUCTION

This chapter presents the analysis of the data through the lens of the duality of structure. The analysis was towards achieving the aim of the study which was to develop an information system framework, which can be used to address the challenges that the duplications and inaccuracy of physical addresses poses to the ID system at the Republic of Angola, the semi-structured interview was used to collect data from a governmental Ministry and the community in Luanda, Angola. The details are presented and discussed in Chapters 3 and 4. The chapter is divided into five main sections. The first section provides an introduction to the chapter. The second section presents an overview of the data analysis. The third section presents the analysis of the data as guided by the duality of structure as a lens. The results and discussion are presented in the fourth section. A conclusion about the chapter is drawn in the last section.

5.2 OVERVIEW OF DATA ANALYSIS

The Hermeneutic method was employed from the interpretive paradigm viewpoint in the data analysis. Hermeneutics is defined as “the theory or philosophy of the interpretation of meaning” (Bleicher, 2017:1). The emphasis in hermeneutics is on finding the meaning of the text within its context, considering the culture and its historical component (Galehbakhtiari, 2015). From the perspective of structuration theory, the duality of structure was used as a lens to guide the analysis of the data. As explained in Chapter 2, structuration theory is a social theory which focuses on the interaction between agents and structure within a social system (Mkhomazi & Iyamu, 2013). The main tenants of the structuration theory include agents, structure and the duality of structure as explained in Chapters 1, 2 and 3.

The duality of structure as shown in Figure 5.1 is a lens of the structuration theory, and it is mostly used in IS studies (Bernardi, 2017). This is mainly because the duality of structure enables the understanding of how Information systems or Information technology (IS/IT) enables and constrains the interaction between agents (technical/non-technical) while at the same time the agents create the IS/IT artifacts (Dennis et al., 2017).

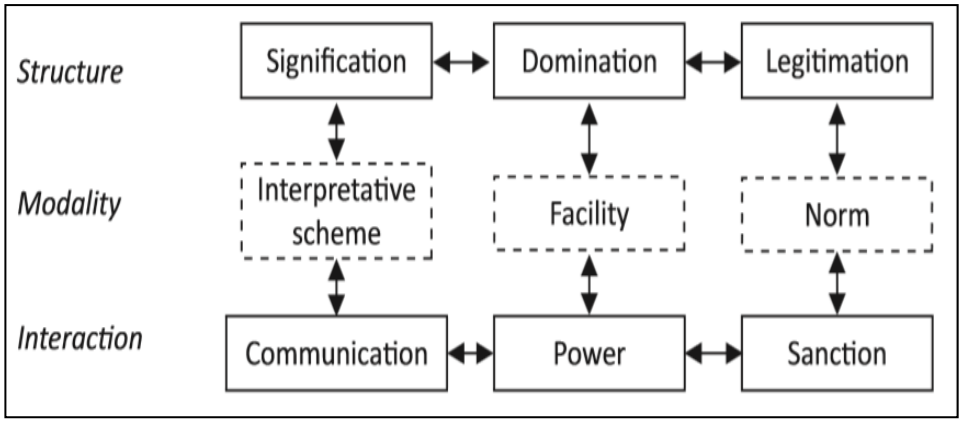

Figure 5. 1 Duality of structure (Giddens, 1984).

The duality of structure was used to guide the analysis of the data, with a primary focus on four main areas in the issuance of IDs in the country: (1) the relationship among agents; (2) the interaction that happen between agents and agencies, that is people-to-people, technology-to-technology and people-to-technology; (3) the rules, regulations and resources (such as IT systems and solution) that existed; and (4) how the rules, regulations, and resources were applied by the various agents.

The qualitative data that were collected in the study were transcribed and documented by using Microsoft Word. The document was formatted, in which page numbers and line numbers were included. This was purposely to ease referencing during data analysis. In order to protect the identity and confidentiality of the participants, the participants were assigned code names. The community members were therefore assigned code as follows: LD01 to LD08. Similarly, the participants from the case (the Ministry of Homeland) were labeled as follows: GC01 to GC08. Therefore, the citation format that was applied in the analysis is as follows: ***Participant, page number: line number***. For example, GC01, 2: 5-6, means participant number 1, page number 2 and line number 5-6.

5.3 DATA ANALYSIS: STRUCTURATION THEORY VIEW

As explained in Chapter 2 the main tenants of structuration theory (ST) are agents and structures. An agent is anything that can make a difference in a social system. They can be both technical (computers) and non-technical (people, processes and procedures) (Mkhomazi & Iyamu, 2013). In structuration theory, structure refers to the rules and resources available and used in the interaction between agents and the production of social systems (Gao & Hua Li, 2010).

Agents (Agency)

Structuration theory focuses on agents. At the organisation (Ministry of Homeland), there were technical and non-technical agents. The technical agents included software, printers, personal

computers, storage, cameras, digital signature device, and fingerprint device. The non-technical agents consisted of human (such as citizens, document analysts, system operators, process supervisors, and IT technicians), processes, documentation, and policies. These agents were at one stage or another involved in the issuance of national identity document (IDs) to citizens.

Structure

Structure is defined as rules and resource in ST (Giddens, 1984). At the Ministry of Homeland, structure existed and was used to enable and support the issuance of IDs to citizens. Some of the rules and policies were the codes of civil registration. These rules were part of laws that govern the issuance of IDs in the country. Some of the resources that were used in the issuance of IDs include people, computer systems (software and hardware), printers, personal computers, cameras, digital signature device, and fingerprint device. According to one of the IT technicians:

> "*The ID is also issued under the codes of civil registration in which the government mostly works with citizen's declarations rather than documentation proof*" (GC03, 2: 59-60).

Agents make use of available resources in order to provide IDs to the citizens. This was done through interactions between agent-to-agent, agent-to-resource, and resource-to-resource. The interactions are enabled and facilitated by the relationship between the entities in the issuance of IDs to the citizens.

5.3.1 Duality of structure

The duality of structure focuses on the dual relationship between agents and structure (Giddens, 1984). This means that agents' actions are based on available structure, which they use to enable and at the same time can constrain activities (Bracker, Schuhknecht & Altmeppen, 2017). As shown in Figure 5.1, the duality of structure consists of three dimensions, namely: Structure, modality, and interaction. Structure consists of Signification, domination, and legitimation. The Modalities consist of interpretative scheme, facility, and norm. Lastly, interaction consists of communication, power, and sanction.

In the use of the duality of structure, as shown in Figure 5.1, to guide the analysis of data in this study, the structure, modality, and interaction were followed accordingly. This means that the arrows in the figure were followed vertically: Signification/ Interpretative scheme/ Communication; Domination/ Facility/ Power; and Legitimation/ Norm/ Sanction.

Table 5. 1 Issuance of Identity document: structuration view.

Signification	Domination	Legitimation
To both, the government and citizens of Angola, identity document (ID) was very important. However, the significance was for various reasons and from different perspectives. Also, information systems and technologies (IS/IT) were considered significant for its critical role in enabling and supporting the production and reproduction of the IDs.	On one hand, the ID was a dominant factor in the relationship that exists between the government and the citizens. This was mainly because the government has made the ID to be the main source of information for service delivery in the country. On another hand, the ID, to a certain degree, defines the relationship between an ID holder and the social system.	Based on the government's bill of rights, every citizen has the right to have an ID. The government also defined criteria for citizens' application for an ID. This includes ownership of an ID and age limit for applicants.
Interpretative scheme	**Facility**	**Norm**
The significance of the ID to the citizens was based on their interest, which was informed and influenced by their understanding from the individual interpretation of the need or usefulness. The government interpretation was guided by political needs rather the citizens' interest.	In order to issue an ID to a citizen, the Ministry of homeland makes use of resources such as people, technologies and processes, within rules and regulations. People were both the employees of the Ministry of Homeland and the citizens. The technology includes software and other devices such as personal computers and printers.	The ID issuance processes were carried out based on rules and regulations prescribed by the Angolan government. Even though most citizens were aware that the addresses on their IDs were not correct or accurate, they accepted it.
Communication	**Power**	**Sanction**
In the application and issuance of IDs, interaction happens at various levels, and between different agents or social systems, such as the Ministry of Homeland, community members, and individuals. The interaction was done through formal and informal by using written document and verbal expressions in Portuguese to individuals and groups during communication	The government mandates the Ministry of Homeland to issue ID to citizens in accordance with the Angolan codes of civil identification (CCI), which are rules and regulations to guide the civil registration of citizens. The citizens and government representatives had the capacity to define and redefine the role of the structure by realizing, or unconscious that it can constrain and enable the process of issuing IDs.	Issuing of an ID involved many activities and processes, as promulgated by the government, for the Ministry of Homeland. Based on fulfillment of the requirements, the Ministry of homeland approves of applications for ID. Although the physical address was a key requirement, no proof of address was required for the application. Mainly because there was no mechanism to authenticate the addresses.

Signification/Interpretative scheme/Communication

In structuration theory, signification simply means importance. Agents subjectively consider an event, behavior or activity to be important in a social system, through the interpretative schemes (Kaewkitipong, Chen & Ractham, 2016). Interpretive schemes are the stock of knowledge that the agents conscious or unconsciously possess (Giddens, 1984). Through the interpretative schemes, meaningful communication is carried out between agents in a social system (Iyamu, 2013).

Both citizens and the government unreservedly considered ID to be of critical importance in the country. What was even more important is the correctness of physical address on the IDs. Thus, it was within the law of the country to have the physical address printed on IDs. As a result, individuals are expected to provide the address of their place of residence to government (Ministry of Homeland) representatives as part of requirements and prerequisite for approval and issuance of IDs. Also, citizens were expected to inform the government authority, Ministry of Homeland whenever, they change the place of residence. This was to ensure that a new ID was issued and the system ID updated. According to one of the IT technicians:

> "*The Angolan law demands that residential physical address must be printed in the ID of every citizen*" (GC03, 2: 57).

The Angolan government's main source of information about citizens was as stated in the ID. This makes it critically important for physical addresses to be correctly and accurately printed on individuals' IDs. This helps to identify, trace, and locate each individuals' place of residence, for various purposes, such as the provision of services and participation in election processes. These purposes make the printing of physical address on ID to be considered critical and important to both citizens and the government. One of the chief engineers who participated in the study briefly explained:

> "*The government primary means of locating the citizens is through the physical addresses that are on the system and printed on the ID*" (GC02, 1:35-36).

The correctness and accuracy of physical address were also important, from the perspectives of control and management of citizens during elections. In the Angolan context, the government assigns locations for each citizen, which eligibly enables them to participate in the election voting process. This was to ensure that the citizens were not deprived of their right to partake in the democratic process. The allocation of locations was done based on the physical addresses as printed on the ID of each citizen. This was to ensure that citizens were assigned to voting locations that were close to the places where they reside. The government's goal was to enable every citizen to participate in the election voting process on the same day. As stated by one of the chief engineers:

> *"During the election, the government assigns places for each citizen to vote. This is done so that each citizen can vote close to their homes.*

> *Therefore, for a citizen to vote, they need to have a correct physical address printed on their ID* (GC02, 1: 13-15).

In addition, the correctness and accuracy of the physical addresses of the citizens that were printed in the IDs facilitated some of the services which the government provides to the country. The services include basic necessities such as healthcare, water, and electricity. The facilitation was essential mainly because the Angolan government provides resources to the administrations of various locations (city, town, village or neighborhood) based on the number of people living in a particular vicinity or zone. Therefore, if the physical addresses were correct and accurate, the government would be sure of how many people live in a certain location.

Thus, providing only the necessary resources for each location based on the number of people that reside there. As a result, the government would have more control and management of the resources (such as money) that is allocated to each administration in the different locations. This was also intended to reduce waste (or surplus) and theft within the public administrations. More importantly, every citizen would benefit from the services provided to their area of residence, which implies inclusiveness in the activities of the government. A system operator expressed his view as follows:

> *"I believe, if there was an accurate database of people living in a* neighborhood *it would be easier to know how many people live in that* neighborhood. As a result, the government would know exactly *how much electricity that must be provided for the number of people living there, how much water is needed for that amount of people or how many sewers is enough for that amount of people*" (GC07, 20: 850-853).

The need and objective to print the correct physical address on the citizen's ID were communicated by the government and its representatives to the citizens. However, the communication was obscured, and somehow indirect. The communication was considered obscured primarily because many of the citizens were not aware of the need to print physical addresses on ID at the initial stage. The objective to have the physical address printed in ID was only communicated as requirements for an ID. The indirect communication from the government was reproduced through different views and actions in understanding and accepting the importance of physical addresses being printed on the ID. This was because it affected the way some of the citizens interpreted the significance of having the physical address printed in ID. According to one of the community members:

> "*The first time that I applied for and received an ID, I saw that it had my physical address in it. This made me conclude that the physical address is printed on my ID because the government wanted to know where I live*" (LD01, 1:14-15).

The objective of the Angolan government was to make the application for an ID as simple as possible for each citizen. Therefore, in order to avoid complexities in the application for ID, the physical address section was obscured. Mainly because direct communication about the importance of the physical address would involve proof of address as one of the documents required to apply for an ID. This would involve a lot of financial expenses and a longer process. As a result, many citizens would not be able to apply for an ID. Hence, the government's fear was that citizens would not apply for ID because of the long list of requirements.

The proof of address, in particular, would be the most difficult document to obtain in the process. This was because the majority of the population doesn't own a house and a large part of the city was not yet urbanized. This means that there were no street names and house numbers in some areas. Also, the public administrations responsible to proof the citizen's physical address was not well equipped. For example, there were no automated systems (information systems), which could be used to validate the correctness of the physical addresses and other resources including people and money. An IT consultant stated:

> "*The public administrations are not yet well technologically equipped to provide proof of address and to validate the correctness of those physical addresses that the citizens provide to us*" (GC03, 2:73-75).

Citizens interpreted the government's objective to have the physical address printed in their IDs differently. Interpretation of some of the citizens was based on their personal experience with the objective. Others wondered why such an objective because they felt and thought that the government doesn't really make use of the physical address, whether printed or not printed in their IDs. This assertion was based on the fact that whenever a citizen moved from one residence to another, there were no instructions from the government entities about how the citizen can update the physical address and why.

Also, there was no explicit repercussion for citizens who provided a wrong physical address. In addition, there was no implication for those individuals who did not provide detail to update their information (change of address) on the government system. Thus, some of the community members were not sure how serious the government was towards achieving the objective. This influence their interpretation on whether to consider the objective significant or not.

Another factor that influenced many citizens' views was that the public administrations of each neighborhood were not technologically equipped. As a result, the office bearers were not capable of updating the citizen's physical address on the system. As a result, some citizens didn't even bother to provide detail information which could be used to update the physical address on their ID after moving to another residence. However, even though some citizens were not penalised for not updating their records, or having an incorrect physical address, they were also constrained from performing many activities in the country, such as banking and applying for a job. Those who did not consider the need to update the information in profile had reasons for doing so. As stated by one of the community members:

> "*I have recently moved from one residence to another and there was no follow up from the government to update my physical address. This means that there is no monitoring of this work, or of this data. Therefore, I think the government doesn't use the physical addresses that are printed on our IDs*" (LD03, 7: 296-299).

Despite the lack of direct communication, some citizens considered the correctness and accuracy of the physical address to be very important. This was often based on an individual's knowledge and understanding of government objective. Some citizens understood the importance of the physical address, the correctness of it, from the moment the government demanded that it should be printed on the ID. Many of the citizens understood the importance only after they were confronted with many challenges, which included; exclusion from public services such as security, water, and electricity; application to school or university for admission. Some of the citizens could not open a bank account or apply for a bank loan. The reproductive native of the challenges manifested themselves and had effects on such citizens' economic activities and status. For example, the inability of many citizens to open a bank account or access financial assistant from the financial institutions contribute to poverty in the country.

Another important implication was that some of the citizens could not apply for documents such as marriage certificate, passport, and household certificate. These had cultural, moral and economic consequences: (1) Married but without marriage certificate was culturally; (2) citizens without passport were limited to and deprived of many activities, such as international travel, and authentic identification; and (3) some people could not guarantee their household property because there was no certificate for them, which made the properties vulnerable to theft and damages.

In terms of employment, many agencies and companies prefer to employ people that live closer to the company premises. Even if the citizen lives closer to the company he/she might end up losing the job opportunity because the physical address on the ID is incorrect. As explained by a community member:

> "*For security reasons, some companies only recruit people that live close to the company. However, even if I live close to the company if my physical address on the ID is incorrect, I will end up not being selected among the candidates*" (LD02, 4:156-158).

Although some of the citizens considered the physical address to be important, most of them still couldn't provide information that could be used to update it. This was because of the long and expensive process that they have to go through in order to update their physical addresses. As a result, the only opportunity to easily update the physical address was if the ID was expired. In Angola, the citizen's ID expires after 5 years. Meaning that during the period of five years the government has no easy way to update and validate the citizen's physical address. As a result, both the government and the citizens would have to go through many challenges until the ID expires. According to a community member:

> "*There is always a need to update the physical address. This is because many people change residences every year. Therefore, waiting for 5 years in order to update the physical address is too long and risky"* (LD01, 3:119-121).

Domination/Facility/Power

In structuration theory, domination means that a technical or non-technical agent can express itself above others, thereby enable or constrain events or activities within its social structure (Parvez, 2006). Agents dominate through the use of facilities, from the perspective of the duality of structure. Facilities are the resources that are used to produce and reproduce actions (Kaewkitipong, Chen & Ractham, 2016). Facilities are also considered the source of power.

Power is the ability to make a difference in a social system by agents (Omar, Weerakkody & Sivarajah, 2017).

In Angola, ID was a dominant factor in a social relationship between the government and citizens. Thus, on one hand, the government required all citizens to have an ID for various reasons, such as: (1) the government wanted to be able to trace, and easily link individuals to activities; (2) to understand the distribution of residences; and (3) allocate resources for services delivery. Therefore, the Angolan government demands that everyone from 6 years old was eligible for an ID. On another hand, citizens understood and felt that without a national ID, access to facilities and amenities such as monetary credit facility, government services, verification for job opportunities, and travels were limited or impossible.

As mentioned several times in this thesis, the key attributes that are printed on the ID of Angolans are full names and physical address of where the holder resides. In addition to the rationale stated above, these attributes are influenced by other four main factors: (1) government policy that requires all citizens to have ID; (2) the processes that are required in the application and issuance of the ID to citizens; (3) the IS/IT solutions that are used to store and manage individuals records, which include databases and other technologies; and (4) people, formulate and interpret the policies, rules and processes in the application and issuance of ID to the citizens.

The issuance of ID in Angola was gazetted under the codes of civil registration (CCR). Within the CCR, the government works more with citizen's verbal declarations and oral representation rather than written or proof of formal documentation. However, the government was strict on some information, as such, requires certification of the document. These types of information include names, date of birth, and place of birth. The following documentation, birth certificate, and parents IDs are required for those applying for ID for the first time.

The Angolan government and its agencies including private institutions and non-governmental organisations require ID as the primary authentic source of information about the citizens. However, not all the information specifically the physical address printed on the ID were always correct and accurate. This can be attributed to the fact that the government did not require a proof address for the issuance of the ID. Also, there was a lack of resources such as information systems that could be used to validate the physical address that is verbally provided by the citizens. As a result, the majority of the citizens have the incorrect physical address printed on their IDs. Consequently, government service delivery becomes more difficult and complex for reasons, they are not able to balance or appropriately allocate resources to various locations. According to an IT consultant who participated in the study:

> *"Proof of address is not part of the requirements for ID application. The goal of the government is to facilitate the citizen's application for ID or the legalization of any document as quickly as possible. Also getting a proof of address involves a lot of financial costs and the process very long*" (GC03, 2:81-84).

The issuance of ID involved, people's actions, processes, rules, and technologies. Some of the people involved included both the employees of the Ministry of Homeland such as document analysts, system operators, process supervisors, and IT technicians and the citizen who applies for ID. The technologies included computers, fingerprint machine, cameras, printing machines and software (applications and databases).

The process of applying and obtaining an ID in Angola include seven main steps: (1) the applicants (citizens) interact directly with the system's (application) operators by triggering a request for an application; (2) personal information and proof of documentation are requested and provided. The interaction is part of the process of submitting application for ID; (3) the submitted documents are analysed by the analysts; and (4) the system's operators stores the information in a database through a user interface; (5) the information is sent to the printing centres where it is verified and printed; (6) the IDs are then sent to the identification centres; (7) finally the citizen collects the ID. The information stored in the database often include full name, date of birth, parents detail, the place of birth and the physical address. However, there was always many incorrect and inaccurate physical addresses stored in the system and printed on the ID.

One of the main reasons for this inconsistency was that the physical addresses are produced by the Ministry of Territorial Planning. Thus, the Ministry of Homeland get the street names and subdivision of the city from the Ministry of Territorial Planning. However, the database in the Ministry of Homeland is hardly updated whenever there are new urbanizations or when an old area is finally urbanized. Consequently, some of the employees would take any physical address that the citizen would verbally provide. Some of the physical addresses that the citizen provided were unknown by the government. Mainly because the city of Luanda is not yet completely urbanized and yet the government requires a physical address as one of the requirements for an ID. Therefore, the citizens themselves named the streets based on points of references or after the oldest person in the neighbourhood. However, due to the outdated database, there were no ways that a system operator could distinguish between the names created by the citizens and the ones provided by the government. A system operator expressed her opinion as followed:

> *"There are some colleagues that accept without an attempt to verify, any physical address that the citizen provide. Some of the physical addresses are forged by the citizens, unfortunately, accepted by the government representatives. The incorrect addresses are stored in the system, and printed on the ID. I think this is wrong and inappropriate practice" (*GC08, 22: 966-968).

Also, the information systems didn't have the functionality to validate the various information that the system operator captured in the database. There were numerous factors to this challenge of inappropriate practice. Firstly, this was because the system (software) was not programmed to perform such functionality, to validate the correctness of individual's addresses. Secondly, this was also because databases that were used by the Ministry of Territorial Planning to store and manage citizens' record were obsolete. As a result, a lot of incorrect and inaccurate physical addresses of individuals were stored in the databases. Consequently, location and tracking of citizens for emergency services, security, and other services became even more complex. Some banking institutions lost trust on the information printed on the ID. They began to send the citizens back to the Ministry of Homeland to change the physical address before they could be assisted or granted the permission to perform transactions. This was because they had suspected that most physical addresses were not legitimate, but were falsified by the citizens themselves. According to a system operator:

> "*Bank BAI is now sending people back to us to change their physical address on the ID. This is happening because some colleagues will write even the street names created by the citizens*" (GC08, 26: 1139-1141).

Nonetheless, there was a process of verification which was managed by the Process Supervisors. Before printing the information on the ID, the system operator sends the information to the printing centers of the Ministry of Homeland. At that point, the information is automatically verified before it is printed. If there is anything wrong with the information the process goes pending until it is fixed. However, the current system can only check for spelling mistakes and empty rows. The system doesn't validate the information against any other database or documentary proof. As a result, incorrect and inaccurate physical addresses continue to be printed in the citizen's ID.

Legitimation/Norm/Sanction

In structuration theory, legitimation is defined as legal entities within a social system (Moore, 2013). Norm is the way in which agents consistently and persistently carry out activities in a

conscious or unconscious manner (Giddens, 1984). The norm can result from what has been legitimized or sanctioned within the system. Sanction refers to an activity or event that has been approved by agents irrespectively of being right or wrong (Kaewkitipong et al., 2016).

Like in many other countries, it was the right of every citizen in Angola to have an ID, as prescribed by the government bill of right in the constitution. The bill defines the criteria, which include age limit and ownership. The age limit for an ID is six years, which means that any citizen that is above that can have an ID. Ownership means that no citizen shall obtain or hold more than one IDs at a time.

Fundamentally, there is four main legal guidance to the ID: (1) there are features that must appear on the ID. This include physical address of the bearer; and (2) the processes that are followed in applying and obtaining the ID; (3) Only one physical address can be printed on the ID and it should be the correct one; (4) The ID can only be issued by the Ministry of Homeland, following the rules and regulations that are promulgated by the government. These rules dictate and stipulate seven main attributes as follows: (1) how the information such as names, date of birth and physical address should be collected; (2) What documents are required, such as birth certificate and both parents ID; (3) In what condition the document should be, for example, the documents must be well presented in its original form, it must contain all the stamps required; (4) Where the documents should come from, which includes the conservatories and the identification centres;(5) Who qualifies for an ID, in terms of age limit and citizenship; (6) Where the ID should be printed; and (7) How the ID should be collected, whether by applicant or on behalf of the applicant. Unfortunately, there was no automated system that can be used to process and validate these activities at the time of this study. This enables the manipulations of some of the activities by citizens and some government officials or representatives.

Some of the primary rationales for printing individual's physical address on the ID was to ease location and tracking of citizens for service delivery. That is why the government has demanded that the correct physical address is printed on the ID. However, the government has made the correctness of the physical address sole responsibility of the citizen. This was mainly because the government prescribed that proof of address is not required as part of criteria, from the citizens. Such action by the government allows citizens to, not provide, or provide inaccurate and incorrect physical addresses that are printed on their IDs. Consequently, government service delivery becomes more difficult and complex. This means that the government has unintendedly created an action that in ardently affects its service delivery. According to an IT consultant, who was indifferent about the situation:

> *"Based on the law, proof of address is not part of the requirements for ID application*" (GC03, 2:81).

Government's decision to wave proof of address as a criterion for ID application was based on three arguable factors that can hinder citizens from applying for an ID. The factors are (1) Many citizens do not own a house, therefore they cannot authentically proof their places of residence; (2) The public administrations responsible for providing proof of addresses, are not well equipped from both technical (availability of information systems) and non-technical (such as training) perspective; and (3) The major parts of the country are under development and many locations are not yet urbanized, and cannot properly document in an automated system. As a result, the process to obtain a proof of address from the public administrations is very long and expensive. This would affect the government's objective of facilitating the application of ID so that every citizen is able to have an ID and participate in a democratic process such as the election. However, in an effort to achieve one objective, the government's decision constraints the service delivery and citizens activities. In structuration theory, this is the type of situation is describes as a reproduction of action, which enable and at the same constraint (Giddens, 1984). An IT consultant stated that:

> *"The goal of the government is to facilitate the citizen's application for ID or the legalization of any document as quickly as possible*" (GC03, 2:82-83).

However, a system operator expressed her view as follows:

> *"I think we shouldn't insert any physical address in the database without proof of address and all the houses should be numbered. However, here in our country, it is difficult to locate the citizen or even a criminal because of the incorrect information that we store in our databases. Citizens can easily give us the wrong physical address and we have nothing to prove whether they are right or wrong because it is only by word of mouth"* (GC08, 27: 1180-185).

Even though many of the government officials including some citizens did not agree with the waver for proof of address, they had to abide by the government guideline. This makes the opposing view powerless. Despite their concern about the security of the country and government service delivery, there was nothing the opposing view could do change the law. Also, the government sanctioned the waver not because they believe that it is a correct decision, but because of its agenda. The government's agenda was that all citizens had to have an ID irrespectively of their social, academic and economic status. In achieving the objective, the government tried to put the application of ID at the lowest possible level to make

it possible for every citizen to have an ID. This was done, by cutting the maximum costs and requirements including the exclusion of proof of address as a requirement. Which the government believed to be the main factor that could possibly stop them from achieving their objectives.

Having the incorrect physical address printed on an ID limits a citizen from both public and private services. Without the correct physical address on the ID, citizens are unable to participate in public and private context for employment within their area of residence. Also, it is difficult for a citizen to get assistance or service from institutions such as the banks, if the physical address that is printed on the ID does not conform to the information the bank has on its system about the individual or client. As well as applying for a passport, household and marriage certificate. This is because, in order to have either one of those documents, citizens need to have a proof of address. However, when the physical address on the ID is incorrect, it becomes even more difficult to get a proof of address. A community member shared his experience as follows:

> *"It was difficult to get a marriage certificate because you need a proof of address for this effect. It was challenging to get a proof of address because one of the requirements is that the physical address on my ID has to be the correct one. In my case, the physical address was incorrect, so I was saying one thing while my ID was saying something else and that was a problem"* (LD03, 9: 360-363).

Another reason why waver of the proof address was justifiable, even though it has a huge negative consequence for both the government and citizen, was the difficulty of obtaining the documentation. In Angola, on one hand, citizens can only apply for an ID every five years, which was the rule. On another hand, rental lease period, which most people rely on to get proof of residence was often range from six months to two years period. However, a large number of the population of the Angolans live in rented rather than owned property. The lease agreement period is therefore not compatible or in alignment with the valid time of five years, for an ID. This means that within five years, a citizen may move from one residence to another more than once. The main challenge is that most of the citizens do not bother to inform the government about their change of addresses. This was because such action was sanctioned, which they reproduced each time they changed addressed. Also, this was because there was no easy way to provide an update about the physical address on the system unless the ID expires. As a result, the majority of the population have the wrong physical addresses printed on the ID. A community member explains as follows:

> "*My ID will probably expire next year. However, since last year I have moved from one residence to another and the physical address on my ID is of the previous residence. If anyone or the government wants to locate me for some reason, they will use the physical address on my ID but they won't find me because I am no longer living there"* (LD01, 1: 29-32).

The change was not only about providing proof of address, but it is also about providing proof of changing address. In an event where a citizen decides to provide an updated about his/her physical address, the citizen has to also provide a document or demonstrate that he/she does no longer reside in the previous property. This is a process that involves getting letters from the responsible authorities of both the previous and current residences. Only thereafter, the public administrations can provide a proof of address to the individual, based on those letters. However, even the information that the administrations provide cannot be fully trusted. This is because, within these administrations, there are no information systems capable of validating the physical addresses. There is also a lack of skilled people to perform this kind of activities. According to an IT consultant:

> "*The public administrations are not yet well technologically equipped to provide proof of address and to validate the correctness of those physical addresses that the citizens provide to us*" (GC03, 2:73-75).

Despite all the implications and challenges for both government and citizens, the Angolan government has sanctioned that every citizen can apply without providing proof of address, which has become the norm for many years. This gives the citizens license to do things their own ways including changing residences many times without updating the physical address on the ID. This sanctioned norm also provides an easy way for citizens that has intentions to carry out actions against legal activities and law enforcement, to provide a wrong physical address. As a result, both the citizen's ID and the database of the Ministry of Homeland becomes unreliable for government service delivery. Therefore, the government's action enables every citizen to get an ID easily but at the same time constraints service delivery and compromises the security of the country.

In addition, the government has sanctioned the Ministry of Homeland to receive any physical address from the citizen. As a result, citizens can easily get an ID without going through the process of obtaining a proof of address. This cuts down the cost of applying for an ID, the time is taken, and the process. However, because of this, many citizens end up with wrong physical addresses printed on the ID. This hinders the citizens from benefiting from the services provided by the government.

5.4 RESULTS AND DISCUSSION

This section presents and discusses the findings from the data analysis which was carried out by using the duality of structure as a lens. The findings are the critical factors, which constrains and at the same time enables the efficiency and deficiencies in the current system that is used to issue ID in Angola. The factors are seven, and they are of both technical and non-technical in nature. As shown in Figure 5.2, the seven factors are as follows: (1) Validation of requirements; (2) Automated regulation; (3) Effect of urbanization; (4) Authenticity of proof of address; (5) Human interaction; (6) System interaction; (7) System verification. The factors are interrelated and interconnected as shown in Figure 5.2. The figure should be read with the discussion that follows, to gain a better understanding of the significance of the factors to the current system.

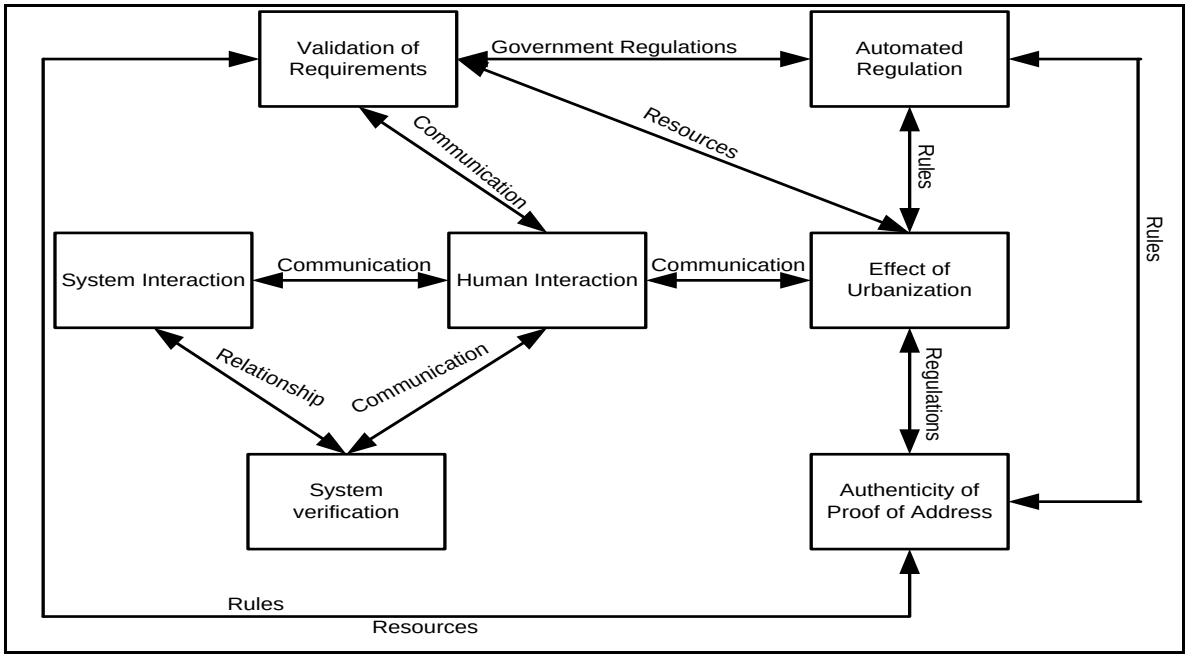

Figure 5. 2 Factors influencing the current system

Once the results (findings) was reached, a careful examination was conducted in order to draw a relationship between the factors. This was done in order to provide a clear understanding of how the factors relate to each other, how they influence each other, and the implications of their influences. Thus, Figure 5.2 was drawn as a result of the relationship between the seven factors.

5.4.1 Validation of Requirements

The requirements for the issuance of ID were formulated and promulgated in alignment with the constitution of the country. This means that each application for ID is validated against the requirements, as revealed by the empirical evidence. The process of validation was done

through their main means: (1) communication with other agents; (2) within rules and regulations; and (3) by using available resources.

The government communicates the requirements to the agency (Ministry of Homeland) responsible for issuing of ID to citizens, for implementation purposes. The communication was done through the government channel in the form of the Gazette. On behalf of the Ministry of Homeland, the Directors and Managers carry out the implementation. The directors then communicate the requirements to the managers of the National Directorate of Civil and Criminal Identification File, which is the department responsible for issuing ID as explained in Chapter4. As revealed from the analysis, the communication was often verbal at the manager's level, As a result, compliance was influenced by the subjective interpretation of the requirements. This makes consistency difficult in the process of validating the requirements against the application in the issuance of ID to citizens.

Owing to the lack of automated procedure within the government, government officials use their individual's subjective reasoning to interpret the requirements in the process of issuing ID to applicants. This includes how the officials understood the rules and regulations pertaining to the issuance of ID. For example, the regulations require citizens to provide a legitimate and certified physical address, which must come from the Ministry of Territorial Planning. However, due to the lack of validation, many system operators did not comply with this regulation. As a result, there was no consistency in the process of validating application against requirements. Thus, it became a common thing, that some system operators would insert in the database any physical address that the citizen would give them irrespective of being right or wrong, legitimate or falsified. This challenge can also be attributed to slow or lack of urbanisation of many of the areas in the country. As consequence, there were a lot of incorrect and fake physical addresses stored in the database. This makes it even more difficult for government service delivery in terms of tracing and locating citizens.

5.4.2 Automated regulations

In the context of this study, automated regulations refer to a computerised (an information system) system. The system is to ensure that the government regulations are complied with in the process of issuing IDs to applicants. This means that the system automatically detects and verifies whether the officials comply with the regulations before an ID is finally printed. The system should be able to check if the information that was captured was correct or not. If it is wrong then, the system operator shouldn't be able to move to the next step.

One of the regulations in issuing an ID is that every physical address captured in the database should be the correct, and legitimate in terms of urbanisation rules of the country. The

automation process should, therefore, compare the government officials (system operators) to comply with the regulations. This helps to minimise incorrect, incomplete and fake physical addresses in the database, as well the information that is printed on the individual's ID.

Currently, the information system within the Ministry of Homeland is not programmed to perform automated regulation. As a result, citizens can easily provide the wrong physical address. Also, the system operators have no easy way to check whether the physical address is legitimate or fake. Even though it is against the regulations, some system operators write the incomplete physical address in the database. This is because the current system only stops the system operator from moving to the next step if there is an empty field. However, some system operators have found a way around it or to manipulate the system. They have created an acronym "S/N" which means house without number. Whenever a citizen provides incomplete physical address the system operator capture "SN", and the system allows processing to the next stage, towards issuing an ID. Thus, the compliance with the regulations was dependent on human interpretation. Therefore, lack of automated regulation contributed to the inconsistency and incorrectness of physical address in the database and printed on individual's ID. Consequently, the government's objective is not met, service delivery continues to be difficult. Also, citizen's activities such as banking and traveling are limited due to the incorrect physical addresses printed on the ID.

5.4.3 Effect of urbanization

In the context of this study, urbanization refers to the structuring and naming of streets and house numbering. The government agency responsible for the urbanization in Angola is the Ministry of Territorial Planning. Thus, the Ministry of Territorial planning creates the physical addresses and the Ministry of homeland records the physical address of each citizen. These physical addresses are then printed on the individual's ID. However, there is little or no interaction between these two Ministries. Also, a large part of the country is not yet urbanized which has a negative effect on the correctness and consistency of physical addresses in the government database in which individual's information is stored, and used for ID.

Due to the low or slow state of urbanization in the country, the government is challenged and lost control in the areas of efficient service delivery, track and trace of the individual, and managing accuracy of information in issuing ID to citizens. Some of the consequences are that the government is unable to stop citizens from naming their own streets although it is an illegal act. Urbanization of the country is the government's responsibility, but when the State fails, the citizens begin to create their own physical addresses due to the need for identification. As, a result, government service delivery becomes more difficult and the citizens themselves are affected. However, unless the government employs an information system to

address urbanization, the challenges can only increase to an uncontrollable state. Consequently, the problem of inconsistency, incorrectness and illegitimate physical address in the database and on individual's ID will remain.

Another problem in urbanization is the lack of interaction between the Ministry of Territorial Planning and the Ministry of Homeland. As a result, the Ministry of Homeland hardly updates the database whenever a new area is urbanized. Consequently, there is no easy way to check whether the physical address provided by the citizen exists or not in the government's database. A system can be employed to enable interactions between both Ministries in order to mitigate this problem. Whenever an area is urbanized the Ministry of territorial planning should interact with the Ministry of Homeland to maintain the database up-to-date. This would facilitate the Ministry of Homeland in validating the physical address provided by the citizen against the Ministry of Territorial Planning database.

5.4.4 Authenticity of proof of address

The proof of address is a legitimate document, which Giddens (1984) describes in structuration theory as resources of authority, from formal organisations, produced and reproduced over a period of time and space. As things stand, there is no system or approach to confirm claim proof of address by citizens. In order to provide such document, the legal entities make use of many resources such as technology and people. The technologies include computer systems that can be used to validate citizen's physical addresses against the government's database in order to authenticate the document.

A proof of address is a key element in reducing the inconsistencies and incorrectness of physical address in the Ministry of Homeland database. By requesting a proof of address as a requirement for ID application, the possibility of printing an illegitimate and incorrect physical address can be reduced. However, despite the importance of having the correct physical address captured on the database and printed on individuals ID, proof of address was not one of the requirements for ID application. Instead, the Angolan government decided that citizens could provide the physical addresses without any documentation to prove. This was due to the time and costs involved in obtaining a proof of address. Thus, the government's decision was based on the objective to facilitate the application of ID so that citizens from different social and economic background were able to apply for an ID. This facilitated the application of ID but it also resulted in many inconsistencies and incorrectness in the database which constraints the government's service delivery.

One of the reasons why the process to obtain a proof of address is very long and expensive, is the lack of resources (people and technology). The public administrations responsible to provide proof of addresses are not technologically equipped. Thus, the proof of addresses that they provided was not always trustworthy. Therefore, in order to reduce the time and costs involved in obtaining a proof of address, there is a need for technological advancement in this area. Also, it is essential to train personnel to ensure skill transfer, to improve quality of service delivery.

5.4.5 Human interaction

Human interaction is the relationship or communication that happens between two or more individuals to achieve a common objective. The communication can be done verbally through the means of various technologies or physical presence. In order to successfully achieve an objective between two entities or individuals, there is a need for a recurrent interaction. In structuration, routine interactions become institutionalized in a social system, as a result, become the norm as well as the culture in the environment (Giddens, 1984).

One of the government's objectives was that the correct physical address is stored in the regularly updated database, which is accessed by the relevant authority, in printing individuals' ID. Government's intention was to have the physical address on the ID, as the main source of information about an individual's location. As mentioned many times in this chapter, the government agency responsible for ID issuance (Ministry of Homeland) only records the physical addresses from the citizens. The Ministry of Territorial plan is the Ministry responsible to produce the physical addresses. However, there was no interaction between both ministries with regards to validation of physical addresses printed on the ID. As a result, it became difficult for the Ministry of Homeland to validate the physical addresses in order to ensure that every physical address captured in the database and printed on the ID are the correct ones.

Therefore, the interaction between the two ministries is critical to facilitate the government in achieving its objectives. The interaction should be between the directors of both Ministries for better management of the physical addresses, validation of requirements and urbanization. In this way, both Ministries can be aware of the processes in each Ministry in terms of physical addresses. This can also facilitate the validation and verification of the physical addresses that are provided by the citizens during the application of ID. As a result, the inconsistencies and incorrectness of physical addresses captured in the database and printed on individuals ID can be reduced.

5.4.6 System interaction

In structuration terms, interaction is the agent's activity within a social system (Jones & Karsten, 2008), which can be understood and routinized, produced and reproduced over a period of time. During the period and within the space, rules are promulgated, which can affect interaction. In the context of this study, system interaction is the relationship between two systems or agents. This involves sharing of data in order to meet a common objective. Within the Angolan government, there are two Ministries directly involved with the physical addresses. Therefore, there should be an interaction between the systems in both Ministries. This could facilitate the validation of the physical addresses in order to reduce the incorrectness and inconsistencies of the physical addresses in the database and individuals ID.

However, there was no interaction between the systems of both Ministries. As a result, the physical address database within both Ministries was different in terms of the information stored in the database. Some physical addresses in the Ministry of Homeland's database were unknown illegitimate and incorrect. Due to the lack of interaction between both systems, the Ministry of Homeland captured any physical address that the citizen provides for ID application. Mainly because there was no easy way that the Ministry of Homeland could validate the physical addresses that were captured in the database.

The Ministry of Homeland had a manual way of validating the physical addresses provided by the citizen during the application for ID. This was done by comparing the physical address from the citizen, with the database containing a list of existing physical addresses from the Ministry of Territorial planning. However, since the communication was poor and the systems did not interact in real time, the database of the Ministry of Homeland was constantly outdated. Also, some employees (system operators) didn't bother checking if the physical address they are receiving is legitimate or not. As a result, the database contains redundant, duplicated records, which were often considered illegitimate and incorrect.

5.4.7 System verification

In the context of this study, system verification results from system interaction. System verification is the act of comparing elements of a system to determine its authenticity. For example, after the interaction between both systems, the system automatically verifies if the physical address that is captured by the Ministry of Homeland is legitimate or not. If yes, then the ID application process proceeds. If it is not legitimate, the system terminates.

The verification serves to ensure that only physical addresses are confirmed legitimate by the Ministry of Territorial Planning database can be used to process applications. This ensures

that only the correct physical addresses are printed on individuals ID. As a result, the inconsistencies and incorrectness of physical addresses within the database and on individual's ID can be reduced. This benefits the government in service delivery and the citizens in receiving quality services.

However, the current system in the Ministry of Homeland is not programmed to perform verification of physical address through the interaction between two systems. The verification process only happens at the last stage of the ID issuance process. This is after the system operator has already captured all the information into the database including the physical addresses. The current verification process, however, doesn't stop the system operators from capturing wrong physical addresses. As a result, even though there is a verification process, the system still contains many inconsistencies and incorrect physical addresses.

In summary, the duality of structure from the perspective of structuration theory structure is both medium and outcome of reproduction of practices. Signification enables both government and citizens to interact with each other, to create shared meaning through which applications are submitted, and ID is issued. Domination is not targetable (Giddens, 1984), it refers to the exercise of power by using various means to enforce rules (capacity to persuade) in the reproduction of ID. Legitimately norms were created and maintained in the application of rules and available resources to reproduce ID. Social systems have patterns of social relationships that change over a period of time, so are the requirements for obtaining ID in Angola. The change is enacted by the interaction of social relations, which is guided and determined by rules and resources. The agents use the rules and available resource in their interactions, thereby employ modalities, and present themselves in the forms of the facility, which are sanctioned within the environment.

5.5 INTERPRETATION OF THE FINDINGS

The findings that were discussed above were interpreted to make more sense of the factors towards the development of an information system framework that can be used to address the challenges that the duplications and inaccuracy of physical addresses pose to the ID system at the Republic of Angola. From the interpretation, four main components were identified for an ID system: agency, system interactivism, Structural property, and databases, as shown in Figure 5.3. Based on the components, a framework (Figure 5.4) was developed. As shown in the framework, the components are influenced by other factors, in their interrelationship, interconnectivity, and interactive. As shown in the framework, some of the influencing factors include validation, authentication, security, compliance, rules and real-time. Thus, the framework is aimed towards achieving the government's objective, to improve the quality of the process and requirements of issuing ID.

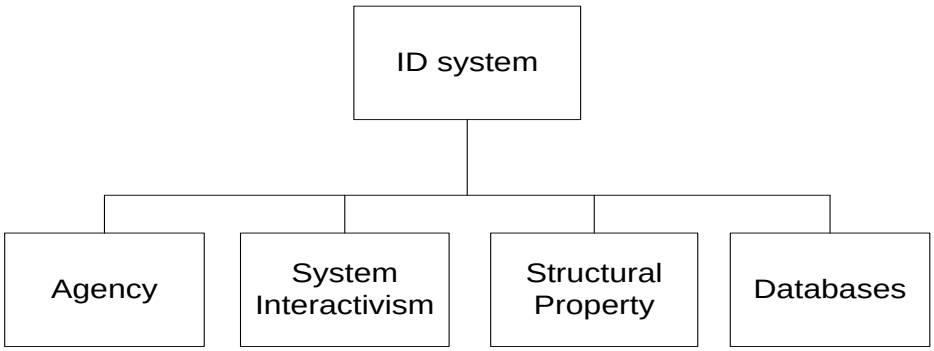

Figure 5. 3 Four main components for an ID system

The framework is discussed from the perspectives of the four components. This helps to explain how other factors influence their interactions and relationship as they reproduce activities over a period of time. The discussion was conducted in order to gain a better understanding of the framework.

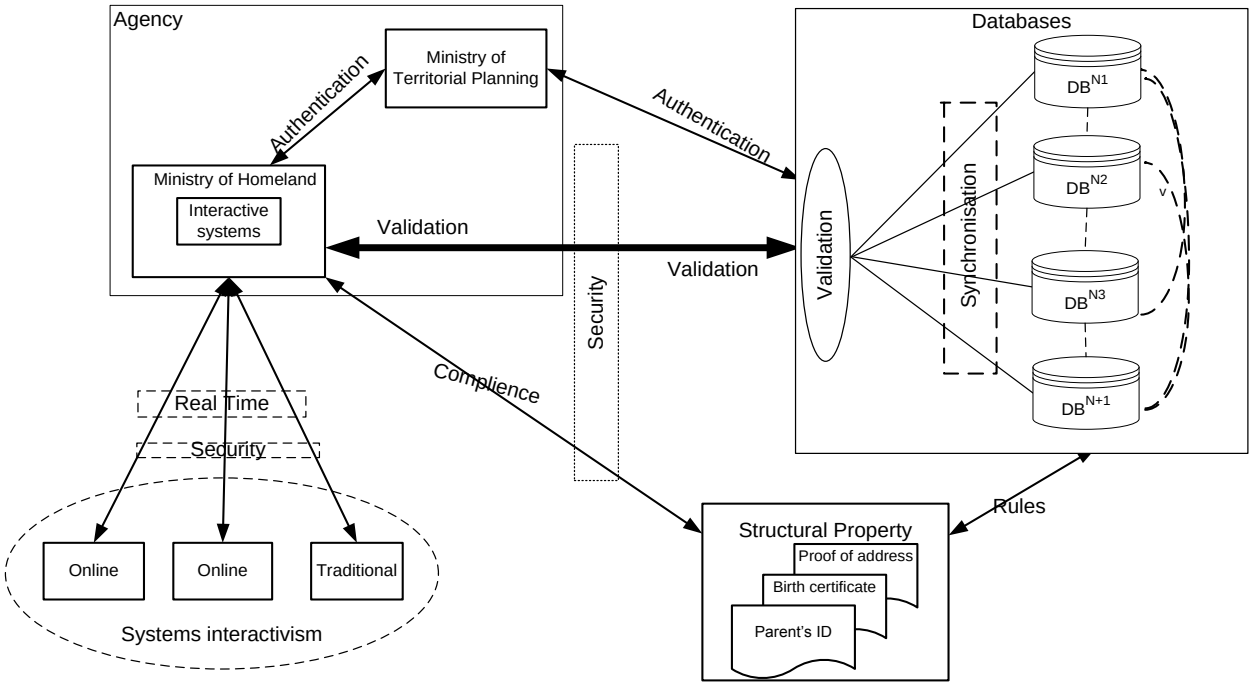

Figure 5. 4 Information system framework for identity document issuance.

Agency

In structuration theory, agency refers to a social structure or organisation that is constituted of agents (technical and non-technical) who carry out activities in a conscious and unconscious way (Giddens, 1984). In this study, the government Ministries are classified as agencies. The agencies act on behalf of the government. The Ministry of Homeland acts on behalf of the government to provide ID to citizens. The Ministry of Territorial Planning acts on behalf of the government in the urbanization of the country. As mentioned many times in this chapter, it

was prescribed by the government that the physical address should be printed on individuals' ID. Therefore, in order to have authenticity in the information stored on the databases, which are printed on citizen's ID, there should be an interaction between both the Ministry of Homeland and the Ministry of Territorial Planning. This means that on one hand, both Ministries support and enable each other towards achieving the government goal in issuing an ID to the citizens. On another hand, inaccurate or incorrect information from one Ministry can constrain the other agency in the process of issuing ID to citizens.

The interaction between the agencies can be done through automated systems, to enable and ensure accuracy and reliability. Through automation of the interaction, the information exchange between the agencies can be authenticated, for verification and validation. Thus, the systems in both Ministries should be an interactive system to allow the validation of physical addresses provided by the citizen against the Ministry of territorial planning's database. This is to guarantee that the Ministry of Homeland only captures and prints on individual's ID, the legitimate physical addresses. Thus, avoiding duplication and incorrectness in the database, which leads to compliance with the government's regulations.

Systems interactivism

System interactivism refers to the modality such as real-time, online and traditional mode through which information flow between agencies. Real-time interaction is the ability of a system to send and access information instantaneously without delays in the communication (Carlucci, De Cicco & Mascolo, 2018). Therefore, it is critical to have real-time interaction to avoid duplication and redundancy. Through the real-time interaction, validation of information can be performed right from the moment that information is being captured from both online and traditional systems.

The system should be designed in a flexible way to allow both online and traditional application from anywhere inside and outside the country. The online application involves electronic application forms, payment, and submission of required documents. The traditional method of submitting application involves physical presence and direct communication between the citizen and systems operators at the Ministry of Homeland. Whereby the ID application, payments, and documentation are submitted in hard copies by the citizens (applicants). For both online and traditional application, the validation of the information should be carried out from the moment the information is captured in the system.

Even though real-time interaction is important to the system, the security is also as vital. Hence, the real-time activities and transactions must be well secured. Including online and traditional systems. This is to avoid unauthorized access to personal information and other

attacks such as identity theft. The security also makes it possible for an authentic transaction to happen.

Structural Property

Structural property is established practices and structures (rules and resources) of a social system or organisation (Giddens, 1984). The three main structural properties in the Ministry of Homeland in the issuing of ID are proof of address, birth certificate, and parents ID for the first time applicants. The birth certificate and parents ID were established by the government to authenticate the information captured in the database such as Name, date of birth, nationality, and guardianship. However, the Proof of address is also as vital in order to authenticate the physical addresses captured in the databases and printed on the IDs. This is to avoid duplications, inconsistencies, and incorrectness of physical addresses in the database.

It is important that the structural properties within the Ministry of Homeland comply with the government's rules and regulations, to ensure unification and authenticity of information. Mainly because it is the rules from the structural properties that enable and support the content and structure of the database. This helps in the validation process, in terms of verifying whether the information captured is authentic or not. As a result, the system will not capture illegitimate and incorrect information into the database.

Databases

The Ministry of Homeland and the Ministry of Territorial planning deal directly with physical addresses. The Territorial planning creates the Physical addresses, and the Ministry of Homeland capture and stores the information which they print on individual's ID. The authenticity of the information makes it easier and accurate to track and locate citizens who have obtained ID. Therefore, the Ministry of Homeland needs interactive access to the Ministry of Territorial planning database in order to validate the physical addresses that are captured in both online and traditional systems. This is to avoid capturing illegitimate physical addresses in the database.

The database stores information as they are captured by various actors in the agencies. The access to the Database is through the interaction between the systems of the agencies. The interactive systems that process the ID, get its information from the databases and validate them against the information that is supplied by the applicants. The validated information is restored in the database. Also, the Databases in the Ministry of Homeland can be deployed in different regions within the country. However, those databases will continuously be synchronized to avoid duplication and replication. In order to ensure authentication, the

databases need to be validated against each other, on a real-time basis. However, with all the open access and interaction, the security of the system can be compromised. Therefore, security measures should be put in place in order to mitigate against intruders and manipulation of information in the databases.

5.6 CONCLUSION

This chapter presents the analysis of the data by following the Hermeneutic approach, which was guided by the duality of structure from structuration theory perspective. The overview of structuration theory and the duality of structure was presented as it relates to this study. From the analysis, seven factors were found to be the constraining and enabling factors of the efficiency and deficiencies in the issuing of ID in Angola. The factors were discussed and interpreted towards the development of an information system framework that can be used to address the challenges that the duplications and inaccuracy of physical addresses in the ID system pose to the Angolan government and its people. The next Chapter (6), presents the conclusion and recommendation of the study.

CHAPTER 6

CONCLUSION AND RECOMMENDATION

6.1 INTRODUCTION

This chapter concludes the study and provides the recommendations of the study. The chapter is divided into six sections. The first section introduces the chapter. The second section presents a summary of the study where a brief of each chapter is provided in a conclusive manner. The evaluation of the study is presented in the third section, to demonstrate how the research questions were answered in achieving the objectives of the study. The contribution and benefits of the study are discussed in the fourth section, followed by the recommendations of the study. Lastly, further research is suggested and the conclusion of the chapter is drawn.

6.2 SUMMARY OF THE STUDY

The study has been structured into six chapters, due to the distinct focuses of the chapters. A summary of each chapter is presented in concluding the study, as follows:

Chapter1

This chapter provides an introduction and background to the study. The chapter is divided into 10 main sections. Section 1 introduces the use of ICT for government service delivery and how an accurate physical address infrastructure can contribute to an effective management and service delivery to the country. In section 2, the research problem was presented from which the aim and objectives of the research derived (Section3). Based on the aim and objectives of the study section 4 presents the literature review in the following areas: Information technology, Information systems, government improvisation of service delivery, database management, and structuration theory. The following section (section 5) presents a brief of the research methodology that was followed in the study. Section 6 explains how and why this study is considered significant. Section 7 presents a summary of the ethical considerations, followed by section 8 which is the delineation of the research. Section 9 presents the structure of the thesis which is followed by a brief conclusion of the chapter (section 10).

Chapter 2

This chapter presents the review of literature in six key areas of the study namely; information communication technology (ICT), government services, Validation of attributes within a system, structuration theory, and information system and structuration theory. The literature review was conducted from various sources including books, peer-reviewed journal, and

conference articles. After conducting the literature review in all the key areas of study, a conclusion of the chapter was drawn.

Chapter 3

This chapter presents the practical application of the methodology selected for the study and the rationale for the selection. The chapter was written to demonstrate step by step how the aim of the study was achieved. The chapter is divided into 8 main sections. In section 1, the philosophical assumptions were discussed and the rationale for the philosophical stances of the research was presented. In section 2 the research approach that was followed is discussed and justified. Section 3 presents the research methods and rationale behind using the qualitative methods. The research design is discussed in section 4 where the case study is discussed and the rationale is presented. In section 5, the data collection process is presented including the challenges and solutions during the data collection. Section 6 presents a brief of the data analysis process which is discussed in more details in chapter5. Section 7 highlights the ethical considerations that were applied in this study. Lastly, a conclusion of the chapter is drawn.

Chapter 4

This chapter presents an overview of the case (Ministry of homeland) where the data was collected. This involves the organisational structure and a brief of each department. The overview of the case is presented with a specific focus on the national directorate of civil and criminal identification file. This was because this is the department that deals directly with IDs. Thus, the fieldwork was conducted within this department. The chapter is divided into 3 main section namely: (1) Fieldwork; (2) Organisation: Ministry of Homeland; and (3) Conclusion.

Chapter 5

This chapter presents the data analysis and the results of the study. The chapter consists of 5 main sections. In the first section, an overview of the data analysis is presented, including an overview of the Structuration Theory. In the second section, the main tenants of Structuration theory were discussed in the context of the study. The data analysis through the duality of structure was also presented in the second section. In the third section, the results from the data analysis were presented and discussed. The fourth section presents the interpretation of the findings towards the development of the framework. The framework is presented and explained also in the fourth section. Lastly, the chapter was concluded.

Chapter 6

This chapter presents the conclusion of the study and recommendations. The chapter is broken down into seven main sections: (1) summary of the study; (2) evaluation of the study;

(3) Contribution of the research; (4) Benefits of the study; (5) Recommendation; (6) Further research; and (7) Conclusion of the chapter.

6.3 EVALUATION OF THE STUDY

The aim of the study was to develop an information system framework, which can be used to address the challenges that the duplications and inaccuracy of physical addresses pose to the ID system at the Republic of Angola. From the aim of the study, the two objectives were articulated as presented in Chapter 1:

I. To identify and examine the factors of deficiencies in the current system, whereby wrong, duplicate, inaccurate or inconsistent physical addresses are printed on identity documents of individuals.
II. Examine both technical and non-technical factors that can improve the current system.

Based on the aim of the research, the research questions were:

How can an information system framework be developed to address the challenges that the duplications and inaccuracy of physical addresses pose to the ID system at the Republic of Angola?

In achieving the objectives of the study, questions (sub-questions) were formulated, which were:

i. What are the factors of deficiencies in the current system, which allows incorrect, duplicate, inaccurate or inconsistent physical addresses of individuals to be printed on individuals identity documents?
ii. What are the technical and non-technical factors that can improve the current system?

Based on the aim of the study, the semi-structured interview was used as a data collection technique. The technique was used due to its flexibility as it allows an in-depth investigation of the phenomenon being studied through continuous probing for clarifications whenever it is necessary. The interview guidelines were formulated based on the research questions. The data collected was then analysed and findings were derived from the analysis. The findings were interpreted towards achieving the aim of the study. Below is a summary of how the objectives were met from the analysis and how the research questions were answered.

Research objective # one: To identify and examine the factors of deficiencies in the current system, whereby wrong, duplicate, inaccurate or inconsistent physical addresses are printed on identity documents of individuals.

Research question: What are the factors of deficiencies in the current system, which allows incorrect, duplicate, inaccurate or inconsistent physical addresses of individuals to be printed on individuals identity documents?

In order to answer this research question, the data collected was analysed through the lens of the duality of structure as detailed in Chapter5. Therefore, this study presents empirical evidence of what are the factors of deficiencies in the current system, which allows incorrect, duplicate, inaccurate or inconsistent physical addresses of individuals to be printed on individuals identity documents. The factors were identified to be both technical and non-technical namely: (1) Validation of requirements; (2) Automated regulation; (3) Effect of urbanization; (4) Authenticity of proof of address; (5) Human interaction; (6) System interaction; (7) System verification.

Within the Ministry of Homeland, the requirement for ID application was often verbally communicated from the management to the system operators. As a result, the requirements were subject to subjective interpretations. This led to inconsistencies when validating the requirements against the ID application. Also, the information system in the Ministry of Homeland was not programmed to enforce compliance with the government's regulations. This facilitated both citizens and government officials (system operators) to act contrary to the regulations. As a result, citizens could easily provide the wrong physical address which the system operators could easily capture and store the information into the database.

From the empirical evidence, it was also found that one of the factors that influence the incorrectness of physical address was the lack of urbanization in the country. A large part of the country was not yet urbanized. This means that many citizens did not have a physical address. However, due to the need for identification, citizens created their own physical addresses in order to get an ID. Since there was no authenticity of proof of address there was no way the system operator could confirm whether the physical addresses the citizen provided were correct or even legitimate.

There was also, no interaction between the Ministry of Homeland and the Ministry of territorial planning which deals with the urbanization of the country. The lack of interaction was from both human and technological aspect. Due to the lack of interaction, it was difficult to maintain the databases in the Ministry of homeland up-to-date. Also, there was no easy way to verify

whether the physical address received from the citizen were legitimate or it was falsified by the citizen.

Research objective # two: Examine both technical and non-technical factors that can improve the current system.
Research question: What are the technical and non-technical factors that can improve the current system?

From the data analysis conducted in chapter 5, the technical and non-technical factors that can improve the system were identified. This was done through the lens of the duality of structure. The factors are demonstrated in Figure 5.2 namely: (1) Validation of requirements; (2) Automated regulation; (3) Effect of urbanization; (4) Authenticity of proof of address; (5) Human interaction; (6) System interaction; (7) System verification.

From the data analysis, it was found that the requirement should be documented and the ID application should be automatically validated against the requirements. This is to avoid the subjective interpretation of requirements from the government officials. Also, by performing automated regulation, the government officials will be forced to comply with the regulations. These regulations include the fact that every physical address stored and printed on individuals ID should be the correct one. Therefore, as explained in chapter 5, automated regulation can help in reducing the incorrectness and inconsistencies of physical addresses stored in the database.

It was also found that the urbanization of the country can reduce significantly the incorrectness of physical addresses within the government database. Mainly because, this can eliminate the citizen's need to create a fake physical address, given the fact that all the citizens will have a complete physical address. This will also give the government the right to ask for proof of address as a requirement for ID application. As a result, the risk to capture wrong physical addresses on the database can be mitigated. This can lead to the authenticity of proof of address. Thus minimising the inconsistency, incorrectness, and redundancy within the government's database.

Other factors that can improve the current system are the system interaction and system verification. Mainly because, within the Angolan government, there are two ministries that deal directly with physical addresses. One creates them (Ministry of Territorial Planning) and the other (Ministry of homeland) capture the physical addresses within the governmental database for ID issuance purposes. Therefore, both systems should interact to ensure the authenticity of the physical addresses. Through the interaction, the verification should take place, in terms

of comparing the information captured by the government official (system operator) in the Ministry of Homeland with the information within the Ministry of Territorial Planning database. This is to validate the information in order to reduce illegitimate and incorrect information being captured in the database and printed on individuals ID.

Human interaction is also as vital due to the fact there is a need for constant interaction in order to achieve a common objective. As detailed in chapter 5, the interaction should happen at the directory level of both Ministries. This is to ensure, better management of the physical addresses, validation of requirements and urbanization.

6.4 CONTRIBUTION OF THE RESEARCH

There are contributions from three main perspectives, the theoretical, methodological and practical from this study:

Theoretical contribution

Theoretically, this study contributes to existing literature from three viewpoints: (1) IS research; (2) structuration theory; and (3) Angolan government. Furthermore, previous to this research, these factors of the deficiencies within the current system, and the technical and non-technical factors that can improve the system were unknown. Thus, the study brings a theoretical contribution in providing empirical evidence of the factors of deficiency in the current system at the Ministry of Homeland. As well as the technical and non-technical factors that can improve the current system.

Methodological Contribution

The application of the duality of structure from the structuration theory perspective as a lens was a methodological contribution. In that, the researcher was able to identify the factors of deficiencies within the current system and the technical and non-technical factors that can improve the system. Even though the duality of structure has been applied in many information systems studies, the theory is a contribution of this study. Mainly because the theory has not yet been applied within the context of this study. Thus, the application of theory within the context of this study helps to bring clarifications on how the interaction between technical and non-technical factors from different social structures happen. And how can both technical and non-technical factors be identified and used to improve government service delivery within the Angolan context and other developing countries facing the same issues.

Practical contribution

The aim of this study was to develop an information system framework, which can be used to address the challenges that the duplications and inaccuracy of physical addresses pose to the

ID system at the Republic of Angola. Therefore, after extracting the findings from the data analysis, the findings were further interpreted towards the development of the framework. Thus, the practical contribution of this study is the information system framework that was developed from empirical evidence. The framework clearly demonstrates the four main components that should be considered for an ID system within the Angolan context. Thus, the framework provides a guide as to how an information system can be developed to address the challenges that the duplications and inaccuracy of physical addresses pose to the ID system at the Republic of Angola. This is so that inconsistencies and incorrectness of physical addresses within the Angolan government's databases be minimized.

6.5 BENEFITS OF THE STUDY

The study is of benefit for both academic and government domains. Within the academic domain, the study contributes to the body of knowledge. Within business, the study benefits the Angolan government its people, and other countries that may face the same challenges.

Body of knowledge

This study is beneficial to the body of knowledge through the addition to existing literature. Mainly because the study provides empirical evidence about the factor of deficiency deficiencies within the ID system in the Angolan government and the technical and non-technical factors that can improve the system. Also, how does validation plays a role in eliminating incorrectness and inconsistencies within the database and how can it be applied. Thus, the study adds to existing literature from the perspectives of the following subject areas: (1) Validation of attributes within a system; (2) Database management; and (3) Structuration theory. This study also adds specifically to the literature within the Angolan context as there is very little scientific research conducted about Angola and in Angola.

Government

From the service delivery perspective, the study can be of benefit to the Angolan government. Through the application of the framework, the study will assist the Angolan government in applying system validation to deal with the inconsistencies, duplications, and incorrectness of physical addresses within the database. Thus, the tracking and location of citizens can be improved so that both citizen's and government's activities can be well managed. This leads to better and more coordinated service delivery as well as improving the security of the country in terms of dealing with fraudulent activities. The study will also be of benefit to the government of other developing countries with similar issues.

6.6 RECOMMENDATIONS

As explained in Chapter 1, background and research problem sections, there are numerous problems with the ID system. The challenges triggered this study. Thus, the Angolan government should consider the implementation of the framework (Figure 5.3) towards improving the current system through which national ID are issued to the citizens. To successfully and meaningfully implement the framework, outcome from this study, there are five recommendations: (1) formulation of policy that can be used to enforce the implementation of the framework; (2) urbanisation of cities, towns and villages in the country; (3) train employees and other relevant agents on the need and usefulness of the framework; (4) a log system is needed, to trace, monitor and document systems user's activities; and (5) continuous review of the system and framework, to promote quality which manifests from maturity of the system.

Implementation policy

It is recommended that, before the implementation of the framework, the government develops an implementation policy document. The document should consist of the implementation plan, strategies, rules and regulations that can govern the implementation of the framework. This should be done taking into consideration the context in which the framework will be implemented from both technical (technologies) and non-technical (people, processes, and procedures) perspective.

Urbanization

It is therefore recommended that before the implementation of the framework, the government should invest more in the urbanization of the country. Mainly because the practical application of the framework provides an information system that can perform a very rigorous validation of physical address. This is to avoid incorrectness and inconsistencies within the databases, to improve the tacking tracing and management of citizen's activities for service delivery. Therefore, if the framework is applied within the current urbanization level of the country, it can constraint many citizens from having an ID. This could bring serious consequences to the country, for both the government and citizen. Therefore, before applying this framework the Angolan government needs to overcome the challenge of urbanization as explained in Chapter 5.

Training

After the application of the framework, it is recommended that the government provide training to government officials to be able to use, monitor and maintain the information system. The government should also, create means for direct communication about government's objectives with regards to the importance of the physical addresses on the ID. Citizens should

also be educated about the significance and implications of the new system and what roles they will play in it. This is to bring awareness so that both government and citizen's work together towards achieving a common objective for the development of the country.

Log system

It is also recommended that a log system be implemented to enable easy documentation of the processes and activities of the system. This is to enhance the control and monitoring of the system and the user's activities. The log system can be used to document information such as, when the system operator logged in and out did, what activities were performed while logged into the system, and what changes were made into the system or devices.

Continuous review

After the implementation of the framework, the system should be continually reviewed. This can be done periodically depending on the need of the organisation. The continuous review of the system and the framework, is recommended in order to assess the functionalities, compliance, and use of the system. This is to promote the quality and the maturity of the system through continues improvement.

6.7 FURTHER RESEARCH

The result of this study was an information system framework that can be used to address the challenges that the duplications and inaccuracy of physical addresses in the ID system poses to the Angolan government and its people. The framework presents the high-level design of the information system. Therefore, for further studies, it is recommended that an in-depth examination of the IT environment within both ministries (Ministry of Homeland and Ministry of Territorial Planning) be conducted. This is to be able to contextualize the framework in order to produce detail design of an information system that will fit within the environment in both Ministries.

This topic has been comprehensively studied. However, due to the criticality of the topic, it is recommended that the data collected should be analysed with a different lens. This includes the use of different social theory such as ANT and activity theory.

6.8 CONCLUSION

This chapter provides a high-level summary of the study and the recommendations. The aim of the study was to develop an information system framework to address the challenges that the duplications and inaccuracy of physical addresses pose to the ID system at the Republic of Angola. In achieving the aim of the study, the objectives of the study were formulated as explained in Chapter1. Based on the objectives of the study, the interview guidelines were

formulated for data collection. The data was collected from the Ministry of Homeland and the community of Luanda through the semi-structured interview technique as detailed in Chapter 3. The hermeneutic technique from the interpretive approach was employed to analyse the data guided by the lens of the duality of structure.

Based on the data analysis seven factors were found to be the factors that constrain and enable the efficiency of the current ID system in Angola namely; (1) Validation of requirements; (2) Automated regulation; (3) Effect of urbanization; (4) Authenticity of proof of address; (5) Human interaction; (6) System interaction; (7) System verification. The factors were diagrammatically represented in Figure 5.2 in order to demonstrate their relationship. These findings were explained in Chapter 5 to provide a clear understanding to the reader. Furthermore, the findings were interpreted towards the achievement of the aim of the study which was the development of an information system framework. From the interpretation of the findings, four components were found to be the main components for an ID system at the Republic of Angola (Figure 5.3). Based on the components namely: Agency, System Interactivism, Structural property, and Databases, the framework (Figure 5.4) was developed and explained in Chapter 5. Therefore, based on the empirical evidences the researcher believes that the implementation of the framework can be used to address the challenges that the duplications and inaccuracy of physical addresses pose to the ID system at the Republic of Angola towards the improvement of service delivery. However, it is suggested that before the implementation of the framework, the Angolan government or any other developing country facing the same issue, take into consideration the recommendations of the study presented in Section 6.6.

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APPENDICES

APPENDIX A: INTERVIEW GUIDELINE

As explained in Chapter 3, three interview guidelines were developed based on the research questions. The questions were directed to three units of analysis which were (1) the non-technical government personnel; (2) the technical government personnel or IT specialists; and (3) the community members. The units of analysis were selected based on the aim of the study which is explained in Chapter 1. This was done in order to get empirical evidence from the perspective of the service providers (IT specialists), system operators (non-technical personnel) and service receivers (community members).

Interview guideline 1#: for non-technical personnel

1.1 What do you think of the idea of printing addresses on individuals' ID?
1.2 Why do you think that way?
1.3 Can you please explain the entire process to me?
1.4 What do you think of the process? And why do you think that way?
1.5 What are some of the challenges with printing address on ID?
1.6 Why do you think that those challenges exist?
1.7 How were some of those challenges addressed/resolved?
1.8 In your view, do you think that things should be done differently?
1.8.1 Why do you think so?
1.9 What do you think of the system that is used to capture, store and print the address?
1.10 Why do you think so Do you have a documented standard that you use as a guide to capture the data? If yes, why? And if no, why not?
1.4.1.1 What are some of the challenges that you faced while applying it?
1.4.2 How are those challenges addressed?

Interview guideline 2#: for IT personnel

2.1 From a technology perspective, can you please describe the process of printing address on ID?
2.2 What do you think of the process?
2.3 Why do you think that way?
2.4 In your view, how would you describe the system that is used to capture the addresses?
2.5 What are some of the challenges that you have encountered?
2.6 Why do you think that you encounter those challenges?
2.7
2.8 How were the challenges addressed?
2.9 In your view, why were those challenges addressed that way?

2.10 In terms of things that have nothing to do with technology (people and process) what challenges have you encountered?
2.11 Why do you think you have encountered those challenges?
2.12 How were those challenges addressed?
2.13 Why were the challenges addressed that way?
2.14 What do you think was the main cause of the challenges?
2.15 How do you think the challenges should be addressed?
2.16 Why do you think that it should be addressed that way?
2.17 Is there anything that you would like to say or add about the entire process of ID that I did not cover?

Interview guideline # three: for the community members

3.1 What do you think about printing the home address on the ID?
3.2 Why do you think that?
3.3 The address where you currently live, is it the same as the one in your ID?
3.3.1 If No! Why not?
3.3.2 If yes! Why so?
3.4 What are the challenges that you have faced by having different addresses?
3.5 Why do think you faced those challenges?
3.6 How were the challenges addressed?
3.7 What do you think should be the best approach to the challenges?
3.8 Why do you think that is the best approach?
3.9 What is the process of changing the address that is printed on your ID?
3.10 What do you think of the process?
3.11 Why do you think that way?
3.12 What is your suggestion?
3.13 In your view, what can be done to improve it?
3.14 Is there anything that you would like to say or add about the entire process of ID that I did not cover?

APPENDIX B: ETHICAL REQUIREMENTS

Appendix B was created as a fulfillment of the ethical requirements of the Cape Peninsula University of Technology research code of ethics. The appendix consists of; (1) introductory letter from the university and the supervisor; (2) the consent in principle that was obtained from the organization where the data was collected; (3) one of the informed consents signed by the participants before the interview; and (4) the ethical clearance from the faculty research ethics committee.

Introductory letter for the collection of research data

Maria Rosa Gombo Mutudi is registered for the M Tech (IT) degree at CPUT (214136531). The thesis is titled Information system framework for validating physical address against identity document in the Republic of Angola and aims to develop an information system framework, which can be used to validate individual's physical address against identity documents at the Republic of Angola. The supervisor(s) for this research is/are:
Prof Tiko Iyamu- Iyamut@cput.ac.za
In order to meet the requirements of the university's Higher Degrees Committee (HDC), the student must get consent to collect data from organisations which they have identified as potential sources of data. In this case, the student will use Semi-structure interview technique to gather data.
If you agree to this, you are requested to complete the attached form (an electronic version will be made available to you if you so desire) and print it on your organisation's letterhead.
For further clarification on this matter please contact either the supervisor(s) identified above or the Faculty Research Ethics Committee secretary (Ms. V Naidoo) at 021 469 1012 or naidoove@cput.ac.za.

Yours sincerely
Prof Tiko Iyamu
07 June 2018

Consent in principle

Republica de Angola

Ministério da Justiça e dos Direitos Humanos

Direcção Nacional do Arquivo de Identificação e Criminal

Nosso Centro da Gamek

I Paulo Mambulo, in my capacity as Chefe da Reparticao at Direcção Nacional do Arquivo de Identificação e Criminal give consent in principle to allow Maria Rosa Gombo Mutudi, a student at the Cape Peninsula University of Technology, to collect data in this company as part of his/her M Tech (IT) research. The student has explained to me the nature of his/her research and the nature of the data to be collected.

This consent in no way commits any individual staff member to participate in the research, and it is expected that the student will get explicit consent from any participants. I reserve the right to withdraw this permission at some future time.

In addition, the company's name may or may not be used as indicated below. (Tick as appropriate.)

	Thesis	Conference paper	Journal article	Research poster
Yes				
No	X			

Paulo Mambulo

27/06/18

Republica de Angola

Ministério da Justiça e dos Direitos Humanos

I....Sebastião Edgar [illegible]......, in my capacity as....Senior Public officer....at....MJDH......................................give consent in principle to allow Maria Rosa Gombo Mutudi, a student at the Cape Peninsula University of Technology, to collect data in this company as part of his/her M Tech (IT) research. The student has explained to me the nature of his/her research and the nature of the data to be collected.

This consent in no way commits any individual staff member to participate in the research, and it is expected that the student will get explicit consent from any participants. I reserve the right to withdraw this permission at some future time.

In addition, the company's name may or may not be used as indicated below. (Tick as appropriate.)

	Thesis	Conference paper	Journal article	Research poster
Yes				
No	X	X	X	X

4.07.2018

Cape Peninsula
University of Technology

FID/REC/ICv0.1

FACULTY OF INFORMATICS AND DESIGN

Individual Consent for Research Participation

Title of the study: Information system framework for validating physical address against identity document at the Republic of Angola

Name of researcher: Maria Rosa Gombo Mutudi
Contact details: email: mariamutudi@hotmail.com phone: +27630171171

Name of supervisor: Prof Tiko Iyamu
Contact details: email: iyamut@cput.ac.za phone: +27(0) 214603025

Purpose of the Study: The aim of the study is to develop an information system framework, which can be used to validate individuals' physical addresses against identity documents at the Republic of Angola.

Based on the aim, the objectives are as follows:

i. To identify and examine factors of deficiencies in the current system, whereby wrong or inconsistent physical addresses are printed on identity documents of individuals.
ii. Examine both technical and non-technical factors that can improve the current system.

Participation: My participation will consist essentially of interviewee.

Confidentiality: I have received assurance from the researcher that the information I will share will remain strictly confidential unless noted below. I understand that the contents will be used only for M Tech thesis and that my confidentiality will be protected by keeping the data confidential to the researcher and her supervisor. The examiners might also have access to the data for audit purposes.

Anonymity will be protected by using pseudonyms and numbers to identify each participant.

Conservation of data: The data collected will be kept in a secure manner. The researcher will record the data only with the participant's permission. The recorded interviews will be encrypted and kept in a password controlled environment. Access to it will be granted only to the researcher, her supervisor and the examiners for audit purposes

Voluntary Participation: I understand that I am under no obligation to participate and if I choose to participate, I can withdraw from the study at any time and/or refuse to answer any

questions, without suffering any negative consequences. If I choose to withdraw, all data gathered until the time of withdrawal will destroyed

Additional consent: I make the following stipulations (please tick as appropriate):

	In thesis	In research publications	Both	Neither
My image may be used:			X	
My name may be used:			X	
My exact words may be used:			X	
Any other (stipulate):				X

Acceptance: I, Madalena Priseila Dizengo

agree to participate in the above research study conducted by Maria Rosa Gombo Mutudi of the Faculty of Informatics and Design, Information Technology Department at the Cape Peninsula University of Technology, which research is under the supervision of Prof Tiko Iyamu.

If I have any questions about the study, I may contact the researcher or the supervisor. If I have any questions regarding the ethical conduct of this study, I may contact the secretary of the Faculty Research Ethics Committee at 021 469 1012, or email naidoove@cput.ac.za.

Participant's signature: Madalena P. Dizengo Date: 09.07.2018

Researcher's signature:  Date: 09.07.2018

Cape Peninsula
University of Technology

P.O. Box 652 • Cape Town 8000 South Africa •Tel: +27 21 469 1012 • Fax +27 21 469 1002
80 Roeland Street, Vredehoek, Cape Town 8001

Office of the Research Ethics Committee	Faculty of Informatics and Design

The Faculty Research Ethics Committee hereby grants ethical clearance to Ms Maria Mutudi, student number 214136531, for research activities related to the MTech: Information Technology at the Faculty of Informatics and Design.

Title of thesis:	An information systems framework for validating physical addresses against identity documents at the Republic of Angola

Comments

Research activities are restricted to those details in the research proposal.

Signed: Faculty Research Ethics Committee	Date
	13/6/2018

RESEARCH ETHICS COMMITTEE
INFORMATICS AND DESIGN
ETHICS APPROVAL GRANTED
13 JUN 2018
Cape Peninsula
University of Technology